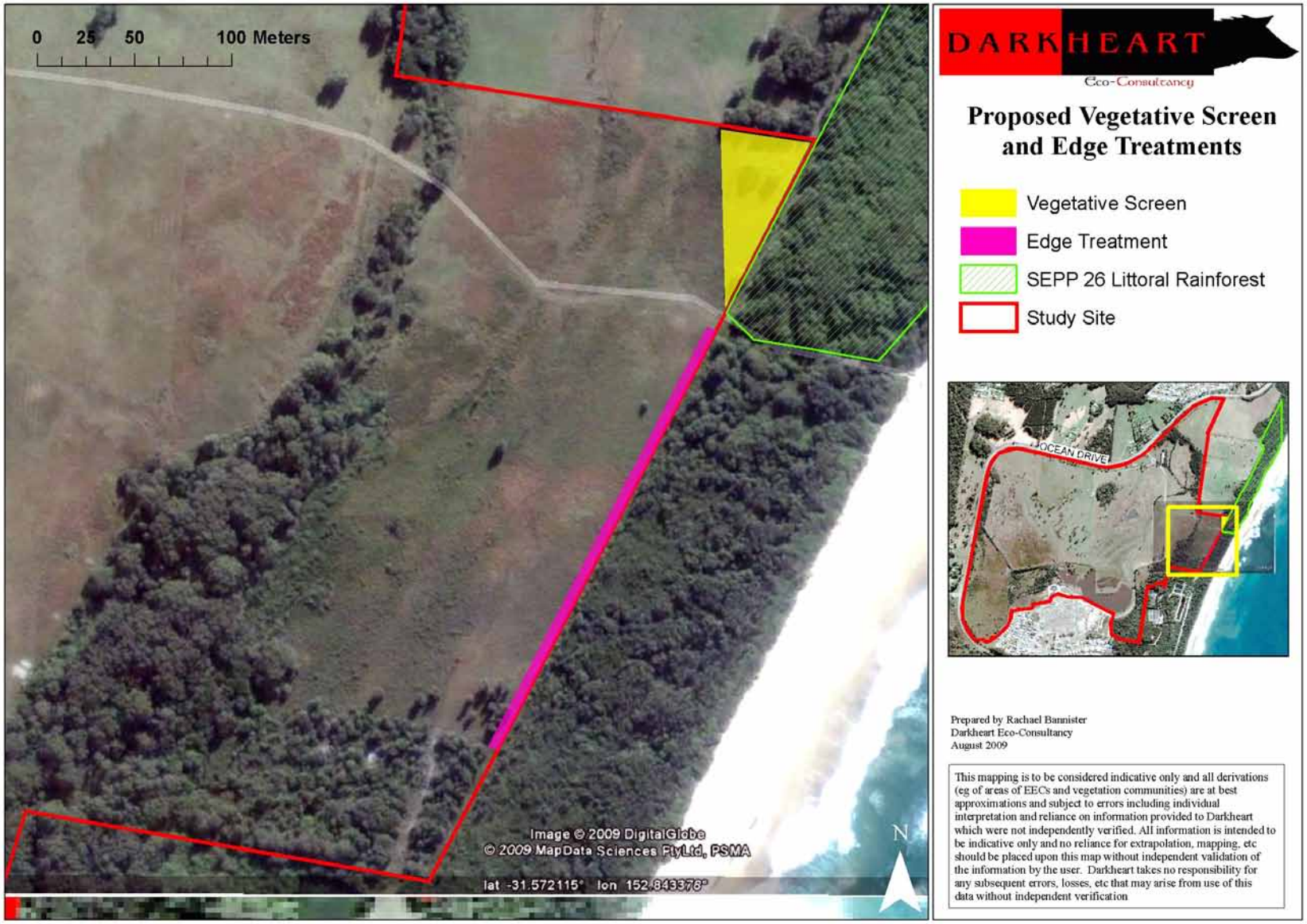
Figure 3: Location of proposed vegetation screen and edge treatments
(base aerial © Google Earth 2009)



3.1.2.2 Structure

It is envisaged that the vegetative screen will be established to structurally and floristically mimic the natural dune succession (Berrigan and Bray 2004). Rainforest species will constitute the core area, extending continuously from the edge of the existing littoral rainforest and intermediate communities (*Banksia* spp woodland underlain by rainforest species), grading to the outermost margins being dominated by typical edge species eg *Banksia serrata, B. integrifolia*, Cheese Tree, *Acacia implexa, Leptospermum liversidgei* (eg see photo 10). The outermost edges will also be heavily planted with suitable shrubs and *Lomandra longifolia* as a disincentive to penetration by the public. This is in line with revegetation works proposed on the adjoining land to the north (King and Campbell 2007).

The proponent's bush regenerator has advised that strategic sequenced planting of first the colonisers/pioneers followed 1-2yrs later by succession species is recommended to maximise establishment success (Sue Regan, Wild Things Native Gardens, pers. comm.). The success of mass planting of all species is limited by season (eg frost may kill many of the post-establishment species, drought in the year of planting may mean significant failures or costly maintenance), and lack of ecological benefits provided by established pioneer plantings ie shade (enhancing weed control, moisture retention, soil temperature, and providing protection from sunburn and frost), leaf litter (enhancing moisture retention, soil microbial activity, etc). Many pioneer species also germinate and proceed through early growth stages significantly faster than succession species, meaning they are available for planting much quicker than many succession species, hence minimising delays in establishment of works before development proceeds on the larger property (Sue Regan, Wild Things Native Gardens, pers. comm.).

3.1.3 Vegetation Management Plan

A formal Vegetation Management Plan (VMP) prepared for the vegetative screen plantings will be prepared prior to works commencing and will contain specific information on the following:

a) **Plant/propagule sources**: It is envisaged that, where possible, all plants used for planting will be sourced via seed collation from the rainforest in the adjacent Crown reserve (subject to permission from the Dept of Lands and DECC licensing). Wild Things Native Gardens is currently undertaking major bush regeneration works on the property, with propagation also being undertaken at an on-site greenhouse and seed storage/sorting facility. Wild Things is capable of generating most tubestock, or subcontracting specialist nurseries to produce tubestock from on-site seedstock (Sue Regan, Director, Wild Things Native Gardens, pers. comm).

b) **Planting Preparation**: Preparation of planting areas will consist of weed removal as required to the specific area. For example, weed removal along the existing edge of the rainforest will have to be strategically staged to minimise exposure to wind and sun from the west, whereas pasture areas can be more comprehensively treated.

c) **Planting Strategy**: The VMP will detail a staged planting strategy for pioneer and succession species over an appropriate time period, with appropriate treatments/maintenance per stage.

d) **Planting Density**: This will be determined by planting strategy stage (eg pioneers vs succession species), location within the vegetated screen, relevant species (eg trees vs groundcover, edge species vs core rainforest), existing vegetation (eg trees within the paddock) and function (eg edge vegetation).

e) **Maintenance Schedule**: This will specify weeding, watering, mulching, seedling protection (eg shields from deer grazing), fertilising (if necessary), etc, measures and maintenance per strategic stage, and replacement plantings over a minimum 5yr maintenance schedule to ensure the plantings establish and weed control/elimination is effective.

3.2 WEED REMOVAL/CONTROL

3.2.1 Site Weed Removal and Control

On-site, the primary weeds are:

- *Lantana*: This only occurs in a localised patch just off the southwest corner of the beach access, falling over the boundary fence onto the site from the infestation within the adjacent Crown reserve.
- *Bitou Bush*: Occurs as scattered plants in the pasture, and under the boundary fence.
- *Winter Senna*: Occurs as a few scattered shrubs along the fence.
- *Morning Glory and Turkey Rhubarb*: Scattered plants on the northwestern edge of the rainforest.
- *Pasture grasses and weeds*: These co-dominate with Bladey Grass and Spiney Headed Matrush over most of the site.

These will be controlled as part of site preparation for planting as specified in the VMP.

3.2.2 Crown Land Weed Removal and Control

The following works are subject to approval of the Department of Lands (as land owner).

3.2.2.1 General Weed Removal

The proponent proposes to extend the current bush regeneration program currently underway on the property to include the section of the adjacent Crown reserve. This area is estimated to be 4.4ha. This area has a light to moderate infestation of the aforementioned weeds (especially Bitou Bush) from the beachfront to the pasture edge. The western edge is generally in very good condition apart from the dense lantana at the southwest corner of the beach access. Bitou Bush is the major weed of concern as it is demonstrably hampering the regeneration of the dune succession vegetation community post-sandmining by preventing development of a sufficient shrub/woodland buffer to the east and exposing regeneration rainforest to maritime stresses (see following photos).

Weed removal will primarily focus on those along the beach access and within the core rainforest area to encourage natural regeneration to fill existing gaps and stabilise edges currently dominated by these weeds, and the Bitou Bush on the foredune. Works will be staged, maintained and monitored to ensure excessive gaps are not created, allow natural regeneration to fill the vacant niches, and minimise intrusion of stresses such as salt-laden winds. With permission of the Dept of Lands, tubestock planting will be undertaken from in situ-derived seedstock to facilitate regeneration and to fill existing gaps to accelerate stabilisation of the succession.

Methods used will be those currently practised and approved by the Department of Environment and Climate Change, Port Macquarie-Hastings Council, and Landcare.

Photo 3: Example of weeds colonising a canopy gap in the rainforest
A senescent Banksia has fallen here, allowing light to the forest floor. Lantana is arising (mid-ground and rear-right). Senna was also found in this gap.

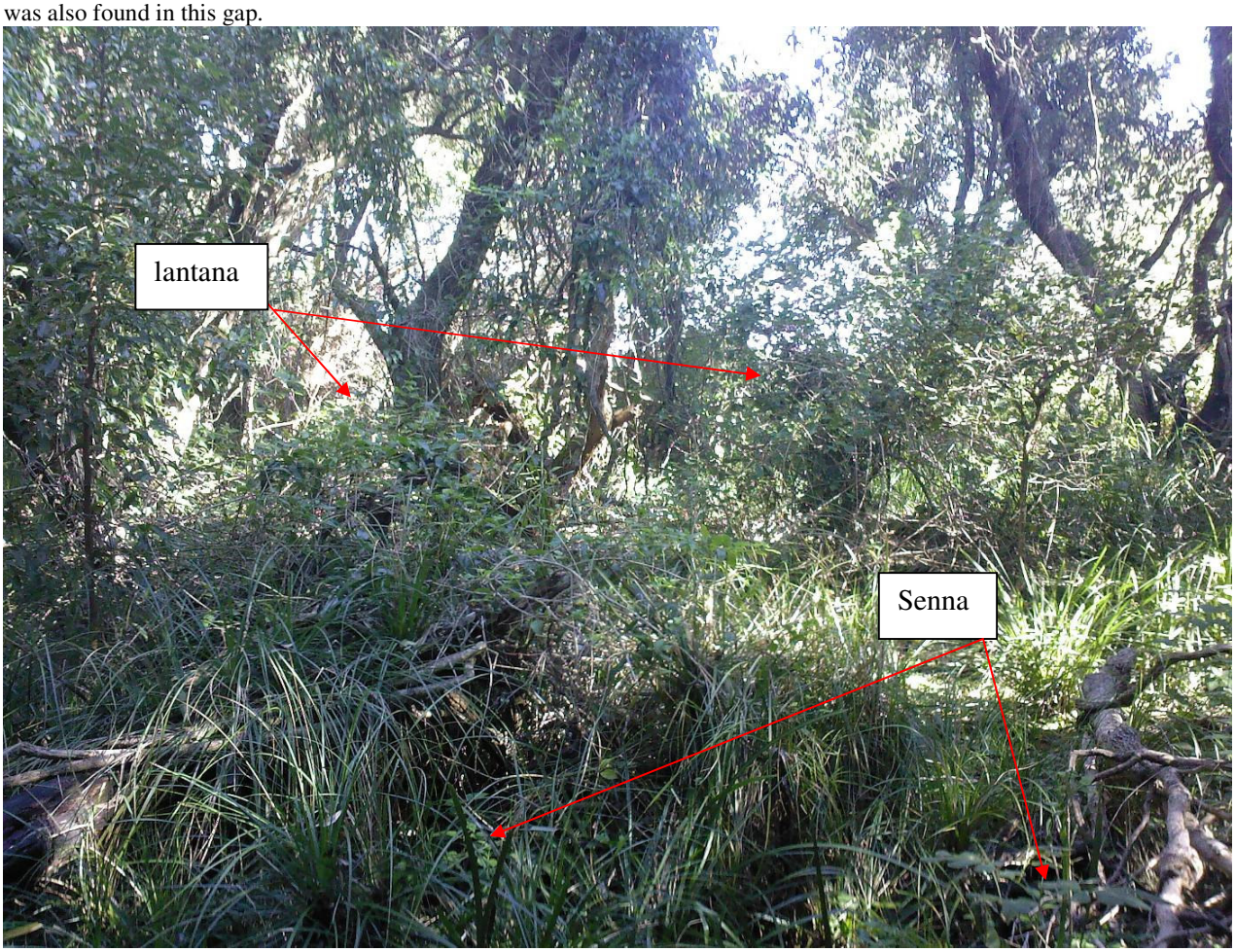


Photo 4: Bitou bush on foredune
Bitou indicated by light green patches.

Photo 5: Bitou bush dominating gaps in the dune vegetation complex
This is one of many gullies in the dune system observed from the site's beach access north to Middle Rock.

Photo 6: Dense Lantana patch at southwest corner of beach access.

Photo 7: Littoral rainforest regeneration hampered by lack of screening vegetation by Bitou
The green vegetation is mostly rainforest species <2m high. The Banksia woodland is senescing but succession is retarded by the high exposure to maritime stresses due to lack of protective vegetation ie recruit Banksias, etc, which would normally precede this community on the foredune and provide a closed structure – not this open woodland structure caused by smothering by Bitou. This may end up as low stunted rainforest scrub due to maritime stresses.

3.2.2.2 Beach Access

As detailed in section 3.4.2, the beach access will be formalised with an all-weather crossing (eg wooden slats with sand) with open paling or post and plain wire type fencing either side to deter wandering off the track.

The edges of this track are currently highly weed infested (see photo 9). These weeds will be removed on a staged basis to minimise impacts from maritime stresses, and will be replaced with native species to provide a suitable structured protective edge of the native vegetation communities.

In addition, Spiney-Headed Matrush is to be densely planted just outside each side of the fence as an active deterrent to users from entering the adjacent native vegetation.

Photo 8: Weeds along current beach access
Lantana dominates the edges, with pasture grasses and weeds along the path.

3.3 SOUTHERN EDGE TREATMENT

This area refers to the area south of the beach access, from the edge of the dune succession on the Crown land to the edge of a proposed cycleway/pathway which will exit the southeast following a cleared overhead powerline easement south to Bonny Hills.

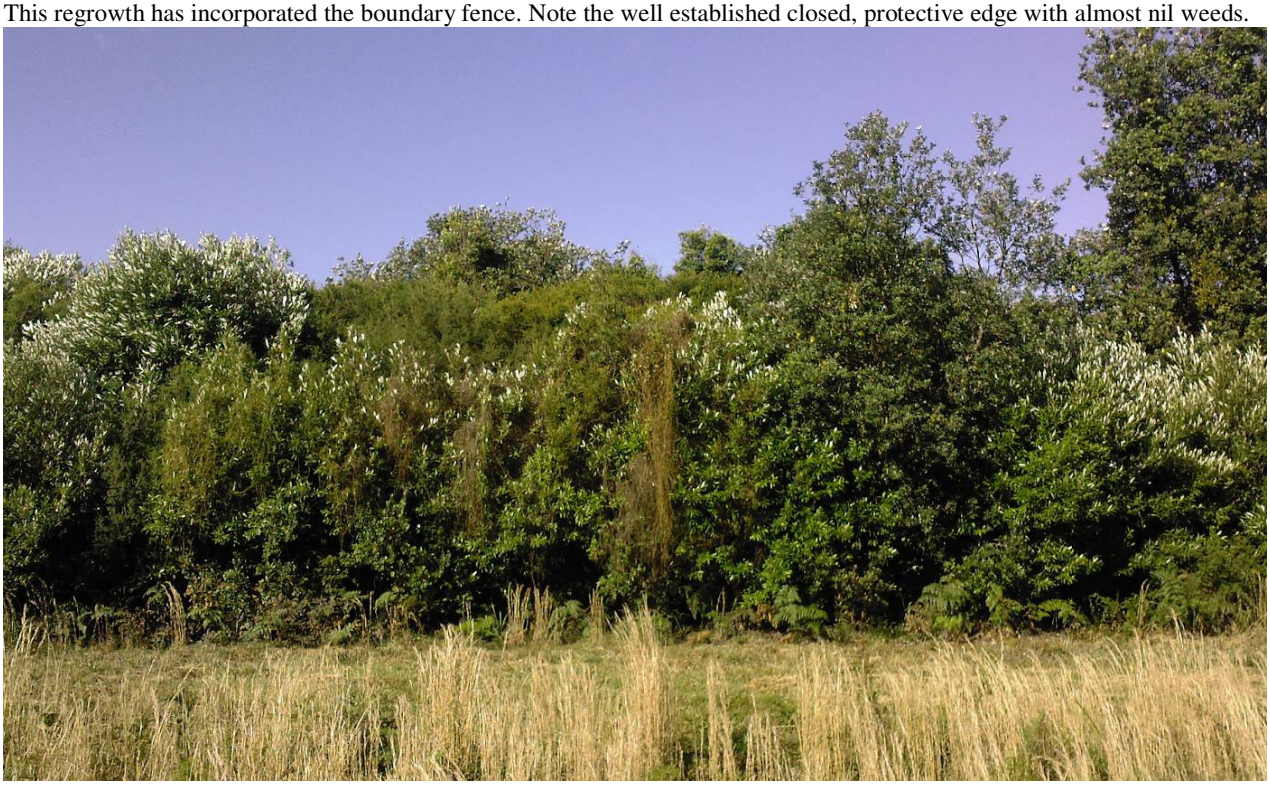
The edge of the forest on the Crown land (subject to the Dept of Land's permission) is to be treated as in section 3.2.1 (ie removal of all weeds), and planted over a width of 5m with suitable edge species such as Cheese Tree, banksias, wattles, etc, to the edge of the pathway. The primary function of these plantings is to protect the adjacent recovering dune succession community from environmental stresses from the west ie setting sun and dry hot westerly winds. The outermost edge of these plantings to the edge of the pathway will mimic a natural ecotone, and is to contain shrubs and Spiney-Headed Matrush to both provide insulation from the western winds and setting sun, and deter the public from entering.

Photo 9: View south along southern edge

Slashed path approximates the location of new edge plantings to a width of 5 metres within the subject land, and adjoin the footpath/cycleway. The existing fence has been incorporated within existing regrowth.

Photo 10: Example of current western edge of southern dune vegetation

This regrowth has incorporated the boundary fence. Note the well established closed, protective edge with almost nil weeds.



3.4 OTHER THREAT MANAGEMENT

Most of the following are not specifically relevant to the subject Part 3A applications, but are recommended for future development applications where relevant.

3.4.1 Artificial Lighting

3.4.1.1 Street Lighting

Street lighting is to be strategically located and/or designed to minimise light spillage on the adjacent native vegetation. This could be facilitated by directional lighting, bollard style lighting, and/or sensor lighting.

Lighting is not recommended to be located at the entrance to or along the beach access.

3.4.1.2 Other Lighting

Lighting within and around the future tourist facility is to minimise light spillage onto native vegetation by innovative use of lighting technology and design, and strategic location.

3.4.1.3 Carpark Screen Plantings

Road and carpark design should take light spillage from headlights and streetlighting into primary consideration in preliminary design stages. For example, access to the area and carparking should direct light from oncoming traffic away from the dune vegetation, and if parking is to be provided along the eastern boundary, it should be arranged parallel not perpendicular to minimise the amount and frequency of light directed into the dune and other remnant vegetation.

To further mitigate this impact, strategic landscaping using native species indigenous to the local area (Duchess Gully to the dune vegetation) such as Banksias and Cheese Trees should be used to filter or block light from traffic entering the site.

3.4.2 Beach Access Formalisation

As mentioned in section 3.2.2.2, the current beach access will be formalised and will provide the only access from the property to the beach. The existing track is at least 2m wide, hence no further clearing is considered required. As noted in section 3.2.2.2, weeds currently dominating the track and its edges will be removed, with the edge rehabilitated.

Clean fill (eg beach sand) will have to be imported or a concrete path constructed to make the access all-weather. The access currently cuts to the foot of the foredune nearly to mean high tide level, and is highly eroded by runoff directed along the track (several such gullies occur along the dune system from Middle Rock to this access – pers. obs.), and/or major storm surges resulting in wave penetration. As shown in the photo below, this access and recent storm surges have led to considerable erosion and further in, it is undermining the root systems of mature banksias, which in turn are major stabilisers of the dune system and protect hind vegetation. In addition to undermining dune stability, this gap and others like it along the dune system pose a threat to the dune vegetation given predicted sea level rises under climate change scenarios. Furthermore, this and other low lying gaps combined with the tunnel like nature of the path provides a funnel for deep penetration of maritime stresses which may impact littoral rainforest, or advantage the colonisation of Bitou (as shown in photo 6).

It thus follows that the appropriate course of action to address these threats is to refill the cutting and restore the previous foredune height. The beach access will then have to be strategically located over the top of this structure, and its structural design formulated to negate the risk of erosion by traffic.

Photo 11: Erosion at eastern end of beach access
The path itself has cut down into the dune and has an active gully. Recent storm surges have resulted in the recent massive damage but illustrates the vulnerability to rising sea levels.

3.4.3 Dogs

Dogs will be allowed to be walked along the footpath and around the tourism area provided they are leashed, as per Council statute. Standard signage will be erected at various points including the beach access detailing the requirement and penalties. Dog owners will also be responsible for removal of faeces.

3.4.4 Bushfire

Standard signage will also ban all fires (eg campfires) apart from portable barbeques in designated areas. Prescription burning is never to be undertaken in the Crown reserve or the vegetated screen.

3.4.5 Litter

Council will provide bins along the pathways, at the beach access and at the tourism facility for depositing of litter. Standard signage will indicate fines for littering.

3.4.6 Public Awareness

Public signage will be erected at strategic points advising the public of the high conservation value of the dune vegetation for ocean surge protection and biodiversity, and directed to use the dedicated access, control pets and remove litter. Such signage should also acknowledge efforts of the proponent, Landcare, Dept of Lands and PMHC in enhancing the value of the vegetation. This will encourage stewardship of the area and vigilance of threats.

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