

Threats to HCV and Recommended Interventions

Within the project area, we recorded 13 invasive alien plant species (IAPS). These consisted mostly of colonizers of disturbed habitats and cultivated plants. African Tulip (*Spathodea campanulata*) and Brazilian Fire Tree (*Schizolobium parahyba*) appeared to be introduced pan-tropically for their ornamental value (Figure 22E & 22C). These species have the tendency to dominate the area where they occur, threatening the natural regeneration processes of native species under their canopy. A few planted trees can initiate the process of invasion due to their profuse fruiting and massive wind dispersal (CABI, 2023). Gradual removal of these trees is highly recommended, particularly when they are close to natural vegetation or waterways.

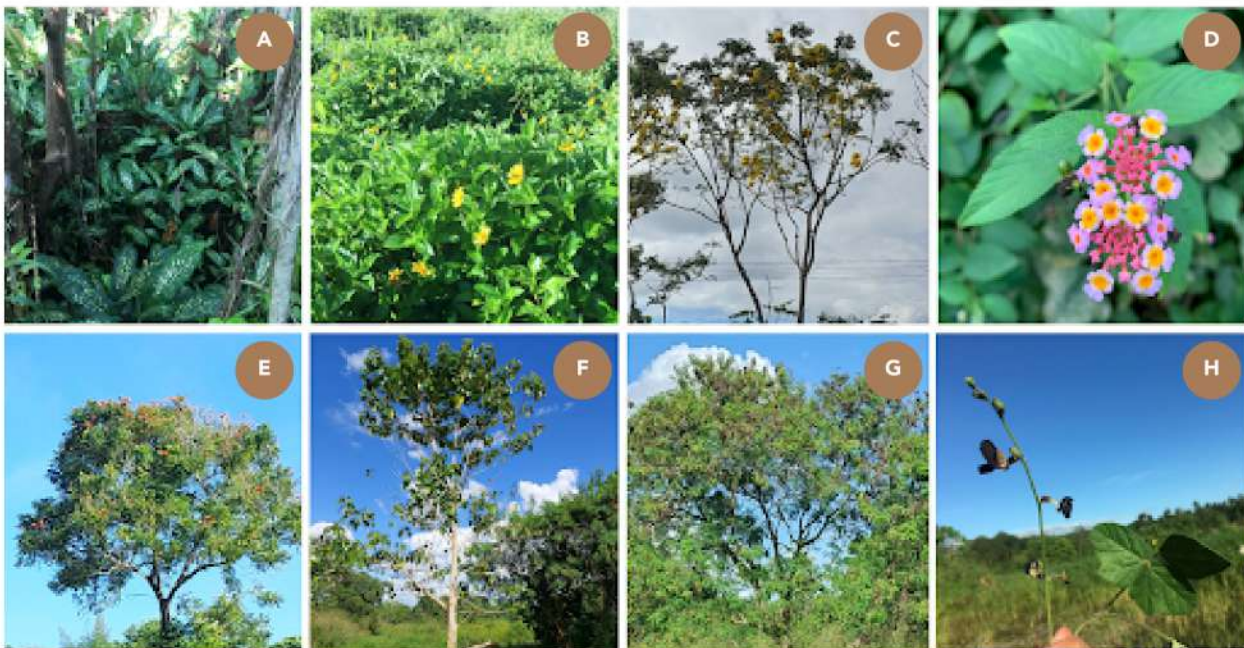


Figure 22. Notable plant species classified as IAPS in Ascenda estate. (A) Dumb cane (*Dieffenbachia seguine*), (B) Trailing daisy (*Sphagneticola trilobata*), (C) Brazilian fire tree (*S. parahyba*), (D) Coronitas (*Lantana camara*), (E) African Tulip (*S. campanulata*), (F) Yemane (*Gmelina arborea*), (G) Ipil-ipil (*Leucaena leucocephala*), and (H) Bala-balatong (*Macroptilium atropurpureum*)

Moreover, Yemane (*Gmelina arborea*) (Figure 22F), Mahogany (*Swietenia macrophylla*), and Panama Rubber (*Castilla elastica*) are fast-growing tree species initially introduced for reforestation or plantation forests. Back then, their invasive potential remained hidden until studies revealed their ability to suppress the growth of other plants under their canopy (Coracero, 2023). After these species were brought to the Philippines, these tree species were freed from particular enemies, such as herbivores or pathogens. This increases their ability to compete with native plants, hence expanding their distribution and abundance. The mode of dispersal is also an added factor to successful biological invasion. Yemane and Panama Rubber yield copious amounts of fertile fruits that are readily dispersed by birds and bats, allowing seedlings to spread far from their parent tree (CABI, 2023). On the other hand, Mahogany produces fruit capsules that burst open, dispersing the winged seeds as the wind blows them. These mechanisms enabled them to escape from plantations and enter wild habitats, replacing native trees and becoming invasive (IUCN, 2013).

Most invasive alien plant species present in the area are also aggressive colonizers of disturbed habitats such as roadsides, forest margins, and clearings. Trees and shrubs like Ipil-ipil, Buyo-buyo (*P. aduncum*), Coronitas (*L. camara*), and Hagonoy (*Chromolaena odorata*) produce a large number of seeds and have rapid growth rates, which offers a competitive advantage, resulting in the production of dense thickets that outcompete native species and reduce biodiversity (CABI, 2023). Coronitas and Hagonoy are also poisonous to animals and host to various pests and diseases. In most open areas, Napier Grass and Bala-balatong (*Macroptilium atropurpureum*) form dense stands and smother native shrubs, grasses, and young trees (CABI, 2023) Both species are well-adapted to drought and can tolerate various conditions.

Aside from frequent colonizers, landscape plants that escaped cultivation are also potential sources of invasive species. Within the estate, Trailing Daisy (*Sphagneticola trilobata*) and Dumbcane (*Dieffenbachia seguine*) were originally planted as ornamental plants but eventually encroached on other areas. Both species can spread vegetatively and are difficult to eradicate. The trailing daisy, which is included in the IUCN's top 100 world's most invasive alien species (Lowe et al. 2000), can rapidly colonize open areas. On the contrary, Dieffenbachia can form a thick understory layer underneath the trees, inhibiting the establishment of natural vegetation. Further introduction of Dieffenbachia also poses a risk to both humans and wildlife due to its poisonous content.

In addition to IAPS, several invasive faunal species were also recorded within the project site. This includes four highly invasive frog species (HerpWatch Pilipinas, Inc. 2020), all of which are listed as Least Concern under the IUCN Red List (Figure 24). One of the four recorded species was the Cane Toad (*Rhinella marina*), which is listed under the top 100 of the world's worst invasive alien species by the IUCN Invasive Species Specialist Group (Lowe et al. 2000). Cane Toads are voracious eaters capable of preying on other native frogs, lizards, and insects. Introduced almost a century ago as a biocontrol agent for sugar cane pests, the absence of natural predators that can withstand their bufotoxin allows Cane Toad populations to grow uncontrollably. The presence of this species signifies high levels of habitat degradation. The introduction of non-native and ornamental plants can also serve as a vector for the spread of invasive frogs such as the Banded Bullfrog (*Kaloula pulchra*) and Common Green Frog (*Hylarana erythraea*) (Figure 23). These plants can harbor the eggs of said IAS and thereby introduce numerous individuals within a given area. Chinese Edible Frogs (*Hoplobatrachus rugulosus*) were introduced in the 1990s likely as a result of frog farming for human consumption or via agricultural plant introduction. The species can be found in aquatic habitats of degraded areas at low elevations.



Figure 23. Amphibian species classified as IAS recorded within Ascenda Estate.
A) Cane Toad (*Rhinella marina*), B) Banded Bullfrog (*Kaloula pulchra*),
C) Chinese Edible Frog (*Hoplobatrachus rugulosus*).

Similar to the aforementioned invasive herpetofauna, the presence of the Oriental House Rat (*Rattus tanezum*) is indicative of anthropogenically disturbed habitats. This species has been recorded to invade agricultural lands that have originally been converted from forested areas (Salibay & Luyon, 2008), and are widely distributed in urban communities in the Philippines (Heaney, et al., 1999). According to Hingston et al. (2005), this invasive rat might be the most disruptive to the natural fauna in the tropics, among all introduced rat species.

The presence of the invasive Eurasian Tree Sparrow or maya (*Passer montanus*) also supports that the area around Ascenda Estate is highly disturbed (**Figure 24**). These birds are highly common in urban areas and are rare or absent in densely vegetated forest areas. As with most IAS, Eurasian Tree Sparrows are capable of rapidly colonizing areas due to their high reproductive rates. This poses a threat to native bird species that can be outcompeted for space and resources.



Figure 24. Invasive Eurasian Tree Sparrow (*P. montanus*) recorded within Ascenda Estate.

Threats to HCV and Recommended Interventions

Recommended intervention: The presence of these IAS is detrimental to biodiversity (HCV 1) given their propensity to outcompete native and endemic species for resources. The continued loss of native species naturally has a negative effect on the quality of surrounding ecosystems (HCV 3). Gradual removal of invasive plants and promoting the establishment of native vegetation through rewilding could help mitigate the impacts of IAS on both biodiversity and ecosystems. Preventing the further introduction of non-native ornamental plants and fostering a natural and wild environment can help an ecosystem remain resilient when faced with IAS. Furthermore, maintaining the integrity of an ecosystem can ensure that native populations of predators capable of limiting IAS populations can thrive (e.g., monitor lizards and cobras are capable of withstanding toxins secreted by Cane Toads).

Potential Threat: Flooding

IUCN category: Climate change and severe weather: Flooding

HCV affected: HCV 1 (Species Diversity) and HCV 3 (Ecosystems and habitat)

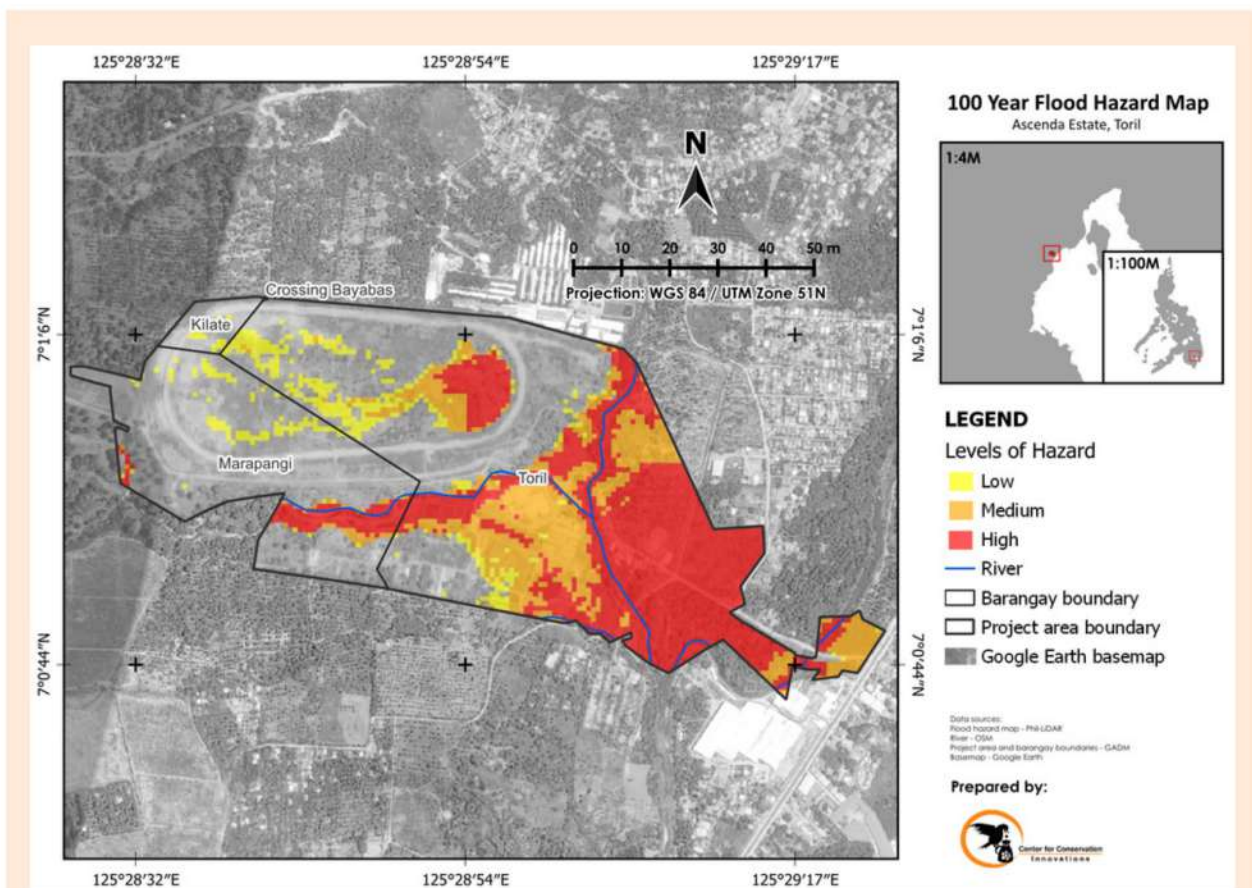


Figure 25. Map showing the potential ecotourism site in Ascenda Estate, Toril, Davao, exhibiting different blocks in the landscape open spaces.

Description of the threat: Flooding is a potential threat identified on the site. Based on the detailed 100 year Flood hazard map from the City of Davao, Davao Del Sur, particularly in barangay Marapangi, where the estate is located, faces a low to high risk of flooding (**Figure 25**). The nearby Lipadas River, prone to overflowing during extreme weather like typhoons, heightens this risk.

Flooding poses a threat to wildlife and habitat. It can inundate and destroy essential areas for animals, displacing or even causing the decline of species that depend on them for food, shelter, and breeding. Furthermore, floodwaters can erode soil and riverbanks, carrying away sediment and nutrients vital for healthy plant growth. This may lead to landscaping challenges and potential damage to infrastructure. Building in a flood-prone area also exposes infrastructure to the risk of flooding, increasing the likelihood of property damage.

Recommended intervention: The estate management has taken proactive steps by incorporating green spaces like parks into their development plan. These green spaces offer multiple benefits, including reducing flood risk by absorbing excess rainwater and slowing runoff, alleviating drainage system pressure, and mitigating floodwaters' impact. It can also improve air quality. Trees act as natural air filters, providing cleaner air and a healthier environment. Furthermore, it also promotes habitat creation. Utilizing native trees in these green spaces fosters a welcoming environment for local wildlife, promoting biodiversity (Waugh, 2022).

To further enhance flood resilience, the estate can consider using permeable pavements to capture and infiltrate stormwater or implement green infrastructure measures near the river, such as green embankments and riverways. These linear green space corridors and green embankments (sloping riverbanks covered in vegetation) can synergistically reduce the risk of flooding by providing space for floodwaters to overflow (riverways) and bind the soil through the presence of extensive root system of vegetation along embankments (ADB, 2022). Green spaces and green infrastructure actively play crucial roles in river management, employing vegetation as a tool for sustainable flood mitigation and environmental protection.

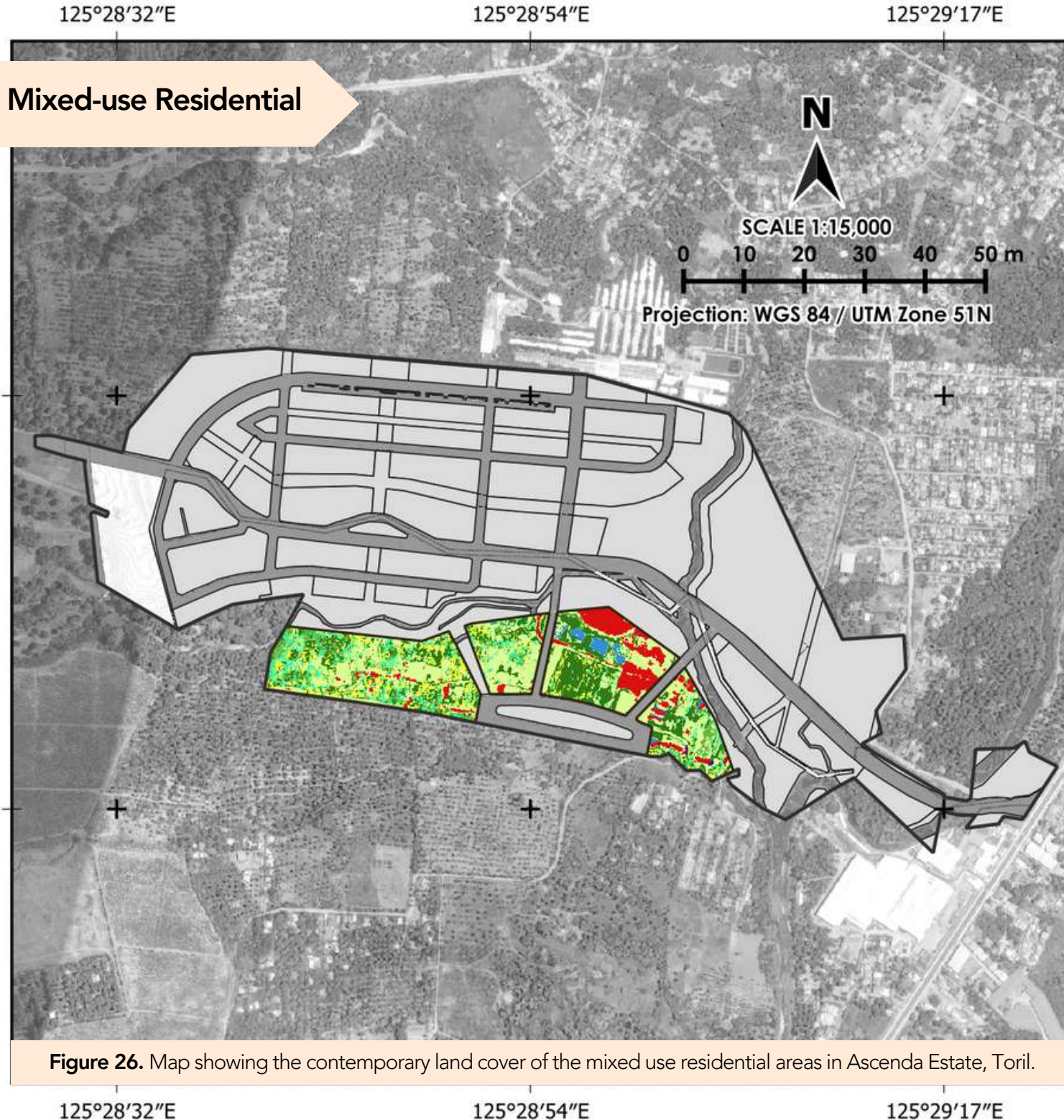
Management and Mitigation Plan

The maps of the proposed mixed-use residential area, eco park and open spaces, esplanade, linear park, commercial area, and utility area according to the Revised Master Plan, March 2022 are presented in **Figure 26-31**. For each block, we identified mitigation measures and conservation recommendations based on their proposed use and how that may impact HCVs (**Table 7-14**). Generally, the higher the risk of impacts towards an environmental value, the more protective the mitigation measures should be.

Table 6. Components of the management and mitigation plan with their descriptions.

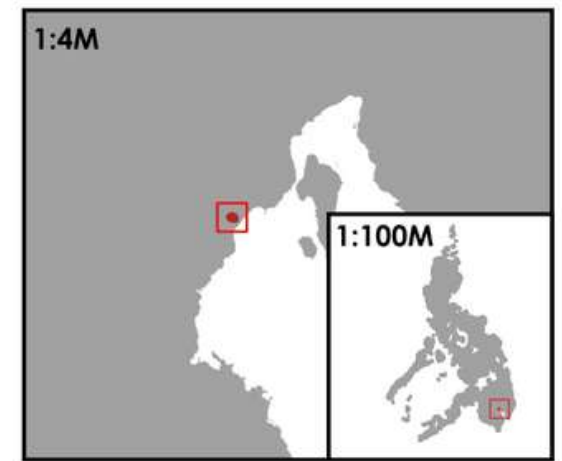
HCV Status and Threats	
HCV Present	HCV existing in a particular management block
Threats	Recorded threats during the assessment
Mitigation Plan	
Avoid	What are the specific actions that can be done to avoid negative impacts in the area?
Minimize	If there are no feasible measures to avoid the impacts of project operations, what actions can be done to minimize the impacts?
Restore/ Rehabilitate	If degradation following exposure to impacts cannot be avoided or minimized, a) what actions are needed to restore an area to the original state before impacts and, b) what actions are needed to rehabilitate an area's basic ecological functions affected by the impacts?
Residual Impacts	What are the possible impacts that would remain or cannot be fully controlled after the implementation of mitigation measures
Offset Measures	What are the measures taken to compensate for adverse impacts that cannot be avoided, minimize and/or rehabilitated or restored? Offset measures can result in no net loss or net positive impact.
Additional Conservation Actions	What are the measures taken that can have positive impacts to biodiversity not related to the footprint?
Mitigation during pre-construction and construction phase	What are the steps to be done to minimize and prevent further impacts to HCVs during the construction phase?
Management Plan	
Conservation/ Mitigation Commitment	What are the measurable conservation targets within the area of influence after the completion of mitigation measures?
Monitoring and Reporting	What monitoring measures and reporting tools can be used to determine the effect of the mitigation efforts done in the area? Who will be tasked to conduct the monitoring and reporting?
Other recommendations	Other recommended interventions to protect HCVs and manage other natural resource

Mixed-use Residential



Contemporary Land Cover in the Mixed Use Residential Areas

Ascenda Estate, Toril



LEGEND

- Land Cover
- Bare
 - Grasses
 - Water
 - Tree
 - Shrubs
 - Built-up
 - Perennial Crops
 - Waterlogged Grasses
 - Waterlogged Built-up
 - Bamboo
 - Project area boundary
 - Google Earth basemap

Figure 26. Map showing the contemporary land cover of the mixed use residential areas in Ascenda Estate, Toril.

Prepared by:



Data sources:
 Project area boundary - GADM
 Land cover - CCIPH
 Basemap - Google Earth

Mixed-use residential

Table 7. Management and mitigation plan for Mixed use residential.

HCV Status and Threats	
HCV Present	1
Threats	Presence of IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> Do not cut endemic tree species (<i>Artocarpus blancoi</i>) Avoid cutting of native trees such as <i>Ficus spp.</i>, <i>Polyscias nodosa</i>, and <i>Terminalia catappa</i>.
Minimize	Not Applicable
Restore/ Rehabilitate	Not Applicable
Residual Impacts	No significant residual impacts predicted.
Offset Measures	While non-native fruiting trees are not considered HCV 1, they still provide food sources to wildlife species. If management decides to clear non-native fruiting trees, we recommend replacing these with native fruiting trees and planting them in the proposed eco park. See Annex 2C for the list of species we recommend for rewilding and revegetation purposes.
Additional Conservation Actions	Control the proliferation of invasive alien plant species (IAPS).
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> Conduct on-site briefings for contractors on mitigation measures prior to construction. Consider including protocols and guidelines on wildlife encounters in operation manuals or in the Health, Safety, Security and Environment plans. Use visible markers (e.g., fencing, signs, ribbons) for native and endemic trees that are off-limits for cutting and clearing activities during construction. These individual trees can also be tagged (using aluminum tags) permanently after. In the event that infrastructure would be established near the trees, each endemic tree (<i>A. blancoi</i>) should have a circumferential buffer of at least two meters (Republic Act No. 386, Section 7, Article 679). Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity. Pruning can be conducted for trees with crown covers that are obstructing the right-of-way along the roads, electric lines or other infrastructures. Pruning can also be done to maintain tree health or for aesthetic purposes. Follow the DPWH DO no. 93 series of 2014.³ Prior to construction, saplings and wildlings can be collected and transferred to nurseries for propagation and as sources of planting materials that can be used for rewilding and rehabilitation.

³ https://www.dpwh.gov.ph/dpwh/sites/default/files/issuances/DO_093_S2014.pdf

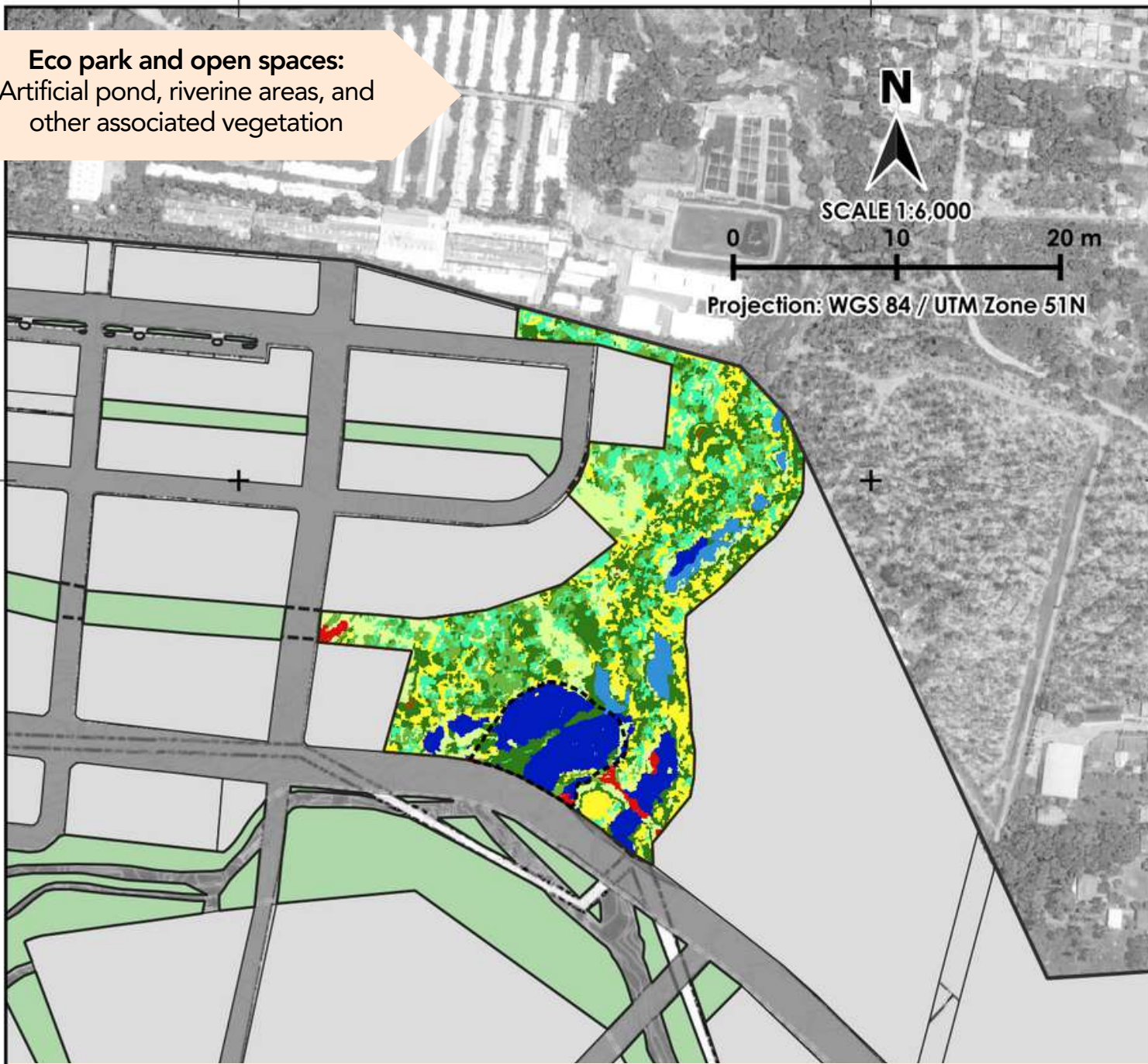
Mitigation Plan	
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Timing, phasing and direction of clearing activities must be considered. Disruption to wildlife is more profound when activities are conducted during sensitive timing windows. For example, some resident and endemic birds are more active during the summer season (between April to June) when they mate and breed. Migratory birds, on the other hand, are more abundant during wintering seasons (October to December, January to March). Where possible, activities should be planned with these timing windows in mind. In cases where construction needs to occur, it must be done in controlled stages as part of pre-stressing. This will allow wildlife to move away from a site prior to the onset of construction or during construction. • Be on the lookout for active bird nests throughout the year. As much as possible, avoid disturbing the nest or taking the eggs when encountered. Put markers near the nesting sites to deter workers.
Management Plan	
Conservation/ Mitigation Commitment	Protection of HCV 1 endemic species
Monitoring and Reporting	<ul style="list-style-type: none"> • Quarterly monitoring of IAPS • Quarterly faunal monitoring • Reassess the status of HCV 1 after five years to evaluate impacts of operations and effectiveness of mitigating measures to biodiversity
Other recommendations	<ul style="list-style-type: none"> • Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora. <ul style="list-style-type: none"> ◦ We recommend focusing first on the mechanical removal of IAPS saplings followed by the gradual replacement of IAPS mature trees. ◦ For groundcover IAPS such as vines and grasses, mechanical removal coupled with a poor-light environment (natural shade) can limit the spread. ◦ Regular monitoring must be conducted to prevent further encroachment of IAPS in any open areas and green spaces. ◦ For the management of invasive alien species, the following articles, reports, and guidelines can help: DENR-BMB (2016)⁴, Tanaka & Larson (2006)⁵, Sankaran et al. (2023)⁶, Lorenzo & Morais (2023)⁷ • Non-native trees and perennial crops can be cleared provided the necessary permits for cutting. • Attach aluminum tags on endemic tree species (<i>A. blancoi</i>). • Non-native trees and perennial crops can be cleared provided the necessary permits for cutting. • Attach aluminum tags on endemic tree species (<i>A. blancoi</i>).

4 Department of Environment and Natural Resources-Biodiversity Management Bureau (DENR-BMB) (2016). The National Invasive Species Strategy and Action Plan 2016-2026 (Philippines).
 5 Tanaka, H., & Larson, B. (2006). The role of the International Plant Protection Convention in the prevention and management of invasive alien species. *Assessment and Control of Biological Invasion Risks*. Shokadoh Book Sellers, Kyoto, Japan and IUCN, Gland, Switzerland, 56-62.
 6 Sankaran, K. V., Schwindt, E., Sheppard, A. W., Foxcroft, L. C., Vanderhoeven, S., Egawa, C., Peacock, L., Castillo, M. L., Zenni, R. D., Müllerová, J., González-Martínez, A. I., Bukombe, J. K., Wanzala, W., and Mangwa, D. C. (2023). Chapter 5: Management; challenges, opportunities and lessons learned. In: *Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Roy, H. E., Pauchard, A., Stoett, P., and Renard Truong, T. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430733>
 7 Lorenzo, P., & Morais, M. C. (2023). Strategies for the management of aggressive invasive plant species. *Plants*, 12(13), 2482.

125°28'55"E

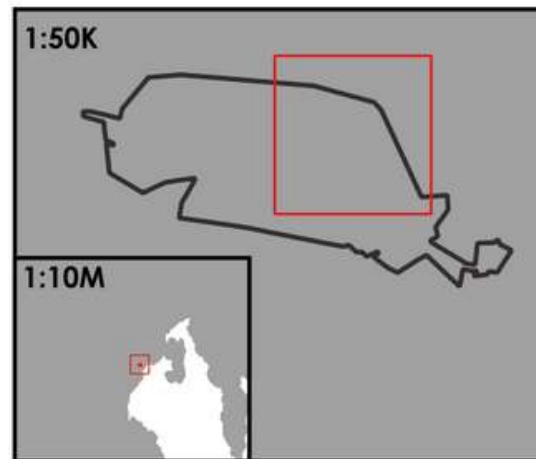
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Eco park and open spaces:
Artificial pond, riverine areas, and
other associated vegetation



Contemporary Land Cover in the Artificial Pond

Ascenda Estate, Toril



LEGEND

Land Cover

- Bare
- Grasses
- Water
- Tree
- Shrubs
- Built-up
- Perrenial Crops
- Waterlogged Grasses
- Waterlogged Built-up
- Bamboo
- Artificial pond boundary
- Open spaces
- Project area boundary
- Google Earth basemap

Figure 27. Map showing the contemporary land cover of Eco park and open spaces of artificial pond, riverine areas, and other associated vegetation areas in Ascenda Estate, Toril.

Prepared by:



Data sources:
 Project area boundary - GADM
 Open spaces & Artificial pond boundaries - AUI
 Land cover - CCIPH
 Basemap - Google Earth

Eco park and open spaces: Artificial pond, riverine areas, and other associated vegetation

Table 8. Management and mitigation plan for Artificial pond, riverine areas, and other associated vegetation.

HCV Status and Threats	
HCV Present	1, 3, and potentially 6
Threats	Hunting, Water Pollution, Excessive residual sediments, Flooding, and IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Restrict wildlife hunting and poaching activities • Avoid further clearing of existing vegetation. • Avoid further introduction of introduced and alien plant species (IAPS). A checklist of the most common IAPS can be found here: CABI Invasive Species Compendium⁸ • Avoid clearing of natural leaf litter • Do not cut threatened tree species. <ul style="list-style-type: none"> ◦ Narra trees are considered threatened and endangered. They are protected under RA 9147.
Minimize	Minimize anthropogenic activities within the proposed eco park
Restore/ Rehabilitate	<ul style="list-style-type: none"> • Restore the area through rewilding⁹ using native flora (trees, understory, groundcover). The end goal is to restore the area to its natural state. Rewilding involves a deliberate change from manicured landscape to an intentional managed state of wildness. Rewilding improves the provision of ecosystem services (HCVs) with minimal intervention. It also has potential for ecotourism and informal recreation because of the aesthetic and sensorial services it provides.¹⁰ A list of proposed species for rewilding can be found in Annex 2C. • Rehabilitate the artificial pond by planting appropriate native plants on its edges and planting a range of wetland plants from dry to wet tolerant to deep water emergent species. • Ponds with artificial substrates (e.g., lined with rubber or cemented) negatively impact and are less capable of supporting biodiversity in comparison with unlined ponds with natural substrates.¹¹ Removing the lining and restoring the natural substrates will allow the artificial pond to make a more positive contribution to the native biodiversity of the area. Additionally, a pond depth of 0.4m or more would better support aquatic fauna and flora.¹² • Restore riparian ecosystems to improve the river's physical, chemical, and biological properties. Planting native vegetation will help stabilize the banks, prevent erosion, minimize flooding, and improve water quality. Invasive plants must also be removed to allow native plants to regenerate and perform the mentioned ecosystem services. Access to riparian areas needs to be restricted while active restoration is ongoing, i.e., control fishing and other domestic activities.

⁸ CABI Compendium from <https://www.cabidigitallibrary.org/journal/cabicompendium>

⁹ Rewilding aims to restore healthy ecosystems by creating wild, biodiverse spaces. It rebuilds ecosystems that have previously been modified by human disturbance, using the plant and animal life that would have been present had the disturbance never occurred.

¹¹ Hall, M.C. (2019). Tourism and rewilding: an introduction – definition, issues and review. *Journal of Ecotourism*, 18-4, 297-308, DOI: 10.1080/14724049.2019.1689988

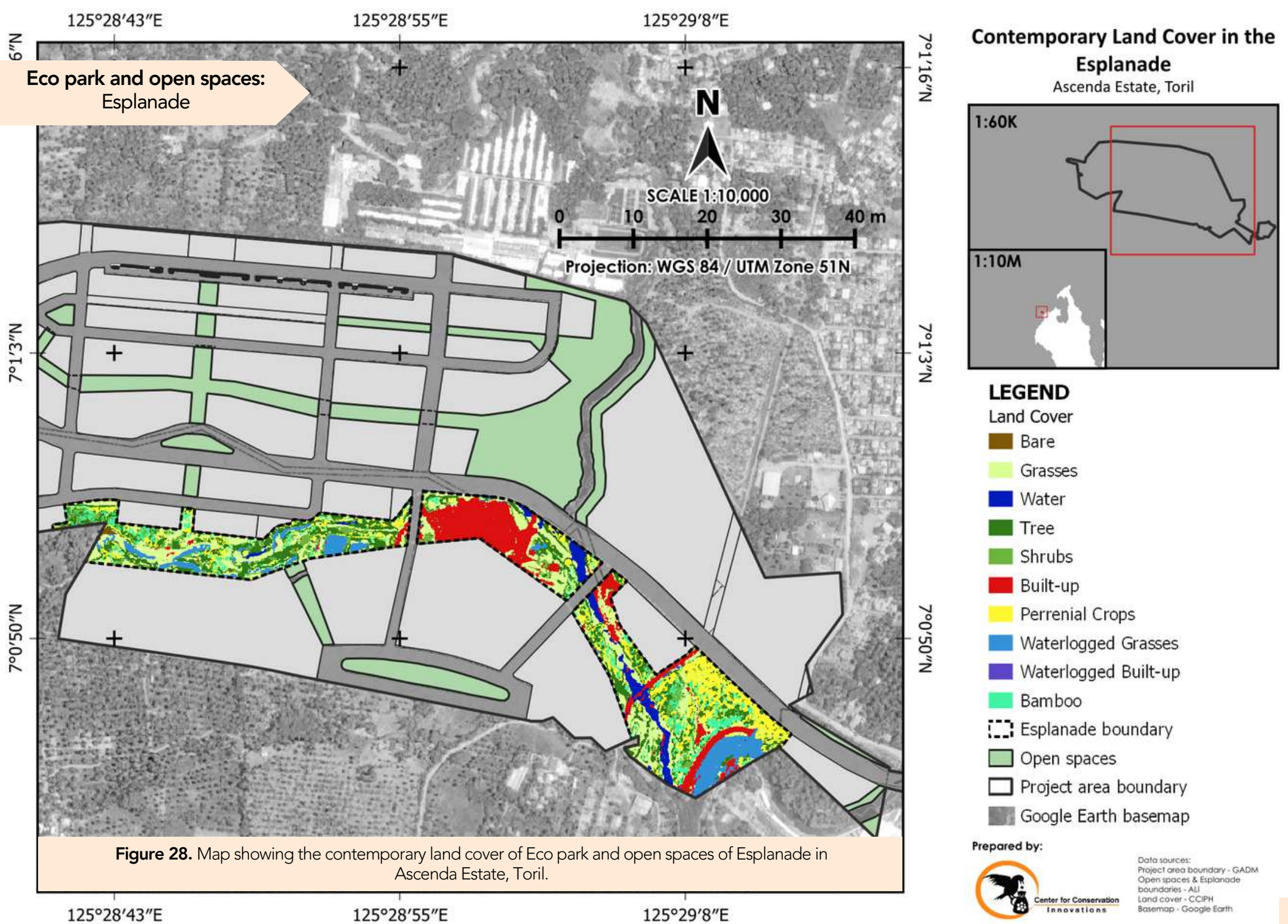
¹² Dertli, B., Decrey, M., Demierre, E., Fahy, J. C., Gallinelli, P., Vasco, F., and Ifig, C. (2023). Ornamental ponds as Nature-based Solutions to implement in cities. *Science of the Total Environment*, 888. <https://doi.org/10.1016/j.scitotenv.2023.164300>

Mitigation Plan	
Residual Impacts	No significant residual impacts predicted.
Offset Measures	Not applicable.
Additional conservation Actions	<ul style="list-style-type: none"> • Conduct information and education campaigns (IEC) that promote biodiversity conservation among estate staff, workers, future residents, and visitors. • Regularly monitor possible impacts of recreational activities on the identified HCVs. • Revegetate along the edge of the eco-park and near the boundaries of the property as a potential corridor for wildlife.
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Minimize noise and light disturbance from nearby construction that may affect breeding and feeding behaviors. • Be on the lookout for active bird nests throughout the year. As much as possible, avoid disturbing the nest or taking the eggs when encountered. Put markers near the nesting sites to deter disturbance. • Use visible markers (e.g., fencing, signs, ribbons) for native and endemic trees (e.g., Narra) that cannot be cleared. Individual trees can also be tagged (using aluminum tags) permanently after. Follow the guidelines on circumferential buffers for trees as stated in RA 386, Sections 7, Article 679. Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity. • Pruning can be conducted for trees with crown covers that are obstructing the right-of-way along the roads, electric lines or other infrastructures. This is applicable to the Narra trees located near the proposed road construction. Pruning can also be done to maintain tree health or for aesthetic purposes. Follow the DPWH DO no. 93 series of 2014.¹³ • Observe proper waste disposal from construction materials. Monitor and promptly remove waste and garbage in water bodies found in this side of the estate. • Avoid clearing of natural vegetation for trail establishment. • Clearing and construction should proceed in phases, ideally starting from the most disturbed areas to the least. Activities can be phased to funnel wildlife towards the proposed eco-park. • Include protocols on wildlife handling and encounters in health and safety orientations for workers. Conduct on-site briefings for contractors on mitigation measures prior to construction.
Management Plan	
Conservation/ Mitigation Commitment	<ul style="list-style-type: none"> • Protection of HCV 1 (endemic and threatened species) • Improve the quality of riverine ecosystem
Monitoring and Reporting	<ul style="list-style-type: none"> • Implement a monitoring and reporting system to regularly monitor key flora, fauna, and threats (IAS, incidence of wildlife traps, pollution, garbage, etc.) in the area • Conduct annual monitoring of water quality • Monitor the success of rewilding by assessing the following parameters every quarter during the first year of implementation: <ul style="list-style-type: none"> ◦ Survival of planted native species and natural regenerants ◦ Occurrence of faunal species, particularly seed dispersers

¹³ https://www.dpwh.gov.ph/dpwh/sites/default/files/issuances/DO_093_S2014.pdf

Management Plan	
Other recommendations	<ul style="list-style-type: none">• Reroute planned road construction away from where narra trees are located.• The area must have seasonal access. A time for public use and time for protection and recovery.• Continue to plant native vegetation. See Annex 2C for the recommended species.• Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora.• Initiate awareness strategies (e.g. IECs on the importance of protecting wildlife species, RTE ecosystems and habitats, and awareness of threats, etc)• Keep the width of planned trails (if there are any) to 2-3 meters, wide enough for humans to pass but small enough to have significant implications to wildlife and existing vegetation.• Attach aluminum tags to narra trees.



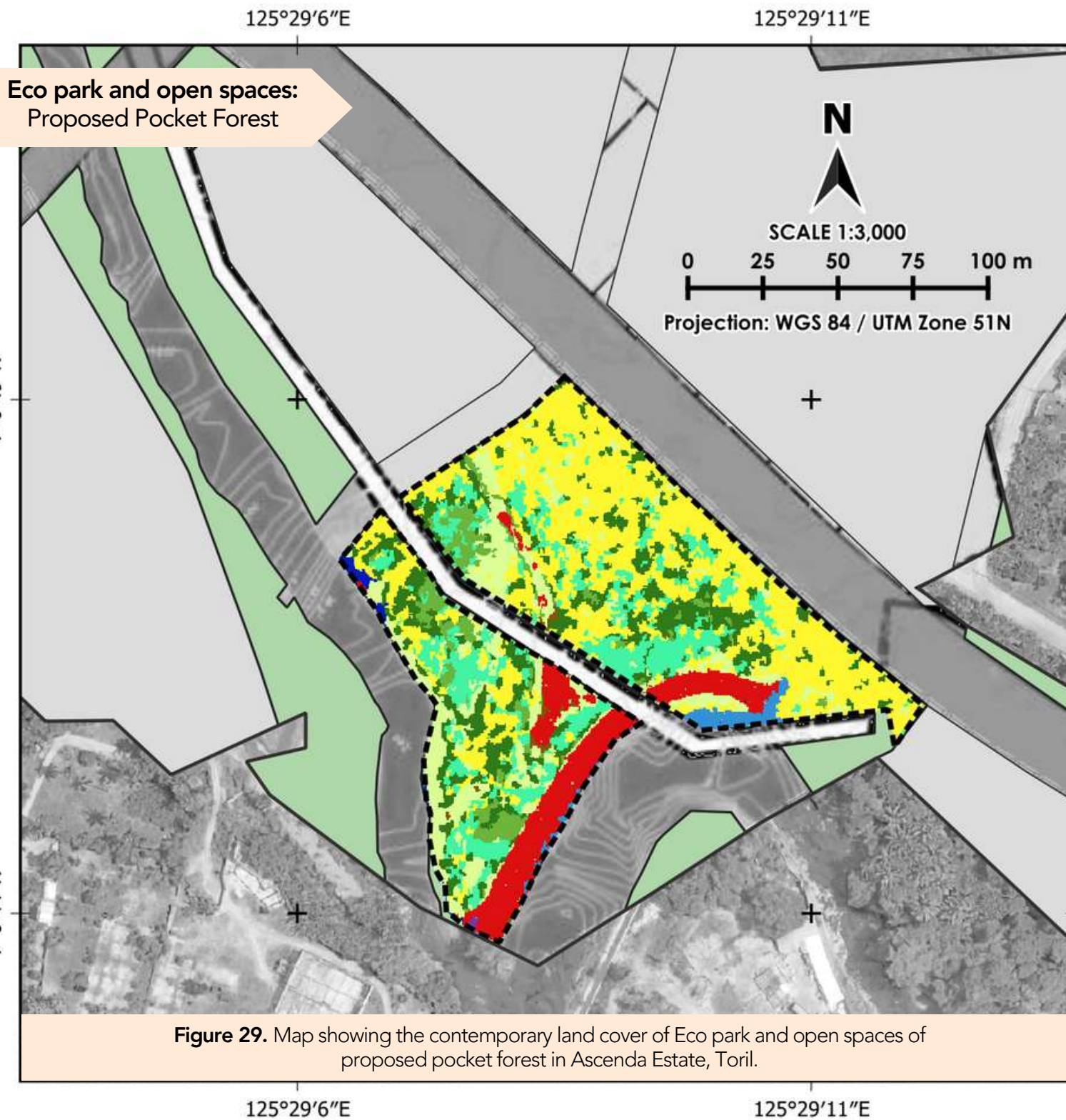


Eco park and open spaces: Esplanade

Table 9. Management and mitigation plan for Esplanade.

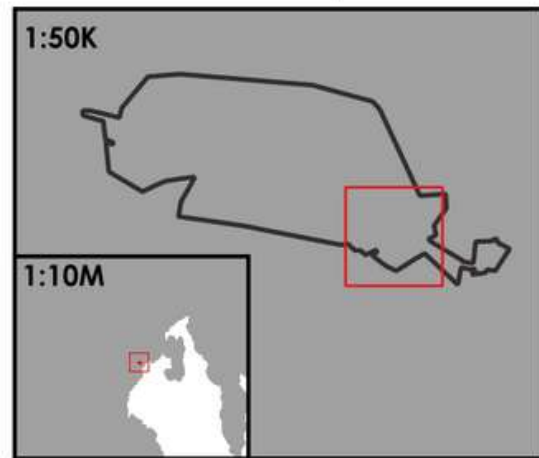
HCV Status and Threats	
HCV present	1 and potentially 6
Threats	IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Avoid further clearing of existing vegetation including the riparian zone. • Avoid further introduction of introduced and alien plant species (IAPS) • Avoid cutting of native tree species.
Minimize	Minimize potential impacts on the identified HCVs by ensuring that the width of the esplanade strip is appropriate to the size of the area. Impose restrictions or conditions that are beneficial to wildlife e.g., allowing only cycling, running, and walking activities, while disallowing motorized vehicles to enter.
Restore/ Rehabilitate	<ul style="list-style-type: none"> • Rewild open spaces. By establishing native plant communities and creating suitable habitats for wildlife, urban areas can witness an increase in the variety and abundance of flora and fauna. Proposed species for rewilding can be found in Annex 2C. • Restore riparian ecosystems to improve the river’s physical, chemical, and biological properties. Planting native vegetation will help stabilize the banks, prevent erosion, minimize flooding, and improve water quality. Invasive plants must also be removed to allow native plants to regenerate and perform the mentioned ecosystem services. Access to riparian areas needs to be restricted while active restoration is ongoing, i.e., control fishing and other domestic activities.
Residual Impacts	In the event that native vegetation will be cleared for construction purposes, replacement planting of trees will not immediately compensate for the loss of mature specimens - this may have minor adverse effects in the short term.
Offset Measures	If native vegetation will be cleared, offset measures should be implemented. Native vegetation should be replaced and planted in a nearby area.
Additional Conservation Actions	<ul style="list-style-type: none"> • Conduct information and education campaigns (IEC) that promote biodiversity conservation on estate staff, workers, future residents, and visitors. • Regularly monitor possible impacts of recreational activities on the identified HCVs.

Mitigation Plan	
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Use visible markers (e.g., fencing, signs, ribbons) for native and endemic trees (Narra) that cannot be cleared. Individual trees can also be tagged (using aluminum tags) permanently after. Follow the guidelines on circumferential buffers for trees as stated in RA 386, Sections 7, Article 679. Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity. • Building near rivers requires planning on wastewater management. Do not discharge any water from the construction site to the water bodies. Be prepared with equipment to treat turbidity and changes in pH levels because of site modifications. • Use appropriate sediment and erosion control measures to protect water bodies near work spaces. Less invasive construction methods or machinery can also be utilized to minimize soil erosion. • Avoid clearing of natural vegetation during trail establishment. • Timing, phasing and direction of clearing activities must be considered in relation to conducting them during sensitive timing windows like during mating or breeding seasons. Ideally, activities should be conducted outside the applicable times but if not possible, mitigation measures may be applied like conducting on-site activities in phases. • Include protocols on wildlife handling and encounters in health and safety orientations for workers and contractors. If young birds or mammals are discovered on site, best to contact a wildlife biologist for advice or leave the specimen alone. For active nesting sites are encountered on trees meant for clearing, avoid disturbing the nest and eggs. Put markers or establish protected buffers until nesting is done. For adult wildlife, the species may be relocated to a site similar to where it was first encountered provided the one doing the handling is qualified or is using the proper equipment. Improper handling can result to injuries or infection.
Management Plan	
Conservation/ Mitigation Commitment	<ul style="list-style-type: none"> • Protection of HCV 1 (endemic and threatened species) • Improve the quality of riverine ecosystem
Monitoring and Reporting	<ul style="list-style-type: none"> • Implement a monitoring and reporting system to regularly monitor key flora, fauna, and threats (IAS, incidence of wildlife traps, pollution, garbage, etc.) in the area • Conduct annual monitoring of water quality
Other recommendations	<ul style="list-style-type: none"> • Maintain the natural state of the watercourse • Observe appropriate buffers along the rivers (i.e., at least 3m for urban areas according to The Presidential Decree No.1067. s 1976 Article 51) • Gradual eradication of IAPS • Initiate awareness strategies (e.g. IECs on the importance of protecting wildlife species, RTE ecosystems and habitats, and awareness of threats, etc)



Eco park and open spaces:
Proposed Pocket Forest

Contemporary Land Cover in the Proposed Pocket Forest Ascenda Estate, Toril



LEGEND

Land Cover

- Bare
- Grasses
- Water
- Tree
- Shrubs
- Built-up
- Perrenial Crops
- Waterlogged Grasses
- Waterlogged Built-up
- Bamboo
- Proposed pocket forest boundary
- Open spaces
- Project area boundary
- Google Earth basemap

Figure 29. Map showing the contemporary land cover of Eco park and open spaces of proposed pocket forest in Ascenda Estate, Toril.

Prepared by:



Data sources:
Project area boundary - GADM
Open spaces & Proposed pocket forest boundaries - AUI
Land cover - CCIPH
Basemap - Google Earth

Eco park and open spaces: Proposed pocket forest

A pocket forest is small area that is densely vegetated with diverse species of native trees, shrubs, and groundcover vegetation to recreate the complexities of a forest ecosystem^{14,15} The concept can be used to rewild urban environments or lands that underwent massive degradation. Pocket forests use the Miyawaki technique combined with permaculture methods for effectively restoring damaged ecosystems. While pocket forests are not part of the master plan for the Ascenda Estate, we recommend establishing them as a way to reimagine urban reforestation and contribute more to creating spaces for local biodiversity to thrive.

Table 10. Management and mitigation plan for proposed pocket forest.

HCV Status and Threats	
HCV present	1 and potentially 6
Threats	IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Avoid planting non-native ornamental species • Do not cut native tree species • Restrict wildlife hunting and poaching activities • Avoid further clearing of existing vegetation. • Avoid further introduction of introduced and alien plant species (IAPS). A checklist of the most common IAPS can be found here: CABI Invasive Species Compendium¹⁶
Minimize	Minimize anthropogenic activities within the proposed pocket forest
Restore/ Rehabilitate	Rewild the area by establishing pocket forest through maximum diversity planting or Miyawaki method. It is a technique used to create a small forest within urban areas by planting fast-growing native trees, shrubs, and ground covers in a dense manner. This mimics the layers of a natural forest and is easier to manage than regular manicured lawns.
Residual Impacts	No significant residual impacts predicted.
Offset Measures	Not applicable
Additional Conservation Actions	<ul style="list-style-type: none"> • Conduct information and education campaigns (IEC) that promote biodiversity conservation on estate staff, workers, future residents, and visitors. • Regularly monitor possible impacts of recreational activities on the identified HCVs.
Mitigation during pre-construction and construction phase	N/A

¹⁴ Schirone, B., Salis, A., & F. Vessella. (2011). *Effectiveness of the Miyawaki method in Mediterranean forest restoration programs*. Landscape and Ecological Engineering, 7 (1): 81-92.

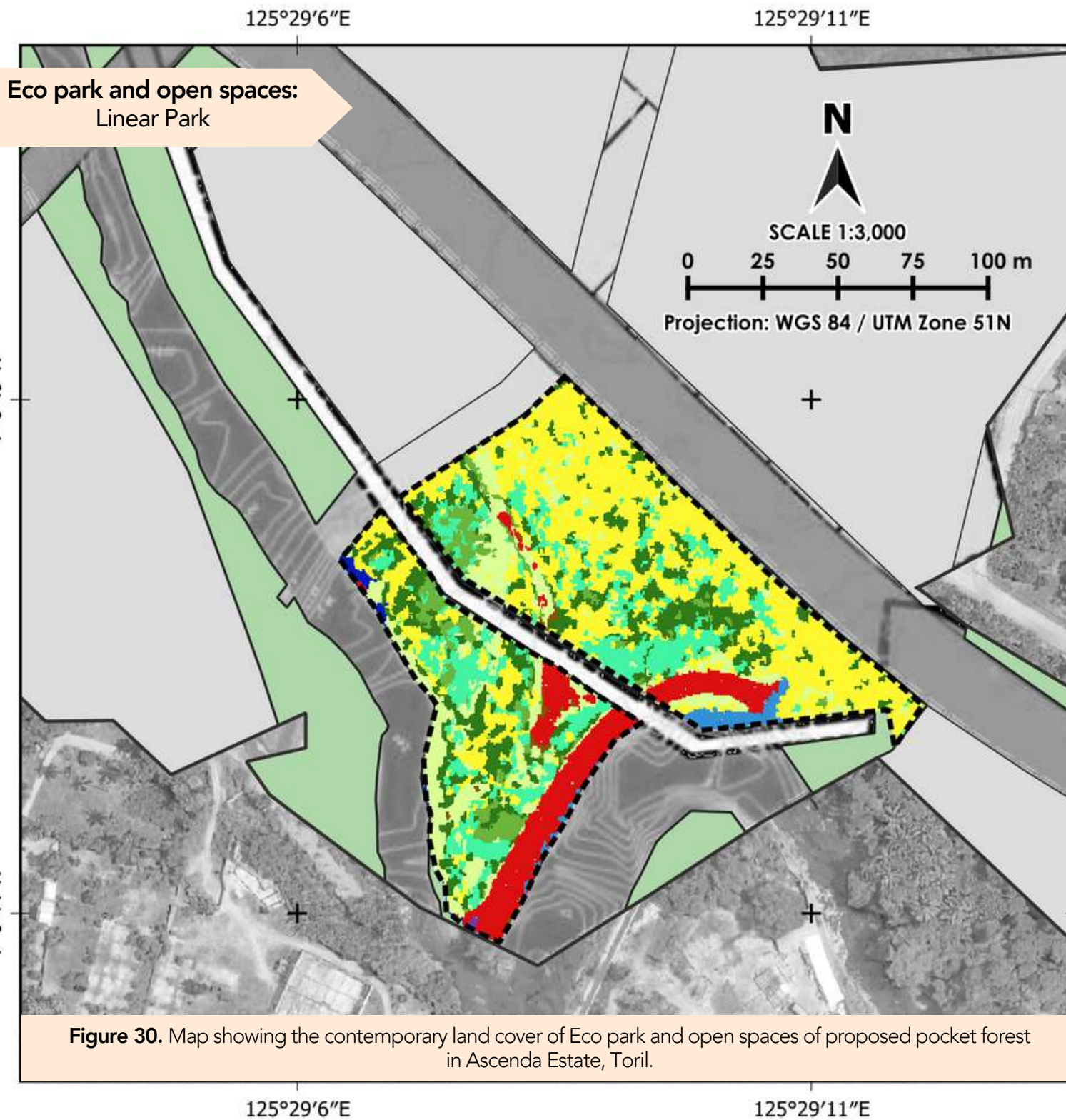
¹⁵ Huang, Y., Lin, X., Lin, S., Chen, Z., Fu, W., Wang, M., & Dong, J. (2023). Pocket Parks: A New Approach to Improving the Psychological and Physical Health of Recreationists. *Forests*, 14(10), 1983. <https://doi.org/10.3390/f14101983>

¹⁶ CABI Compendium - <https://www.cabidigitallibrary.org/journal/cabicompendium>

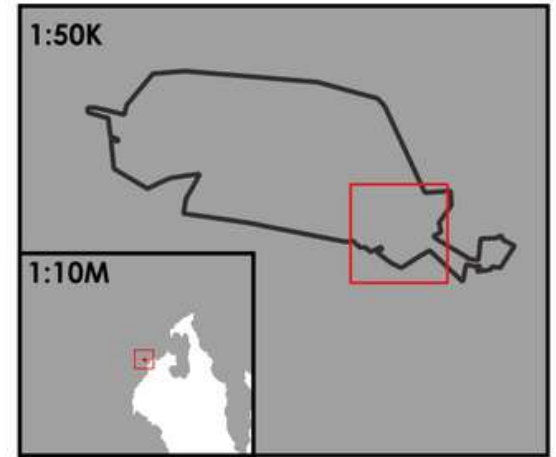
Management and Mitigation Plan

Management Plan	
Conservation/ Mitigation Commitment	Protection of HCV 1 (endemic and threatened species)
Monitoring and Reporting	Implement a monitoring and reporting system to regularly monitor key flora, fauna, and threats (IAS, incidence of wildlife traps, pollution, garbage, etc.) in the area
Other recommendations	<ul style="list-style-type: none">• Pocket forest can be a 'community project' wherein community members can design and nurture their own tiny forest within the estate.• Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora.• Initiate awareness strategies (e.g. IECs on the importance of protecting wildlife species, RTE ecosystems and habitats, and awareness of threats, etc)





Contemporary Land Cover in the Proposed Pocket Forest
Ascenda Estate, Toril



LEGEND

Land Cover

- Bare
- Grasses
- Water
- Tree
- Shrubs
- Built-up
- Perrenial Crops
- Waterlogged Grasses
- Waterlogged Built-up
- Bamboo
- Proposed pocket forest boundary
- Open spaces
- Project area boundary
- Google Earth basemap

Figure 30. Map showing the contemporary land cover of Eco park and open spaces of proposed pocket forest in Ascenda Estate, Toril.

Prepared by:

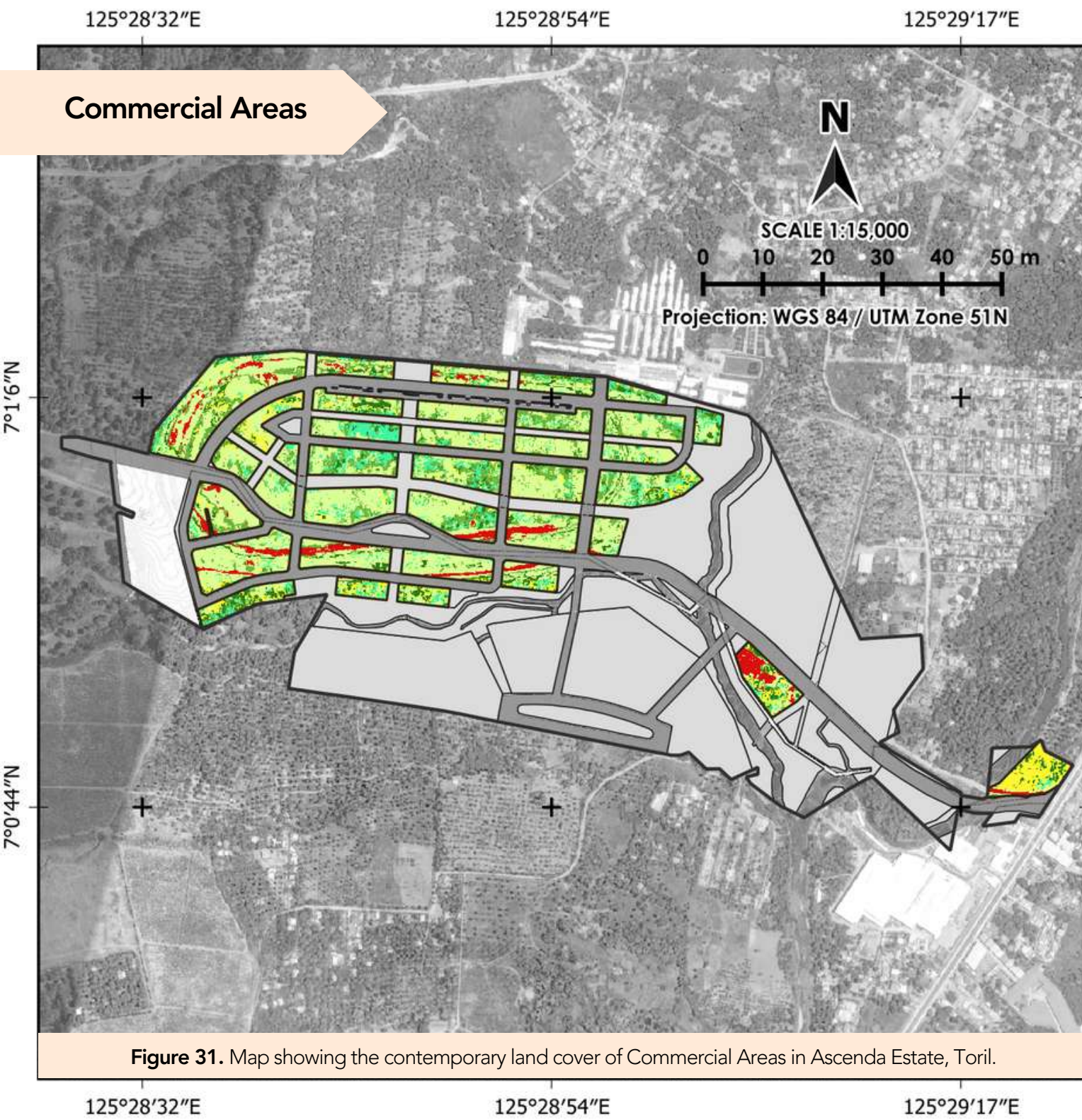


Data sources:
Project area boundary - GADM
Open spaces & Proposed pocket forest boundaries - AUI
Land cover - CCIPH
Basemap - Google Earth

Eco park and open spaces: Linear park

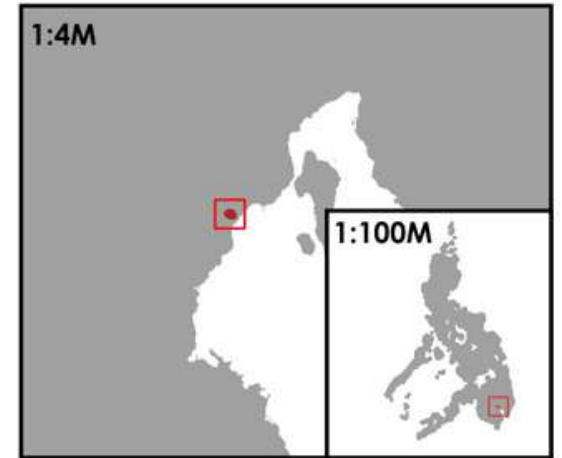
Table 11. Management and mitigation plan for Linear park.

HCV Status and Threats	
HCV present	1 and potentially 6
Threats	IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Avoid planting non-native ornamental species • Avoid further introduction of introduced and alien plant species (IAPS) • Avoid cutting of native tree species
Minimize	Minimize disturbance to native plant communities (e.g. stretching and cutting of flowering twigs for photo shoots, visitors damaging ground cover vegetation due to recreational activities)
Restore/ Rehabilitate	Restore the area through urban rewilding. Urban rewilding promotes sustainable development, environmental management, and community involvement in urban settings, creating more diverse and resilient urban landscapes.
Residual Impacts	No significant residual impacts predicted.
Offset Measures	Not applicable
Additional Conservation Actions	Regularly monitor possible impacts of recreational activities on the identified HCVs.
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Conduct on-site briefings for contractors on mitigation measures prior to construction. Consider including protocols and guidelines on wildlife encounters in operation manuals or in the Health, Safety, Security and Environment plans. • Physically tag trees that are off-limits for clearing activities by using visible markers. • Avoid clearing of natural vegetation during trail establishment.
Management Plan	
Conservation/ Mitigation Commitment	Protection of HCV 1 (endemic and threatened species)
Monitoring and Reporting	Implement a monitoring and reporting system to regularly monitor key flora, fauna, and threats (IAS, incidence of wildlife traps, pollution, garbage, etc.) in the area
Other recommendations	<ul style="list-style-type: none"> • Prioritize planting of indigenous small trees, shrubs, and ground cover. The area cannot accommodate large trees with a spreading root system. Vibrant native plants with conspicuous flowers and fruits can be included in the plant palette since they attract pollinators and improve ecosystem services. • Gradual eradication of IAPS, including saplings. • Initiate awareness strategies (e.g. IECs on the importance of protecting wildlife species, RTE ecosystems and habitats, and awareness of threats, etc)



Commercial Areas

Contemporary Land Cover in the Commercial Areas
Ascenda Estate, Toril



LEGEND

- Land Cover
- Bare
 - Grasses
 - Water
 - Tree
 - Shrubs
 - Built-up
 - Perennial Crops
 - Waterlogged Grasses
 - Waterlogged Built-up
 - Bamboo
 - Project area boundary
 - Google Earth basemap

Prepared by:



Data sources:
Project area boundary - GADM
Land cover - CCIPH
Basemap - Google Earth

Figure 31. Map showing the contemporary land cover of Commercial Areas in Ascenda Estate, Toril.

Commercial Areas

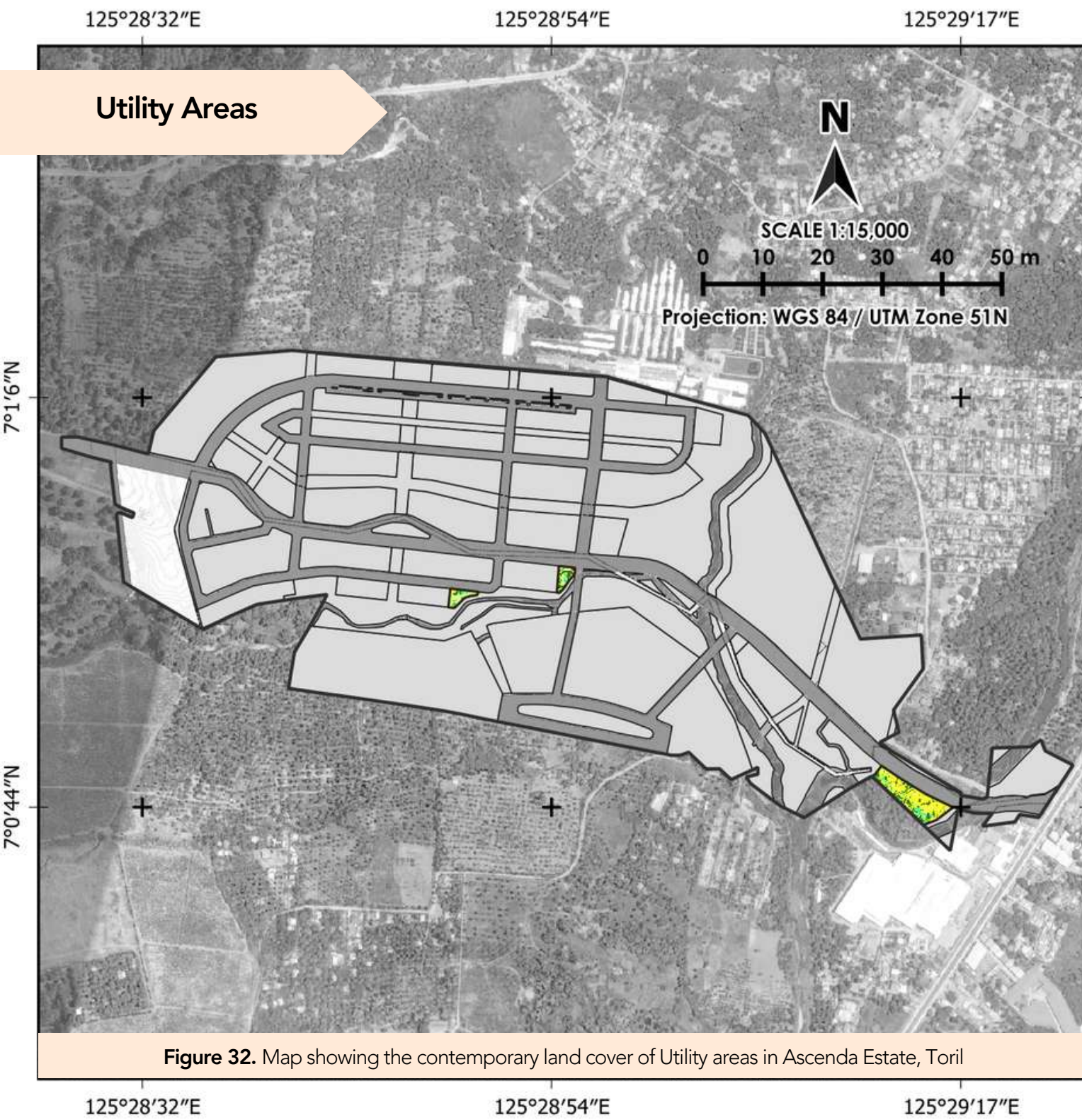
Table 12. Management and mitigation plan for commercial areas.

HCV Status and Threats	
HCV present	1
Threats	IAS, Hunting
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Avoid planting non-native ornamental species • Avoid further introduction of introduced and alien plant species (IAPS) • Avoid cutting of native tree species.
Minimize	Not Applicable
Restore/Rehabilitate	Not Applicable
Residual Impacts	In the event that native vegetation will be cleared for construction purposes, replacement planting of trees will not immediately compensate for the loss of mature specimens - this may have minor adverse effects in the short term.
Offset Measures	If native vegetation will be cleared, offset measures should be implemented. Native vegetation should be replaced and planted in a nearby area.
Additional Conservation Actions	Control the proliferation of invasive alien plant species (IAPS).
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Conduct on-site briefings for contractors on mitigation measures prior to construction. Consider including protocols and guidelines on wildlife encounters in operation manuals or in the Health, Safety, Security and Environment plans. • Use visible markers for native and endemic trees that cannot be cut or cleared. These individual trees can also be tagged (using aluminum tags). • Establish circumferential buffers for native trees following RA 386, Section 7, Article 679. • Pruning can be conducted for trees with crown covers that are obstructing the right-of-way along the roads, electric lines or other infrastructures. Pruning can also be done to maintain tree health or for aesthetic purposes. Follow the DPWH DO no. 93 series of 2014.20 • Prior to construction, saplings and wildlings can be collected and transferred to nurseries for propagation and as sources of planting materials that can be used for rewilding and rehabilitation. • Timing, phasing and direction of clearing activities must be considered. Phasing of site activities can start in the most disturbed areas, those nearest existing development, or the area that will have the most significant clearing or construction activities. • Be on the lookout for active bird nests throughout the year. As much as possible, avoid disturbing the nest or taking the eggs when encountered. Put markers near the nesting sites or establish protection buffers.

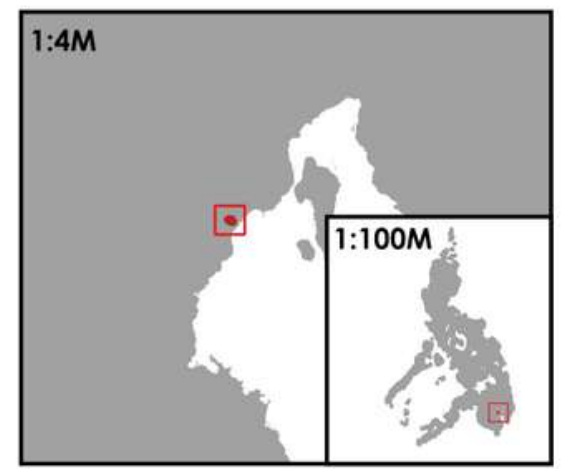
²⁰ https://www.dpwh.gov.ph/dpwh/sites/default/files/issuances/DO_093_S2014.pdf

 Management and Mitigation Plan

Management Plan	
Conservation/ Mitigation Commitment	Protection of HCV 1 (endemic and threatened species)
Monitoring and Reporting	<ul style="list-style-type: none"> • Quarterly monitoring of IAPS • Quarterly faunal monitoring • Reassess the status of HCV 1 after five years to evaluate impacts of operations and effectiveness of mitigating measures to biodiversity
Other recommendations	<ul style="list-style-type: none"> • Utilize native trees in bio-fencing. Bio-fencing is considered an eco-friendly boundary wall wherein boundaries are established by planting lines of native trees and shrubs at relatively close spacing. • Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora. • In the event that infrastructure would be established in the area, each tree should have a circumferential buffer of at least two meters (Republic Act No. 386, Section 7, Article 679). <ul style="list-style-type: none"> ◦ Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity. • Non-native trees and perennial crops can be cleared provided the necessary permits for cutting.



Contemporary Land Cover in the Utility Areas
Ascenda Estate, Toril



LEGEND

- Land Cover
- Bare
 - Grasses
 - Water
 - Tree
 - Shrubs
 - Built-up
 - Perennial Crops
 - Waterlogged Grasses
 - Waterlogged Built-up
 - Bamboo
 - Project area boundary
 - Google Earth basemap

Figure 32. Map showing the contemporary land cover of Utility areas in Ascenda Estate, Toril

Prepared by:



Data sources:
Project area boundary - GADM
Land cover - CCIPH
Basemap - Google Earth

Utility areas

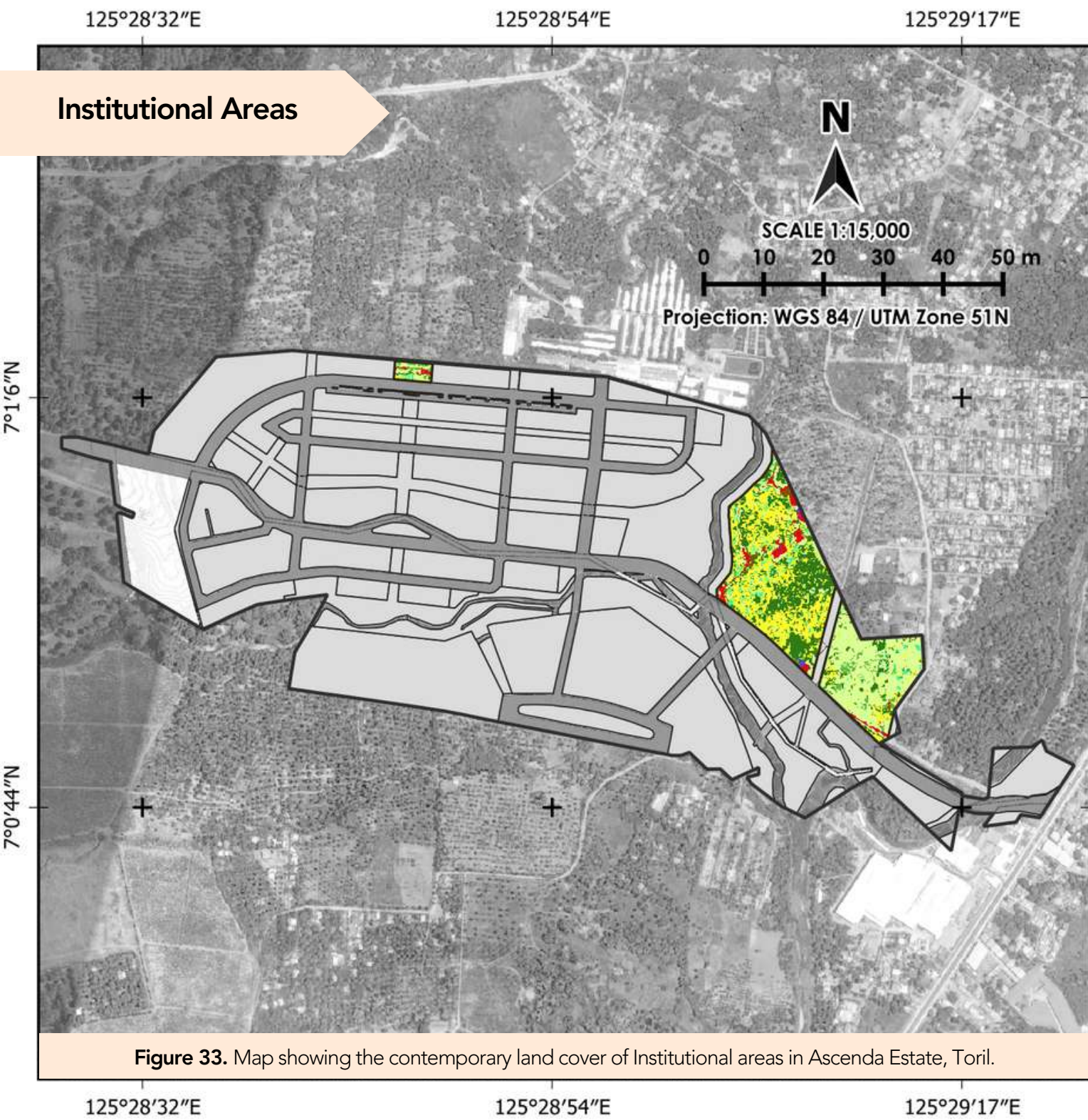
Table 13. Management and mitigation plan for Utility areas.

HCV Status and Threats	
HCV present	1
Threats	IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> Do not cut threatened tree species (Molave) Avoid cutting of native trees Avoid planting non-native ornamental species Avoid further introduction of introduced and alien plant species (IAPS)
Minimize	Not Applicable
Restore/Rehabilitate	Not Applicable
Residual Impacts	In the event that native vegetation will be cleared for construction purposes, replacement planting of trees will not immediately compensate for the loss of mature specimens - this may have minor adverse effects in the short term.
Offset Measures	If native vegetation will be cleared, offset measures should be implemented. Native vegetation should be replaced and planted in a nearby area.
Additional Conservation Actions	Control the proliferation of invasive alien plant species (IAPS).
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> Conduct on-site briefings for contractors on mitigation measures prior to construction. Consider including protocols and guidelines on wildlife encounters in operation manuals or in the Health, Safety, Security and Environment plans. Physically tag trees that are off-limits for clearing activities by using visible markers. Avoid clearing of natural vegetation during trail establishment.
Management Plan	
Conservation/Mitigation Commitment	Protection of HCV 1 (endemic and threatened species)
Monitoring and Reporting	<ul style="list-style-type: none"> Quarterly monitoring of IAPS Quarterly faunal monitoring Reassess the status of HCV 1 after five years to evaluate impacts of operations and effectiveness of mitigating measures to biodiversity

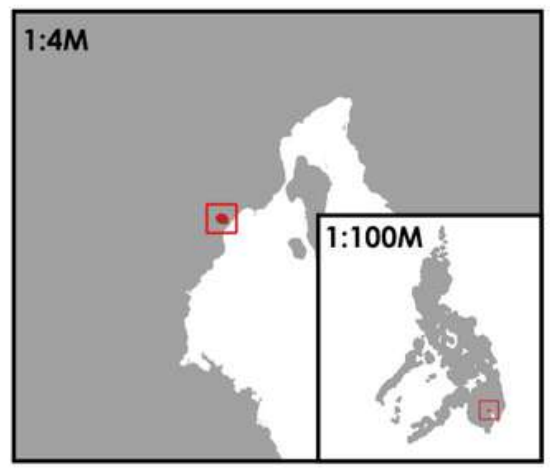
Management and Mitigation Plan

Management Plan

Other recommendations	<ul style="list-style-type: none">• Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora.• In the event that infrastructure would be established in the area, each tree should have a circumferential buffer of at least two meters (Republic Act No. 386, Section 7, Article 679).<ul style="list-style-type: none">◦ Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity.• Non-native trees and perennial crops can be cleared provided the necessary permits for cutting.• Attach aluminum tags to molave trees.
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Contemporary Land Cover in the Institutional Areas
Ascenda Estate, Toril



- LEGEND**
- Land Cover
- Bare
 - Grasses
 - Water
 - Tree
 - Shrubs
 - Built-up
 - Perrenial Crops
 - Waterlogged Grasses
 - Waterlogged Built-up
 - Bamboo
 - Project area boundary
 - Google Earth basemap

Prepared by:



Data sources:
Project area boundary - GADM
Land cover - CCIPH
Basemap - Google Earth

Figure 33. Map showing the contemporary land cover of Institutional areas in Ascenda Estate, Toril.

Institutional Areas

Table 14. Management and mitigation plan for Institutional areas.

HCV Status and Threats	
HCV present	1
Threats	Flooding, IAS
Mitigation Plan	
Avoid	<ul style="list-style-type: none"> • Avoid cutting of native trees • Avoid planting non-native ornamental species • Avoid further introduction of introduced and alien plant species (IAPS)
Minimize	Not Applicable
Restore/Rehabilitate	Not Applicable
Residual Impacts	In the event that native vegetation will be cleared for construction purposes, replacement planting of trees will not immediately compensate for the loss of mature specimens - this may have minor adverse effects in the short term.
Offset Measures	If native vegetation will be cleared, offset measures should be implemented. Native vegetation should be replaced and planted in a nearby area.
Additional Conservation Actions	Control the proliferation of invasive alien plant species (IAPS).
Mitigation during pre-construction and construction phase	<ul style="list-style-type: none"> • Conduct on-site briefings for contractors on mitigation measures prior to construction. Consider including protocols and guidelines on wildlife encounters in operation manuals or in the Health, Safety, Security and Environment plans. • Use visible markers for native and endemic trees that cannot be cut or cleared. These individual trees can also be tagged (using aluminum tags). • Minimize noise and light disturbance from nearby construction that may affect breeding and feeding behaviors. • Establish circumferential buffers for native trees following RA 386, Section 7, Article 679. • Pruning can be conducted for trees with crown covers that are obstructing the right-of-way along the roads, electric lines or other infrastructures. Pruning can also be done to maintain tree health or for aesthetic purposes. Follow the DPWH DO no. 93 series of 2014.¹⁷ • Prior to construction, saplings and wildlings can be collected and transferred to nurseries for propagation and as sources of planting materials that can be used for rewilding and rehabilitation. • Timing, phasing and direction of clearing activities must be considered. Phasing of site activities can start in the most disturbed areas or those nearest existing development to the least disturbed. • Be on the lookout for active bird nests throughout the year. As much as possible, avoid disturbing the nest or taking the eggs when encountered. Put markers near the nesting sites or establish protection buffers.

¹⁷ https://www.dpwh.gov.ph/dpwh/sites/default/files/issuances/DO_093_S2014.pdf

 Management and Mitigation Plan

Management Plan	
Conservation/ Mitigation Commitment	Protection of HCV 1 (endemic and threatened species)
Monitoring and Reporting	<ul style="list-style-type: none"> • Quarterly monitoring of IAPS • Quarterly faunal monitoring • Reassess the status of HCV 1 after five years to evaluate impacts of operations and effectiveness of mitigating measures to biodiversity
Other recommendations	<ul style="list-style-type: none"> • This is a flood risk area, we recommend avoiding or prohibiting cutting of native species in the area considering native species help reduce flood risks. One of the most important functions trees play in flood control is their ability to absorb and hold water. Their enormous root systems operate as natural sponges, absorbing large volumes of water during heavy rains or flooding. Trees draw in water through their roots, reducing the volume of water moving across land and into streams, hence mitigating flood risk. • Gradual eradication of IAPS, including saplings, and slowly replace areas dominated by IAPS with native flora. • In the event that infrastructure would be established in the area, each tree should have a circumferential buffer of at least two meters (Republic Act No. 386, Section 7, Article 679). • Ecologically, the distance between the tree and the man-made structure must be equivalent to half the diameter of the tree crown at maturity. • Non-native trees and perennial crops can be cleared provided the necessary permits for cutting.