



EXECUTIVE SUMMARY FOR THE PUBLIC (English Version)

Lumino Trento Tree Plantation for Biomass Production Project
Municipality of Trento, Agusan del Sur



Version : 1.0
Date : 06-Feb-2023
Prepared by : GreenDevelopment Sustainable Solutions, Inc.

Project Fact Sheet

Name of Project:	Lumino Trento Tree Plantation for Biomass Production Project
ECC Reference No.	ECC-R13-2106-005
Location of Project:	CADD R13-TRE-0518-223 Barangays Cebolin, Cuevas, Langkilaan, Manat, New Visayas, Pangyan, Salvacion, San Ignacio, San Isidro, San Roque, Sta. Maria and Tudela, Municipality of Trento, Agusan del Sur
Service Contract	Memorandum of Agreement With FETREMTCO
Project Type	Issued ECC <ul style="list-style-type: none"> Tree Plantation: Category D – Non-Environmentally Critical Project (NECP) 2.2.1 Community Based Forest Resources Utilization Without Tree Harvesting (Non-ECP) 2.2.1 Community Based Forest Resources Utilization Headquarter: Category B 3.6.2 Office and Residential Building (Non-ECP) with More Than 5 Hectares Total and Gross Floor Area Road Widening: Category B. 3.4.2 (Non-ECP) Road Widening and Rehabilitation of Greater Than 20 kms Proposed Modification <ul style="list-style-type: none"> Addition of Tree Harvesting: Category A – Environmentally Critical Project (ECP) 2.2.1 Community Based Forest Resources Utilization with $\geq 10,000 \text{ m}^3$ Annual Volume of trees to be cut
Project Area	Issued ECC: 23,301.74 hectares Proposed Modification: 17,963.18 hectares
Total Project Cost:	One Billion and Thirty Million Philippine Pesos (PhP1,030,000,000.00)
Project Duration:	Construction and development: 2 years Operation: 24 years Daily operational cycles: Tree planting and maintenance - eight hours per day Nursery operation and office works - eight hours per day Harvesting - eight hours per day
Proponent Profile	
Name of Proponent:	Lumino Energy Plantations, Inc. (LEPI)
Office address:	Kilometer 8, Barangay San Jose, Bislig City
Contact Person:	Mr. Joel P. Lubguban – President Email Address: jlubguban@luminocapital.com Contact Number: 0968-854-3285
Authorized Representative for ECC application:	Joseph JR Anders Abella – Chief Operating Officer GreenDevelopment Sustainable Solutions, Inc. (GSSI)

Project Proponent

- ¹ The implementation of the project will be carried out by Lumino Energy Plantations, Inc. (LEPI), a legitimate company based in the Philippines with the registration number CS201953529 and recognized by the Securities and Exchange Commission. LEPI's headquarters are located at Km. 8, Barangay San Jose, Bislig City, Surigao del Sur and is a subsidiary of Lumino Biomass Fuel, Inc.

ECC History

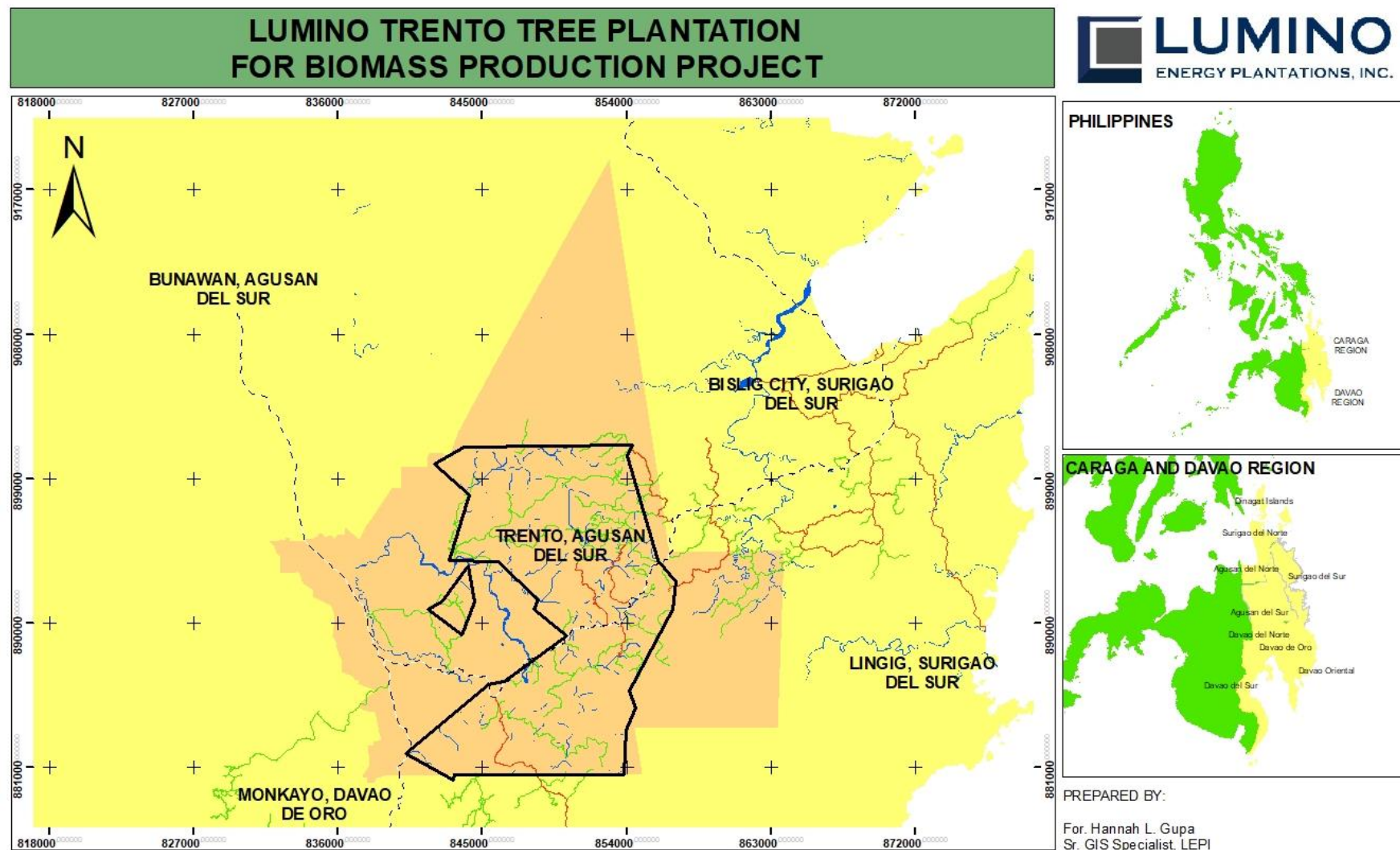
- ² On July 07, 2021, Lumino Energy Plantations, Inc. (LEPI), the proponent, was granted by the Department of Environment and Natural Resources (DENR) through the Environmental Management Bureau (EMB) Region 13 an Environmental Compliance Certificate (**ECC-R13-2106-005**) for the **Lumino Trento Tree Plantation Biomass Production Project** to be located in Barangays Cebolin, Cuevas, Langkilaan, Manat, New Visayas, Pangyan, Salvacion, San Ignacio, San Isidro, San Roque, Sta. Maria and Tudela, all within the municipality of Trento, Agusan del Sur. Under the approved ECC, the project covers 23,301.74 hectares property, acquired by the proponent through a Memorandum of Agreement with Federation of Trento Manobo Tribal Council Inc. (FETREMTCO) of **CADT R13-TRE-0518-223**.

Project Type and Size

- ³ In line with the current developments on the Project, rectification of CADT R13-TRE-0518-223 due to the adjustment of NGP areas, and its boundary adjustments following the dispute resolution of the IPs, and the new boundary survey conducted by NCIP dated May 25, 2022, LEPI proposes modification with the project components. Summarized below are the proposed modifications for this ECC amendment application.

General Overview of Proposed Modification

Description	ECC-R13-2106-005	Proposed Modification
Location	Barangays Cebolin, Cuevas, Langkilaan, Manat, New Visayas, Pangyan, Salvacion, San Ignacio, San Isidro, San Roque, Sta. Maria and Tudela, Trento, Agusan del Sur	No Modification
Total Project Area	23,301.74 hectares	17,963.18 hectares
Project Type / Activity	Tree Plantation (Cat. D) Headquarter (Cat. B) Road widening (Cat. B)	Inclusion of harvesting with an annual yield of 1,592,000 cubic meters of wood materials (Cat. A)
Project Components	<ul style="list-style-type: none"> • Tree Plantation • Headquarter <ul style="list-style-type: none"> - Administrative building - Motorpool Building with Stand-by Diesel Power Generator - Nursery Area with 1 Multi-purpose Building - Main Gate Security Bldg. - Perimeter Fence - Water System with Pump House and Overhead Tank • Logging Roads • Protected area • Buffer zone 	<ul style="list-style-type: none"> • Tree Plantation • Headquarter <ul style="list-style-type: none"> - Administrative building - Motorpool Building with Stand-by Diesel Power Generator - Main Gate Security Bldg. - Perimeter Fence - Water System with Pump House and Overhead Tank - Parking Area • Nurseries • Logging Road • Protection/Conservation Area



Project site within the CADT R13-TRE-0518-223

Project Components

- ⁴ The five major components of the project described in the approved ECC are the: a) tree plantation, b) headquarter, and c) logging road, (d) protected area and (e) buffer zone.
- ⁵ Proposed modification of the components shall cover: a) tree plantation, b) headquarter, c) nursery, d) logging road, and e) protection/conservation area, as summarized in a matrix in the succeeding table.

Project Components Matrix

Project Components/ Facilities	Existing (ECC- R13-2106-005)	Proposed Changes for the Amendment	
	Area Allocation (m ² or has.)		Specification / Description
1. Tree Plantation	15,920 hectares	15,920 hectares	<p>The planting intensity up to 4,444 trees per hectare at 1.5 X 1.5 meters to 3 X 3 meters spacing will be done, subject to area conditions and optimization during operations. These trees will be planted in the area identified by LEPI and FETREMCO as production forest areas.</p> <p>Protected areas such as sacred grounds, old secondary forest, buffer areas, and those considered as protection zone will be separated for protection and conservation. Assisted natural regeneration including enrichment planting of native tree species will be done.</p> <p>The cycle or rotation period is three (3) years from planting. The management will be conducted together with the Indigenous People for the next twenty-four (24) years or more based on the contract</p>
2. Headquarter	5.01 hectares	12.33 hectares	This will be the center for the project administrative, maintenance and logistical operations.
3. Nurseries	<i>Subcomponent of Headquarter: 3.00 hectares with 600 sq. m. building</i>	92.42 hectares	The nursery seedlings production center will have one (1) main central nursery and six (6) satellite nurseries spread over the project area with total seedling capacity of approximately 83.4 million seedlings.
4. Logging Roads	56.65 hectares (186.82 km)	93.64 hectares (167.00 km)	These roads will be for logs, seedlings, equipment and personnel transport
5. Protection / Conservation Area	7,030.13 hectares (Protected Area) 289.86 hectares (Buffer Zone)	1,844.78 hectares	This includes all inland water with 40-meter buffer zone, conservation areas, slope class, and CADT protected areas.
Total Project Area	23,301.74	17,963.18	

Process Technology

Technology description

- ⁶ The management of the plantation will be done by block method because the area is composed of harvestable trees from the previous concessionaire. The identified plantable blocks will be subjected to the standard planting and cycle.
- ⁷ Plantation management is broadly divided into nine management phases: a) Planting Site Survey and Delineation, b) Selection of Species for Planting, c) Nursery Establishment/ Planting Stock Production, d) Planting Site Preparation, e) Transport of Planting Materials, f) Planting g) Protection and Maintenance h)Harvesting, i) Log transportation/storage and an additional Scalling and weighing of produce. The brief descriptions of the management schemes are shown in the succeeding paragraphs.
1. Planting site survey and delineation - The survey aims to provide a general layout of the area, assess vegetation and soil conditions, and determine boundaries. The delineation using GIS will identify production areas, separate protection areas identified by Indigenous People, and divide the area into

manageable blocks. The outcome will show current infrastructure, proposed nursery sites and future developments, and roads for better balance and sustainability.

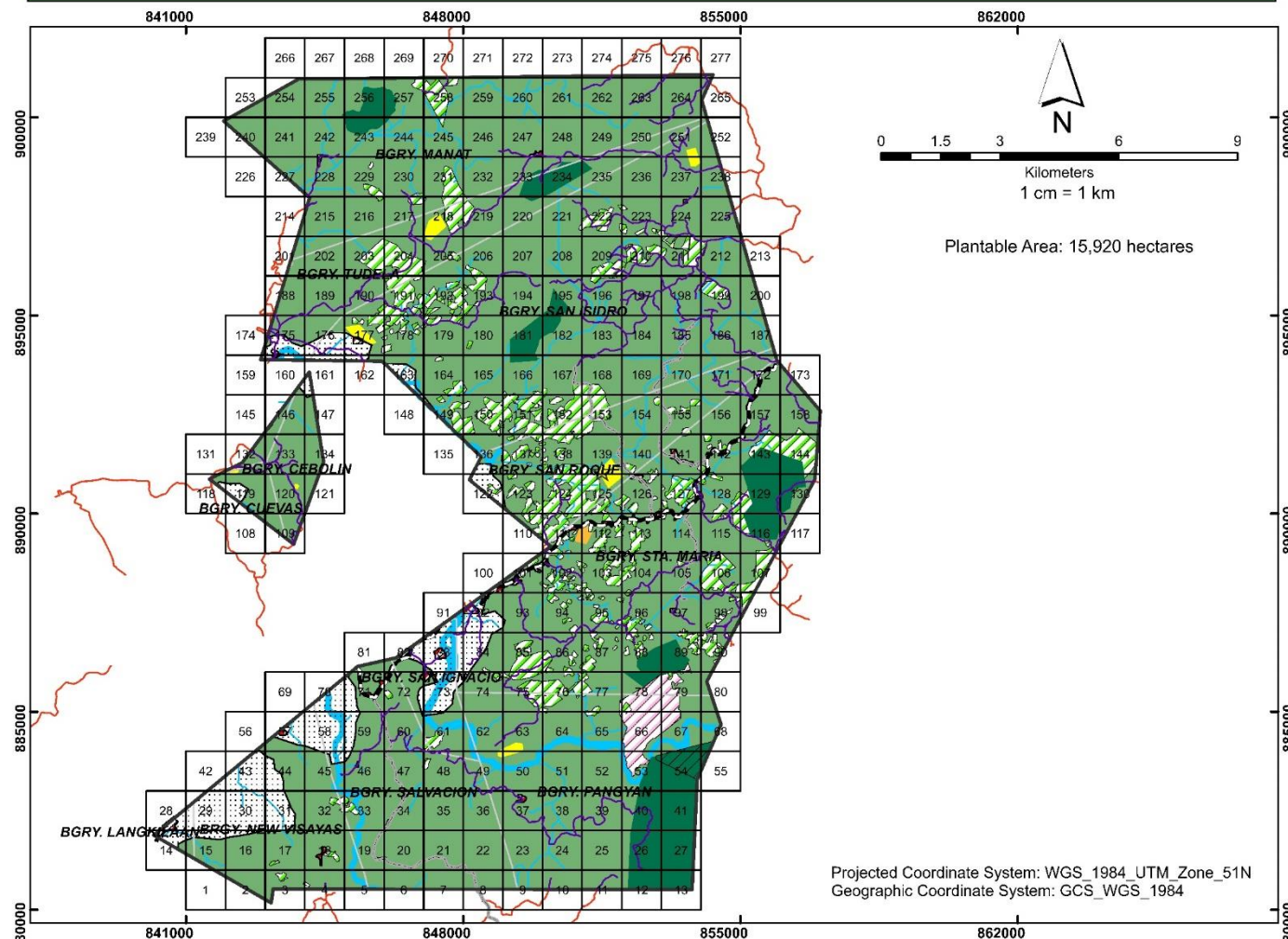
2. Selection and sourcing of species for planting - *Acacia mangium* is a species of tree that is well adapted to the Philippines for reforestation and rehabilitation purposes, according to reports and studies. It is an evergreen, fast-growing tropical tree that can grow up to 30 m tall and 50 cm thick. The tree is native to Indonesia, Papua New Guinea, and Australia. Still, it has been introduced to other countries for use as a plantation tree due to its rapid growth and tolerance to poor soil. *A. mangium* has a variety of uses, including furniture, cabinets, turnery, floors, particleboard, plywood, veneer, fence posts, firewood, and charcoal. It is also used in pulp and paper making because of its good pulp traits. The suitability of *A. mangium* to the site conditions of the Philippines was determined based on soil, climate, elevation, and slope, and the seeds will be sourced locally.
3. Nursery establishment and planting stock production - The plan is to establish nurseries for producing planting stock, including a central nursery and satellite nurseries near the plantations to easily transport seedlings. In case of a seedling shortage, local procurement may be used.
4. Preparation of the planting site - The preparation of planting sites includes clearing and cultivation activities such as brushing, clearing, marking, staking, and hole digging. Unwanted vegetation and weeds will be removed using tools like bolo and scythe. Rocks that may affect seedling growth will be removed, and soil will be loosened if necessary. The spacing between seedlings will be 1.5m x 1.5m to 3m x 3m to maximize tree density and wood yield and will be adjusted based on existing plants, rocks, and other obstacles. Staking and hole digging will be done to accommodate the roots of the seedlings and fertilizer. The area used is suitable for *Acacia mangium*, and no site amelioration is needed. Seedlings will be planted in contour lines on slopes and straight lines on flat areas, and organic fertilizer and pesticides will be used for their production and growth.
5. Transport of planting materials - Proper hauling of the seedlings to plantation site is necessary because seedling transport is critical to its survival. Watering the seedlings before loading may help. Seedlings should be handled on the container, not the stem, to avoid damage.
6. Planting - Planting for the LEPI plantation can be done year-round due to the climate and organic and soil-based bio-fertilizers will be applied to improve soil. Seedlings will be planted with the ball of soil on the same level as the ground, stabilized with topsoil and subsoil, and surrounded by a shallow catchment to retain moisture. The plantation of LEPI is a short-rotation forestry/plantation, and the target area is 9,325 hectares to be developed in three years, with a target of 3,108 hectares per year. The company will adopt high-density planting with 1.5 X 1.5 meters to 3 X 3 meters spacing or up to 4,444 trees per hectare for maximum yield, with an expected 300 tons per hectare at 50% moisture content.
7. Protection and maintenance - The maintenance phase of a plantation involves various silvicultural activities, such as fire protection, replanting, weeding, pruning, and thinning. Management treatments vary between blocks and may not always require thinning or pruning.
8. Harvesting - Manual harvesting will be used for cutting trees in the plantation and will provide job opportunities for the community. It is preferred over mechanical harvesting because it has a lower environmental impact, as part of a short rotation woody crop plantation scheme.
9. Log Transport/Hauling - All wood harvested from the plantation will be loaded mechanically on haulers along the road. Woods that will be gathered are smaller in diameter and length than timber; hence hauler trucks will be configured to accommodate the woody crops.
10. Scaling and Weighing - Harvested wood will be scaled and weighed at the mill site for documentation purposes and to monitor the production performance of the plantation. A standard scale and weighing method will be used in compliance with the law on tree harvesting and to determine the actual yield of the plantation

Operation

- ⁸ The project will operate with a cycle or rotation period of three years from planting. The management will be conducted with the Indigenous People for the next 24 years or more based on the contract. The intensity of planting is 4,444 trees per hectare. The *Acacia mangium* will be planted in areas identified by the LEPI and MMADMC as production forests. Areas such as existing NGP sites, sacred grounds, steep slopes, and elevation are within the protected area for assisted regeneration.
- ⁹ The newly developed plantations shall be harvested when they reach their rotation period of three years or earlier, depending on the end-use of the product. All harvested products shall be hauled, transported, and delivered to the company's log yard to be established and located near the project area and access roads. The harvesting and transport of trees plantation inside the CADT area will be in accordance with the approved

Ancestral Domains Sustainable Development and Protection Plan (ADSDPP) and existing laws, rules, and regulations of the NCIP and DENR.

Trento Tree Plantation Site Development Plan



Legend

- Management Block
- CADT 223
- Barangays within CADT 223
- A&D
- Project Area**
 - LEPI Plantable Area
 - LEPI Headquarter
 - LEPI Main Nursery
 - LEPI Indicative Satellite Nursery
 - Logging Road: Secondary Road
 - Logging Road: Tertiary Road
 - Inland Water with 40m Buffer Zone
 - CADT Protected Area
- Excluded from the Project**
 - Highway
 - Built-up Area
 - NGP 2016-2022
 - CADT Agro-Forestry Area
 - CADT Protected Area

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Trento Tree Plantation Site Development Plan

Summary of Alternatives Considered in terms of Siting, Technology Selection/Operation Processes and Design

Category	Considerations
Siting Project Location	The proponent considered the approved CADD areas in Region 13 and Region 11 for siting of the project during the pre-feasibility stage. The CADD R13-TRE-0518-223 has a rectified area of 21,594.36 hectares in Trento Municipality was selected.
Tree Plantation	The main criterion is the availability of plantable area within the CADD R13-TRE-0518-223. The 15,920-hectare proposed plantation area is currently planted by Acacia (<i>Acacia auriculiformis</i>) and Falcata (<i>Paraserianthes falcata</i>).
Headquarter and support facilities	To be developed within a flat and rolling terrain. The criteria for selecting the site are cost, time efficiency construction, and operation requirements.
Logging Roads	The existing barangay roads are all-weather roads but with light or heavy damages. These access roads will be rehabilitated before used as logging roads with area coverage of 93.64 hectares. Their maintenance during operation phase will provide better road transport of the public as well.
Protection / conservation area	Includes all inland water with 40-meter buffer zone, conservation areas, slope class, and CADD protected areas.
Nursery	The nursery seedlings production center with a coverage of 92.42 hectares will have one (1) main central nursery and six (6) satellite nurseries spread over the project area with total seedling capacity of approximately 83.4 million seedlings.
Technology selection	Tree plantation establishment is broadly divided into three management phases: (a) seedlings production and nursery maintenance, (b) plantation establishment and management, and (c) tree cutting and transport. The plantation management phase includes the following silvicultural activities: protection, tending (weeding and fertilizing), pruning, thinning, felling and regeneration/replanting. This management technology is standard to the Philippine wood industry particularly for large-scale industrial forest plantation. Hence, no other technologies including the tree felling and cutting and transport were considered.
Resources	Resources needed for project implementation are available at the site, e.g., access to power, road network, water supply, solid waste collection, among others.
Hazard contextualization	The project site is safe from most natural hazard but has a low susceptibility to rain-induced landslides.
No Project Option	The impacts during project implementation will not be observed at the "no Project" scenario. Other impacts however, e.g., deforestation due to population increases and the absence of economic growth may occur if the project will not push through.

Concise Integrated Summary of the Main Impacts and Residual Effects after Applying Mitigation

¹⁰ The concise integrated summary of the main impacts and residual effects after mitigation is presented in a table the following page.

Project Proponent's Statement of Commitment and Capability to Implement Necessary Measures to Prevent Adverse Impacts

¹¹ Lumino Energy Plantations Inc. commits to following the guidelines outlined in the Environmental Management Plan (EMP), Environmental Monitoring Plan (EMoP), and Environmental Compliance Certificate (ECC) during all phases of the project. We take our environmental responsibilities seriously and are dedicated to ensuring that all measures taken to address potential impacts are in accordance with relevant laws, policies, guidelines, and standards. Our goal is to meet the target level of efficiency and performance outlined in the EMP to guarantee that the protective and mitigating measures we implement are adequate and meet the project's requirements.

Integrated Summary of the Main Impacts and Residual Effects After Mitigation

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
PRE-CONSTRUCTION PHASE					
Due diligence	(LAND) Land use and classification	<ul style="list-style-type: none"> Compatibility with existing land use 	<ul style="list-style-type: none"> Confirm classification of the other project areas to the zoning regulation of the Municipality or Trento Confirm existence of NGP areas within the project site with DENR CENRO 	Confirm 100% of the Project Areas zoning regulations and nearest areas for NGP.	Issuance of the Zoning Clearance NGP overlap issues resolved
	(LAND) Pedology	<ul style="list-style-type: none"> Soil erosion, loss of topsoil and overburden 	<ul style="list-style-type: none"> Formulate a Soil Erosion Management Plan (SEMP) that includes among others minimized cut and fill operations and Immediate removal of excavated soil stockpiles 	100% Formulation of Soil Erosion Plan	Soil erosion controlled and minimized
	PEOPLE	<ul style="list-style-type: none"> Displacement of land and conflict in land ownership 	<ul style="list-style-type: none"> Compliance to NCIP regulation as authority over project area 	100% Completion of Pre Conditions of the NCIP Certificate	-
	PEOPLE	<ul style="list-style-type: none"> Traffic congestion 	<ul style="list-style-type: none"> Prepare a workable Traffic Management Plan (TMP) at all affected public roads 	100% completion of Traffic Management Plan	-
Land acquisition	(LAND) Land use and classification	<ul style="list-style-type: none"> Possible tenorial/ land issue 	<ul style="list-style-type: none"> Ensure authority to develop the project site 	Securing 100% of land titles	Land issues resolved
Design of the project components	(LAND) Land use and classification	<ul style="list-style-type: none"> Encroachment in Environmentally Critical Areas (ECA) 	<ul style="list-style-type: none"> Include susceptibility of the project site to geo- and hydrological hazards in the detailed design 	Continuous Monitoring conducted	-
	(LAND) Geology – Impacts of the project	<ul style="list-style-type: none"> Change in sub-surface and underground geomorphology Inducement of geo-hazards 	<ul style="list-style-type: none"> Conduct Geotechnical Investigation and EGGA and consider its recommendations 	100% Completion of EGGA Activities and implementation of recommendations	Unnecessary changes in surface landform, sub-surface geomorphology, and inducement of geohazards minimized
		<ul style="list-style-type: none"> Geo-, hydrological, and meteorological hazards 	<ul style="list-style-type: none"> Consider recommendations of the GIR and EGGAR and use industry standards for seismic and structural design parameters 	¹² 100% Completion of EGGA Activities and implementation of recommendations	¹³ Susceptibility of the Project components from geo- and hydrological hazards minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
Design of the project components	(LAND) Terrestrial biology	<ul style="list-style-type: none"> Impacts on terrestrial flora and fauna 	<ul style="list-style-type: none"> Conduct a complete census of flora to determine the total count of affected trees and other arborescent taxa; Consider the locations of significant vegetation types and populations during project design; Secure a Tree Cutting Permit from the DENR; Prepare a Construction Vegetation Removal Plan (CVRP); Prepare a Construction Vegetation and Tree Planting Program (CVTPP); Prepare a Buffer Zone Plan (BZP); Prepare a Tree Transfer and Balling Plan (TTBP) for affected mature trees. Prepare a Tree Survival and Monitoring Plan (TSMP); Prepare a Vegetation and Tree Planting Program during Operations (VTPPO) Prepare a Biodiversity Conservation Plan (BCP); and Prepare a Wildlife Monitoring Plan (WMP) 	¹⁴ 100% compliance to Tree Cutting Permit requirements	¹⁵ Impacts to terrestrial ecology controlled and minimized
CONSTRUCTION PHASE					
<ul style="list-style-type: none"> Site clearing and preparation Construction of utilities (road, drainage, water supply, septic vaults) Erection of headquarter 	(LAND) Land use and classification	<ul style="list-style-type: none"> Impairment of visual aesthetics 	<ul style="list-style-type: none"> Proper implementation of the Buffer Zone Plan (BZP) 	100% Completion and implementation of Buffer Zone Plan	Issuance of the Zoning Clearance NGP overlap issues resolved
		<ul style="list-style-type: none"> Devaluation of land value as a result of improper solid waste management 	<ul style="list-style-type: none"> Proper implementation of the Construction Plan and CWMP 	100% Completion of the Construction Plan and CWMP	Insignificant devaluation of land value due to improper solid waste management
	(LAND) Geology	<ul style="list-style-type: none"> Change in sub-surface geomorphology Inducement of subsidence and liquefaction 	<ul style="list-style-type: none"> Proper implementation of the Construction Plan 	100% Completion of the Construction Plan and CWMP, and Continuous	Unnecessary changes in surface landform, sub-surface geomorphology, and

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
		<ul style="list-style-type: none"> Effects of geo- and hydrological hazards 	<ul style="list-style-type: none"> Proper implementation of the Construction Plan 	Monitoring of its implementation. 100% Completion of the Construction Plan and CWMP	inducement of geohazards minimized Susceptibility of the Project components from geo- and hydrological hazards minimized
		<ul style="list-style-type: none"> Soil erosion or loss of topsoil 	<ul style="list-style-type: none"> Proper implementation of the Construction Plan Proper implementation of the SEMP 	100% Completion of the SEMP and its implementation	Soil erosion controlled and minimized
	(LAND) Pedology	<ul style="list-style-type: none"> Change in soil quality/fertility 	<ul style="list-style-type: none"> Further study on soil fertility and micronutrient requirements of the tree species for planting Formulate a Soil Fertility Augmentation Plan (SFAP) Proper implementation of the Construction Plan Provide oil sumps in machine repair shops Proper storage and disposal of used oil and other hazardous wastes 	Continuous Monitoring of Soil Quality Continuous implementation of Solid waste management plans	Changes in existing soil quality and fertility controlled and minimized
		<ul style="list-style-type: none"> Vegetation removal and loss of habitat Threat to existence of important local species, abundance, frequency and distribution of important species Hindrance to wildlife access. 	<ul style="list-style-type: none"> Proper implementation of the Construction Plan Proper implementation of the CVRP, CVTPP, BZP, TTBP, and Tree Cutting Permit conditions Strict implementation of a "No Hunting and No Collecting" policy Minimize hindering the flow of streams at the project area. Limit the development activities within the planned structure or component footprint. 	100% Completion of Construction Plan and continuous monitoring of its implementation. 100% Acquisition of Necessary permits and licenses. 100% implementation of Plans mentioned	Impacts to terrestrial ecology controlled and minimized
	(LAND) Terrestrial ecology				
	(WATER) Hydrology	<ul style="list-style-type: none"> Change in drainage morphology Inducement of flooding 	<ul style="list-style-type: none"> Provide temporary drainage system Provide detention ponds in the immediate drainage outlet to maintain the peak runoff 	100% Completion of Flood Management Plan.	Minimized changes in the existing drainage morphology

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
			<ul style="list-style-type: none"> Formulate a Flood Management Plan (FMP) for the operation phase 		
	(WATER) Water quality	<ul style="list-style-type: none"> Degradation of surface water quality 	<ul style="list-style-type: none"> Housekeeping practices Provide onsite sanitary facilities Provide adequate drainage leading to siltation ponds 	Continuous Monitoring of Water quality	Water pollution of waterbodies controlled and minimized
	(WATER) Freshwater ecology	<ul style="list-style-type: none"> Impact to freshwater biodiversity 	<ul style="list-style-type: none"> Proper implementation of the SEMP Provide cover, bunds, and drainage canal leading to silt ponds for stockpiles Proper implementation of the CWMP Provide onsite sanitation facilities Provide cover on vehicles carrying construction materials Formulate and implement protocols to address gasoline and oil spills from boats (if used during construction) using the Simulao River. 	100% Completion of the SEMP and its implementation Continuous Monitoring of Water Quality	Impacts to the freshwater ecology controlled and minimized
	(AIR) Meteorology	<ul style="list-style-type: none"> Contribution in terms of greenhouse gas emissions 	<ul style="list-style-type: none"> Regular and proper maintenance of motor vehicles and heavy equipment Optimize schedule of vehicle use Regular and proper maintenance of onsite power generators 	Continuous monitoring of the implementation of Maintenance of heavy equipment both internally and from contractors	Insignificant greenhouse gas emissions
	(AIR) Air quality	<ul style="list-style-type: none"> Degradation of air quality 	<ul style="list-style-type: none"> Implement dust suppression methods, e.g., water application and vehicle speed restriction Optimize the use of heavy equipment and motor vehicles Compacting of exposed soil surfaces Provide tarpaulin cover on trucks loaded with construction materials Regular maintenance of heavy equipment and motor vehicles Regular maintenance of standby generator Prohibit engine idling in parking areas 	Continuous Implementation of dust preventing practices 100% implementation of Pollution Management Measures.	Air pollution controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
	(AIR) Noise	<ul style="list-style-type: none"> Noise pollution 	<ul style="list-style-type: none"> Provide and maintain mufflers of gasoline or diesel engines powered equipment Establish barriers and shielding stationary vibrating equipment 	Continuous monitoring of Construction Plan	Excessive noise levels attenuated
	PEOPLE	<ul style="list-style-type: none"> In-migration 	<ul style="list-style-type: none"> Monitor arrival of informal dwellers within the project area 	100% completion and implementation of Construction plan including its development of Tempfacil..	In-migration controlled and addressed
		<ul style="list-style-type: none"> Impacts on IPs/Culture/Lifestyle 	<ul style="list-style-type: none"> Proper orientation of migrant workers on culture of IP groups 	100% Completion of NCIP Requirements	Impacts on IP group, culture, and lifestyle minimized
		<ul style="list-style-type: none"> Impacts on physical cultural resources 	<ul style="list-style-type: none"> Report chance finds to National Museum 	100% Turnover of any found cultural resources.	Physical cultural resources preserved
		<ul style="list-style-type: none"> Threat to public health and safety 	<ul style="list-style-type: none"> Contractor's vaccination plans and to sustain the minimum health protocols in conformance with the national and local guidelines Regular and proper maintenance of heavy equipment and vehicles Proper implementation of the CWMP Proper implementation of the Construction Plan 	100% Creation and Implementation of Safety Process and Procedures, including but not limited to wearing PPEs, CoViD-19 related measures. 100% of Contractors submitting Safety and Health Management Plans.	Threat to public health and safety controlled and minimized
		<ul style="list-style-type: none"> Generation of local benefits from the project (BENEFICIAL IMPACT) 	<ul style="list-style-type: none"> Prioritize hiring of qualified residents from the host barangays Purchase supplies from local sources Provide livelihood opportunities if possible Prompt payment of taxes and other legal fees 	100% completion of SDMP	Local benefits from the project maximized
		<ul style="list-style-type: none"> Threat to delivery of basic services and resource competition 	<ul style="list-style-type: none"> Monitor arrival of informal dwellers within the project area 	Monitoring of migrating applicants	Threat to delivery of basic services and resource competition controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
		Traffic contribution along impact roads	<ul style="list-style-type: none"> Implement the Traffic Management Plan 	100% completion and implementation of traffic Management Plan	Traffic congestion and accidents controlled and minimized
OPERATION PHASE					
Administrative Works	PEOPLE	Generation of local benefits from the project (BENEFICIAL IMPACT)	<ul style="list-style-type: none"> Prioritize hiring of qualified residents from host barangay Purchase supplies from local sources Provide livelihood opportunities Prompt payment of fees and taxes 	100% implementation of SDMP	Local benefits from the project maximized
Nursery Operation & Tree Planting	(LAND) Land use and classification	Impairment of visual aesthetics	<ul style="list-style-type: none"> Sustained implementation of the BZP 	100% implementation of BZP	Minimal impairment of visual aesthetics
		Devaluation of land value as a result of improper solid waste management	<ul style="list-style-type: none"> Proper implementation of the IWMP Best housekeeping practices 	100% implementation of IWMP	Insignificant devaluation of land value due to improper solid waste management
		Effects of geo- and hydrological hazards	<ul style="list-style-type: none"> Undertake assessment of slope protection measures after heavy rain or seismic events Maintain drainage system Regular inspection of structure integrity 	All assessments undertaken and necessary actions implemented	Susceptibility of the Project components from geo- and hydrological hazards minimized
	(LAND) Pedology	Soil contamination by municipal and hazardous waste	<ul style="list-style-type: none"> Proper implementation of the IWMP Best housekeeping practices 	100% implementation of IWMP	Soil contamination controlled and minimized
		Soil erosion	<ul style="list-style-type: none"> Sustained implementation of the SEMP 	100% implementation of SEMP	Soil erosion controlled and minimized
	(LAND) Terrestrial ecology	<ul style="list-style-type: none"> Vegetation removal Threat to existence of important indigenous species Threat to Abundance, Frequency, and Distribution of Important Species Hindrance to Wildlife Access (avifauna) 	<ul style="list-style-type: none"> Sustained implementation of the Buffer Zone Plan Proper Implementation of the Tree Survival and Monitoring Plan Proper Implementation of the Vegetation and Tree Planting Program during Operations Sustained implementation of the Biodiversity Conservation Plan (BCP) 	100% implementation of Plans mentioned	Impacts to terrestrial ecology controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
			<ul style="list-style-type: none"> • Proper Implementation of the Wildlife Monitoring Plan (WMP) 		
	(WATER) Freshwater ecology	<ul style="list-style-type: none"> • Impact to freshwater biodiversity 	<ul style="list-style-type: none"> • Sustained implementation of the SEMP • Proper implementation of the IWMP • Provide onsite sanitation facilities • Sustained implementation of protocols to address gasoline and oil spills from boats (if used during operation) using the Simulao River. 	100% implementation of SEMP and WMP mentioned	Impacts to freshwater ecology controlled and minimized
Plantation Protection and Maintenance Operations	(LAND) Pedology	<ul style="list-style-type: none"> • Soil contamination by municipal and hazardous wastes 	<ul style="list-style-type: none"> • Proper implementation of the IWMP • Best housekeeping practices 	100% implementation of IWMP	Soil contamination controlled and minimized
		<ul style="list-style-type: none"> • Soil erosion 	<ul style="list-style-type: none"> • Sustained implementation of the SEMP 	100% implementation of SEMP	Soil erosion controlled and minimized
	(LAND) Terrestrial ecology	<ul style="list-style-type: none"> • Vegetation removal • Threat to existence of important indigenous species • Threat to Abundance, Frequency, and Distribution of Important Species • Hindrance to Wildlife Access (avifauna) 	<ul style="list-style-type: none"> • Sustained implementation of the Buffer Zone Plan • Proper Implementation of the Tree Survival and Monitoring Plan • Proper Implementation of the Vegetation and Tree Planting Program during Operations • Sustained implementation of the Biodiversity Conservation Plan (BCP) • Proper Implementation of the Wildlife Monitoring Plan (WMP) 	100% implementation of Plans mentioned	Impacts to terrestrial ecology controlled and minimized
Harvesting	(LAND) Terrestrial ecology	<ul style="list-style-type: none"> • Vegetation removal and loss of habitat • Threat to existence of important local species, 	<ul style="list-style-type: none"> • Sustained implementation of the Buffer Zone Plan • Proper Implementation of the Tree Survival and Monitoring Plan 	100% implementation of Plans mentioned	Impacts to terrestrial ecology controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
		abundance, frequency and distribution of important species • Hindrance to wildlife access.	• Proper Implementation of the Vegetation and Tree Planting Program during Operations • Sustained implementation of the Biodiversity Conservation Plan (BCP) • Proper Implementation of the Wildlife Monitoring Plan (WMP)		
	(WATER) Hydrology	• Change in drainage morphology • Inducement of flooding • Increase in run-off	• Provide temporary drainage system • Provide detention ponds in the immediate drainage outlet to maintain the peak runoff • Formulate a Flood Management Plan (FMP) for the operation phase	100% implementation of FMP	Flooding and run-offs minimized
	(WATER) Water quality	• Vegetation removal may have potential impact on siltation • Degradation of surface water quality	• Best housekeeping practices • Provision of sanitation facilities • Maintain drainage system leading to siltation ponds • Monitor water quality affected portions of the Simulao River.	100% implementation of drainage plan	Water pollution of waterbodies controlled and minimized
	(WATER) Freshwater ecology	• Impact to freshwater biodiversity	• Sustained implementation of the SEMP • Proper implementation of the IWMP • Provide onsite sanitation facilities • Sustained implementation of protocols to address gasoline and oil spills from boats (if used during operation) using the Simulao River.	100% implementation of SEMP	Impacts to the freshwater ecology controlled and minimized
	(AIR) Meteorology	• Contribution in terms of greenhouse gas emissions	• Regular maintenance of standby generator(s) • Optimize use of motor vehicles • Prohibit engine idling in parking areas	• 100% implementation of necessary equipment maintenance and usage of Pollution control devices on applicable equipment • 100% implementation of tree planting and reforestation plans	¹⁶ Insignificant greenhouse gas emissions

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
	(AIR) Air quality	<ul style="list-style-type: none"> Degradation of air quality 	<ul style="list-style-type: none"> Implement dust suppression methods, e.g., water application and vehicle speed restriction Optimize the use of off-road equipment and motor vehicles Compacting of exposed soil surfaces Provide tarpaulin cover on trucks loaded with logs Regular maintenance of off-road equipment and motor vehicles Prohibit engine idling in parking areas 	100% implementation of necessary equipment maintenance and usage of Pollution control devices on applicable equipment	Air pollution controlled and minimized
	(AIR) Noise	<ul style="list-style-type: none"> Noise pollution 	<ul style="list-style-type: none"> Regular maintenance of off-road equipment Maintain vegetated buffer along the perimeter 	Continuous Monitoring of noise level in the project site.	Excessive noise levels attenuated
	(PEOPLE)	<ul style="list-style-type: none"> Threat to public health and safety 	<ul style="list-style-type: none"> LEPI's vaccination plans and to sustain the minimum health protocols in conformance with the national and local guidelines Provide onsite sanitation facilities Regular and proper maintenance of vehicles Proper operation and maintenance of sanitary facilities Proper implementation of the IWMP 	100% implementation of health and safety management plan.	Threat to public health and safety controlled and minimized
Log Storage and Transportation and Road Maintenance	(LAND) Pedology	<ul style="list-style-type: none"> Soil erosion 	<ul style="list-style-type: none"> Sustained implementation of the SEMP 	100% implementation of IWMP	Soil contamination controlled and minimized
		<ul style="list-style-type: none"> Soil Compaction 	<ul style="list-style-type: none"> Sustained implementation of the SEMP 	100% implementation of SEMP	Soil erosion controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
	(AIR) Meteorology	<ul style="list-style-type: none"> Contribution in terms of greenhouse gas emissions 	<ul style="list-style-type: none"> Optimize use of heavy vehicles Prohibit engine idling in parking areas 	<ul style="list-style-type: none"> 100% implementation of necessary equipment maintenance and usage of Pollution control devices on applicable equipment 100% implementation of tree planting and reforestation plans 	¹⁷ Insignificant greenhouse gas emissions
	(AIR) Air quality	<ul style="list-style-type: none"> Degradation of air quality 	<ul style="list-style-type: none"> Implement dust suppression methods, e.g., water application and vehicle speed restriction Optimize the use of heavy equipment and motor vehicles Compacting of exposed soil surfaces Provide tarpaulin cover on trucks loaded with logs Regular maintenance of heavy equipment and motor vehicles Prohibit engine idling in parking areas 	<ul style="list-style-type: none"> 100% implementation of necessary equipment maintenance and usage of Pollution control devices on applicable equipment 	Air pollution controlled and minimized
	(AIR) Noise	<ul style="list-style-type: none"> Noise pollution 	<ul style="list-style-type: none"> Maintenance of heavy equipment Maintain vegetated buffer along the perimeter 	Continuous Monitoring of noise level in the project site.	Excessive noise levels attenuated
	(PEOPLE)	<ul style="list-style-type: none"> Threat to public health and safety 	<ul style="list-style-type: none"> LEPI's vaccination plans and to sustain the minimum health protocols in conformance with the national and local guidelines Provide onsite sanitation facilities Regular and proper maintenance of vehicles Proper operation and maintenance of sanitary facilities Proper implementation of the Traffic Management Plan Proper implementation of the IWMP 	100% implementation of health and safety management plan.	Threat to public health and safety controlled and minimized
		<ul style="list-style-type: none"> Traffic congestion 	<ul style="list-style-type: none"> Proper implementation of the Traffic Management Plan 	100% completion of created Traffic Management Plan	Traffic congestion and accidents controlled and minimized

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention, Mitigation or Enhancement	Target Efficiency	Residual Effects
ABANDONMENT / REHABILITATION PHASE					
Administrative Works	(PEOPLE)	<ul style="list-style-type: none"> • Possible loss of employment / • Loss of livelihood 	<ul style="list-style-type: none"> • Series of consultations with stakeholders before implementation of abandonment for proper turn-over of constructed facilities and structures 	100% of stake holders representatives involved	Local benefits from the project maximized
Rehabilitation/ Restoration	(LAND)	<ul style="list-style-type: none"> • Land use change 		100% implementation of Abandonment and Rehabilitation Plans	