

1.1 Project Description

Mayon KJ Realty Development, Inc. intends to develop an eighteen (18) - hole golf course on an approximately 67 hectares of land in Barangay Padang, Legazpi City, to be known as Mayon Imperial Golf Club Project (formerly Dona Pepita golf course). Also included in the golf course design is a driving range, clubhouse and maintenance area. A nursery is also proposed for the propagation of sod to be used as turf on the fairways, greens and tees of the golf course. The golf course will include Fairways, Greens, Tees and Roughs, sand bunkers and a club house.

The project is in line with the local government's goal to promote eco-tourism within the City.

1.2 Project Size, Location and Area

The proposed Mayon Imperial Golf Club Project is located at Barangay Padang, Legazpi City, Province of Albay. Legazpi is a first-class City located at the eastern portion of the province of Albay, which is approximately 527 kilometers away south from Manila in an overland trip. It is bounded on the north by the municipality of Santo Domingo, on the east by the Albay Gulf, on the west by the municipality of Daraga, and on the south by the municipalities of Manito, Pilar and Castilla, Sorsogon. The proposed project is geographically centered 13°13'8.03" North Latitude and 123°44'21.29" East Longitude and shown in **Figure 1.1**. Photos of the project area are presented in **Photos 1a to 1f**.

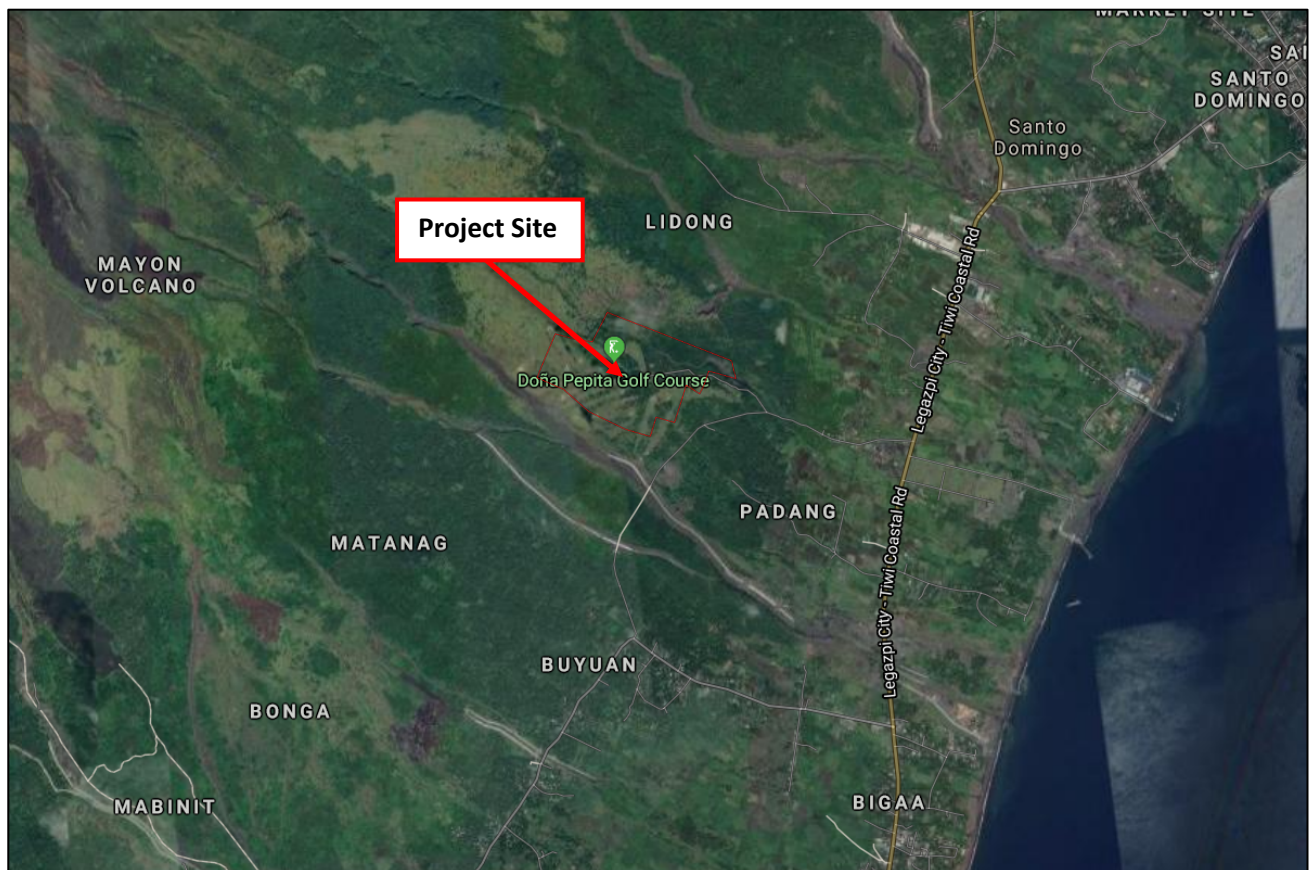
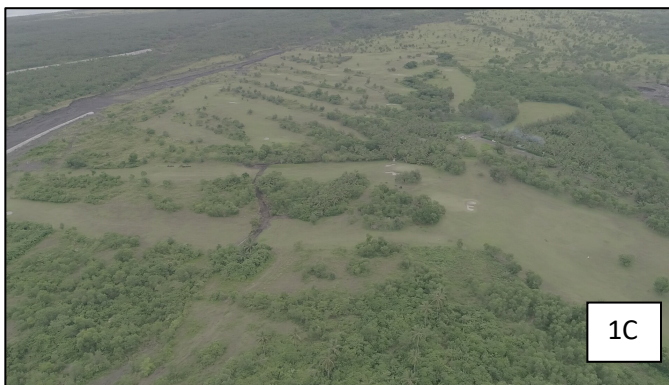
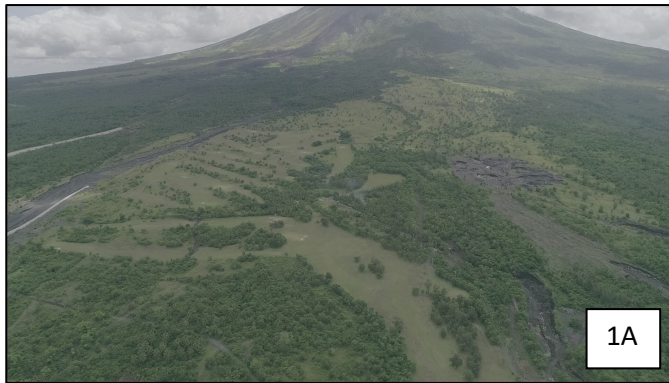


Figure 1.1: Map of the project site



Photos of the Project Area

Legazpi's topography is generally plain on the northeastern areas, with slopes ranging from five to fifteen degrees. The site has a gentle undulating terrain, dense vegetation in patches and natural features appropriate for the development of a golf course. The natural terrain topography will prevent unreasonable cut and fill. Also, the slopes can be adequately engineered and stabilized to accommodate a golf course.

The City of Legazpi is 527 kilometers or one hour plane flight or more than 10 hours away from Manila via South Luzon Expressway, Asian/Pan-Philippine/Maharlika Highway / Roman Superhighway to Legazpi City then travel 12 kilometers through the Tiwi coastal road. The project site may be accessed via land by traversing this coastal road.

Delineation of Impact Zones

The direct and indirect impact areas of the Project were delineated based on DENR Administrative Order No. 30 Series of 2003 (DAO 03-30) and DENR Administrative Order 2017-15.

As per DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), the biophysical and social impact areas (in terms of the environment) are those areas where all project components are proposed to be constructed/operated/situated which should be at least a 40-hectare golf course area. Indirect impact areas, on the other hand, are areas located immediately outside the coverage of the project facilities and operations. In accordance with Annex 2-2 of the Revised Procedural Manual (RPM), Sec 3.a, the Direct Impact Area (DIA) is defined as “the area where ALL project facilities are proposed to be constructed/situated and where all operations are proposed to be undertaken”. Based on the definition cited, the DIA is the 67-hectare project area where the proposed golf course project will commence.

On the other hand, Indirect Impact Areas (IIA) are areas located immediately outside the coverage of the project facilities, operations and activities. Specifically, these are the communities / barangays outside the project area that will be affected by the project. These impacts can be assumed or determined using secondary data, maps, and information from key informant interviews. The secondary impact areas are those which may experience and affected by the residual effect of the construction activities, such as but not limited to dust pollution and intolerable sound inside the project site, due to use of heavy equipment, vehicles and machineries.

DENR Administrative Order 2017-15 provides a more detailed description of the impact areas:

Impacts	Direct Impact Areas	Indirect Impact Areas
Biophysical Impacts	<ul style="list-style-type: none"> The entirety of the 67-hectare golf course area 	<ul style="list-style-type: none"> The adjacent waterbodies of the golf course Surrounding / adjacent barangays i.e, Padang and Lidong.
Social Impacts	<ul style="list-style-type: none"> Barangay Padang as primary beneficiaries of the Social Development Programs and whose lifestyle would be affected by the project. Residents of Barangay Padang who will most likely be affected by the construction and operation (livelihood and employment, health, etc.) City of Legazpi as direct beneficiary of the revenue from the development. 	<ul style="list-style-type: none"> Adjacent barangays/cities other than the primary beneficiaries of the SDP that will benefit at a provincial and regional level from potential revenues and taxes of the project. Adjacent communities other than direct impact areas that will benefit from potential livelihood and employment opportunities both during development and eventual operations.

The Impact Areas are delineated in the **Figure 1-2**.



Figure 1.2: Direct Impact Area (Red) and Indirect Impact Area (Yellow)

1.3 Project Rationale

1.3.1 Project Benefits

The project development is envisioned to be economically attractive while preserving a large portion of the area as green, aesthetically pleasant open space. Further, it will complement the residential area and enhance the overall land values of the property and environs. In addition, the project site has the potential of attracting tourists due to its proximity to existing resorts and tourist spots.

The project site for the proposed project is identified as one of the priority areas for eco-tourism of the city. Likewise, the area has been identified as tourist destination due to the presence of two resorts (an inland and a beach resort), nearness to a nature park and views of Mayon Volcano and Cagsawa ruins.

It has been projected that there will be a big need for developments that will blend the environs and at the same time provide enjoyment and satisfaction to residents and visitors.

1.3.2 Relevance to locality on a city, provincial, regional and national scale

The proposed project will contribute to the economic growth of the area by providing first-class recreational facilities. The project is projected to provide a major attraction for investors and tourists both local and foreign helping further boost in tourism in Legazpi City.

In the local context, the proposed project will increase job opportunities for the communities and revenues for the local government unit. As a consequence, it will induce economic growth and will also assist the economic recovery of the country through tourism industry/development.

1.4 Project Alternatives

1.4.1 Development Concept

The development area for the proposed golf course will see some changes to its environmental attributes (physical and biological). Ecologically there will be loss of habitat and species diversity in the area. While not discounting the value of the ecology that persists in the area, the loss to be incurred will be significant but not major as the species diversity in the area is not very high. Drainage patterns, groundwater, surface water and soil quality may also be affected.

From a Socio-Economic perspective the proposed golf course development would contribute significantly to a partial national, regional and local income generation. In addition, numerous jobs would be created by the development either directly or indirectly as well as community growth and development for the surrounding communities.

- **Utilization for Agriculture Alternative**

The large expanses of property available for development in this area could make it suitable for intense agricultural activity and this was mentioned in the CLUP of Legazpi City.

From an environmental perspective agriculture would, however, present similar negative impacts to the development of a golf course through the similar wholesale clearing of vegetation which would mean a loss of habitats for species currently occupying the development area. The impacts associated with the use of chemicals for the maintenance of these agricultural activities would also be similar and so would be the impacts associated with the strain on water resources that this type of activity would present. Characteristics of the area such as climate, poor soil cover, saline intrusion and topography would however make this practice unsuitable.

From a socio-economic perspective considerable revenue could be gained from agriculture through the supply of produce locally and for export if the area was suitable for this practice. The returns due to the characteristics of the area would however be marginal, as there would have to be a significant input of resources to make this alternative successful.

- **Utilization for Mining and Quarrying Alternative**

Mining is another alternative for land-use in the development area. Land-use information shows that the site consists mainly of dense vegetation with limited opportunity for mining; however. The area is also located near areas zoned for quarrying at the Padang River.

- **Housing and Resort Development Alternative**

The alteration of the Development plan design to strictly housing and resort development may not be the best option from an environmental perspective. This type of development would mean an increase in the amount of vegetation that would be cleared within the development area. Barangay Padang was also proposed for socialized housing. Due to security reasons and aesthetics the number of green belts and buffer areas that are proposed within the golf course design may be removed.

The number of houses and resort type activities would also increase in an effort to offset the loss of income that would be associated with the removal of the golf course from the development plan. Aesthetically this may not be best option either, as whilst there may be landscaping involved in the development, this cannot compare to the aesthetic appeal that would be afforded by the development of the golf course. This intensive concretization of the area would also have effects on the drainage patterns, the soil and to a lesser extent the climate of the area.

From a socio-economic perspective the increase in the residences, villas and hotels in the development, could mean an increase in the income earnings for the developers, as well as the increase in job creation and income generation for the surrounding communities as compared to the projections for the golf course.

- Project Design, Scale and Implementation Alternative

Nine (9) Hole Golf Course Alternatives

The alteration of the plan to include a nine (9)-hole golf course rather than an eighteen (18) hole golf course may see both positive and negative impacts on the environment. The design of a smaller golf course would mean that the level of clearing of vegetation, this would also mean that the amount of chemicals used on the golf course would be reduced, the level of change to the drainage patterns would decrease and the impacts to soil and underground water quality would also be reduced. Despite these initial obvious reductions of impact, the final impacts may be more negative than if a larger golf course was developed. A smaller golf course would mean that the areas for buffer zones and green areas would also be reduced as the developer may alter the development plans to increase the number of houses, villas and hotels within the development plans to offset the economic losses that developing a smaller golf course would have. This concretization would itself have its own major negative environmental impacts.

From a socio-economic perspective, whilst the development of a nine (9)-hole golf course would still have some socio-economic benefits, its benefits would be marginal to those that the proposed eighteen (18) -hole golf course would have. Due to the smaller size, the development may not receive the number of visitors expected to the area due to the inability to host championship games at the site. A smaller golf course would also mean that the amount of direct employment anticipated for the development in both the construction and operation phases would also decrease. This would also affect the indirect employment and income generation associated with the project.

- Chosen Alternative

Whilst the golf course itself may have major negative impacts on the environment, of all the alternatives presented, the development of the eighteen-hole golf course seems to be the most desirable. This proposal presents an opportunity for the retention of natural vegetation within the area as buffer areas will be incorporated in the golf course design and vegetation

that currently exists will be maintained for 'rough areas', which would still provide a habitat for fauna in the area.

From a socio-economic perspective the development of the eighteen (18)-hole golf course will have the most social and economic benefits locally, regionally and nationally.

1.4.2 Facility Siting

In the province that houses the volcano with the perfect cone shape, Mayon Volcano in Albay, lies the Doña Pepita Golf Course. It is also known as the Doña Pepita Eco Park and Golf Course. The golf club is a Par 72, 18-hole golf course that offers great views of the world famous Mayon Volcano and the Albay Gulf. The course was greatly affected by major eruptions of the volcano.

The factors considered for the project siting are:

- Availability of lot property covered by Transfer Certificate of Title (TCTs);
- Accessibility and the site are very ideal for the proposed development considering that associated tourism facilities are present nearby;
- Compatibility with the existing land use as well as the support of the Local Government Unit (LGU) in favor of the project;
- The area is far from the community and free from any informal settlers and no indigenous people present at the project site; and
- Basic services are available.

While alternative locations were considered, none met the above mentioned requirements as well as the proposed area.

1.4.2.1 Severity of Impacts

The severity of impacts in terms in project siting alternatives is minimized due to the following:

1. No communities will be displaced as the project area is idle and privately-owned;
2. No indigenous groups are present in the area; and
3. Compatible with the City's land use.

1.4.2.2 Perception of Affected Communities

The community nearby are already used to having a golf course in their midst dating back to the defunct Mayon golf course.

1.4.3 Technology Selection / Operation Processes

Pollution control devices involved are waste management system and wastewater treatment that will be installed in the area.

The golf course design will conform to the international standards of quality, resource conservation and ecological safety. A prominent feature of the project is its system for water conservation that will minimize water consumption, discharge, and risk of chemical contamination.

1.4.4 Resources

1.4.4.1 Source of Power Supply

To ensure high reliability of power supply during the operation, adequate redundancies in the transmission and distribution will be incorporated in the detailed design stage. Electricity may be supplied by the local distribution utility, Albay Power and Energy Corporation

1.4.4.2 Water Supply and Demand

Water supply during operational phase will be sourced from the Legazpi City Water District. There is an adequate supply of water in area to cope with the water requirements of the proposed project. Water extraction from Padang River or rainwater harvesting may be resorted to as much as possible through the construction of irrigation is envisioned.

1.4.5 Without the Project Scenario

From an environmental perspective, the removal of the golf course project may be the best option. Without the development, the area would remain a relatively undisturbed area providing a habitat for the varied flora and fauna presently observed. This area will continue to be impacted, although minimally, by anthropogenic and natural factors.

From a socio-economic perspective the “no action” alternative may not be the best alternative as the numerous benefits to be gained from the development both locally and nationally would not be realised and the resources in the area would continue to be underutilized. Since the site is underutilized, no yield is expected which would mean no profit and no additional income for the local government. Without the project, the economic benefits such as employment, livelihood opportunities and social development programs will not be pursued.

1.5 Project Components

1.5.1 Major Facilities

1.5.1.1 Golf Course

The proposed Mayon Imperial Golf Club Project is an 18-hole golf course with facilities such as clubhouse and car path. The development will be built on a 67-hectare lot and designed to conform to the international standards of quality, resource conservation and ecological safety.

Figure 1-3 shows the Site Development Plan of the project.



Figure 1-3: Site Development Plan

- Tees, greens, bunkers, fairways, limits of rough, native planting areas, lakes and car paths;
- Irrigation system including, but not limited to, sprinkler heads, quick couplers, pipe fittings, wire splices, valves, pump station, and mainline and lateral line routing;
- Property line, clubhouse area, maintenance facility, parking lot, entrance road, and rain shelters and utility easements; and
- Perforated and solid pipe, manholes, catch basins, pipe outlets, overflows and observation risers including cleanouts for greens, bunkers and practice area tees.

The tee area should be large enough for heavy pedestrian traffic, must have multiple entry and exit points and must receive sufficient sunlight. The surface must be as flat as possible. It should have the top 150 centimeters with an amended soil and the use of subsurface drainage lines. Depending on the impermeability of the sub-grade soil, a drainage system for the teeing ground will be installed. It consists of 10 cm laterals and main line arranged in a herringbone fashion. Spacing for the laterals will be of 5 m intervals. Drain lines will have a minimum slope of 1%.

The turf grass proposed to be used on the Fairways, Greens, Tees and Driving Range is the Carabao grass. Native trees and shrubs will be used on the 'Rough' areas of the golf course. Bunkers are filled with "lava" sand and some with white sand.

Bunkers

Fairway /Green side Bunkers

Bunkers will follow the Golf Course Designer's size, shape, and depth. Drainage trenches will extend into the low area of each bunker lobe and will extend to rivers, streams or other approved outfalls. The trench will be 20 cm in width by 30cm in depth, having a 0.5% bottom

slope. Washed gravel of 6 to 10 mm diameter will be evenly spread 5 cm deep in the bottom of all trenches. Upon the gravel blanket, be laid the same type of pipe as used on greens. The portion outside the bunker will be covered with topsoil or sand capping.

Sand for the bunkers should be of a consistency and color approved by the Golf Course Designer, after testing at an approved USGA laboratory, as per above sieve analysis. The material will be stockpiled at a high point of the bunker sub-grade sufficiently away from the edges of the bunker. Sufficient sand will be placed to provide a 15 cm sand layer over the entire bunker subgrade.

BUNKER SAND

Sieve Size % retention

16 mesh	3.91
20 mesh	5.22
30 mesh	14.59
40 mesh	26.45
50 mesh	32.50
70 mesh	14.12
100 mesh	2.86
140 mesh	0.36

Cart Paths

Locations and grades are general in nature. All engineering to establish grades all inspections of work and final approval will be done by Project Engineer. Paths will be two and one-half meters (2 1/2m) wide and ten centimeters (10cm) deep. In the areas of the Club House, Driving Range, 1st and 10th tees and the 9th and 18th greens, all cart paths will be 3.5m in width (approx. 750m).

1.5.2 Support Facilities

1.5.2.1 Clubhouse

The clubhouse will be developed that will consist of multi-purpose function area, lounge and bar, lockers and shower area, storage facility for Golf Equipment/Golf Carts/Other Storages, pool area, kitchen, office for administrative and engineering services. Open parking areas will also be part of clubhouse facility.

Holiday Cottage

A small holiday cottage will be developed inside the proposed golf course. This will serve as a rest house to accommodate the owners whenever they are in the area for visit.

Back of House & Maintenance Facilities

A maintenance area will also be included in the golf course design. This area will be the central hub for the maintenance of the golf course and its main function includes the storage of equipment and materials needed for the daily upkeep of the turf.

1.5.2.2 Plumbing & Sanitary Systems

Potable Water

Potable water shall be supplied from the nearest water main of Legazpi Water District. The plumbing system will be designed with energy and water conservation in mind; such devices as variable speed drive for pumps, pneumatic tanks and flow limiting devices will be installed at all plumbing fixtures.

Internal Sanitary System

Soil waste and waste water piping system shall be discharged to respective inspection chambers located within 1.5 m from the building for final connection to the sewerage network taking it to the Sewage Treatment Plant. Kitchen wastes shall be connected to screen chambers and proprietary grease traps prior to connection to network. Laundry discharge shall be connected to dilution tank prior to discharge to the drainage.

1.5.2.3 Turf Nursery Area

A turf nursery area will be established and maintained by the company in support of its turf grass replacement requirement. Putting surface nursery area of least 500 sqm. according to normal greens specifications (USGA) as also a Fairway/Rough grass nursery area of at least 25,000 sq.m. will be constructed according to fairway specifications. This will be used to harvest sprigs from roughs, tees and fairways

1.5.2.4 Power Supply

Electricity that will supply all facilities and support infrastructures of the project will be supplied by the local distribution utility, Albay Power and Energy Corporation (APEC). The additional power requirement of the project will not result to power shortage. However, to ensure steady supply of power for the golf course project, a stand-by generator set a sufficient capacity to supply the project will be a back-up power source in cases where power interruption is imminent.

1.5.2.5 Water Supply and Demand

1.5.2.5.1 Water Demand - Construction Phase

During the construction phase, water will be required for construction activity and the daily laborers' domestic activity requirement for the purpose of drinking, washing, cleaning and other ancillary requirements such as water requirement for the maintenance of plant nursery and other construction-related purposes. Around 25,000 cubic meters of water is estimated as the requirement for the construction phase of the project.

The estimated water requirement during construction phase is assumed on the basis where construction phase is estimated to last for a period of 24 months.

1.5.2.5.2 Water Demand - Operation Phase

During operation period, water requirement for potable and non-potable (golf course operation and maintenance) purposes is estimated to have a combined peak requirement of 1;230 cubic meters per day.

Potable water supply during operational phase will be sourced from the Water District system while non-potable water from Padang River or from irrigation ponds/lakes can be

availed of to supplement piped sources. There is an adequate supply of water in area to cope with the water requirements of the proposed project.

Domestic Water Supply

Domestic water will be required for the day-to-day operation of Clubhouse and other support facilities and amenities of the project, particularly for washing, cleaning, and other similar activities.

It is estimated that a maximum demand of 30m³/day during peak season of operation especially during events and tournaments where influx of visitors and golfers are at peak. Table 1-1 shows the potable water requirements for clubhouse facility.

Table 1-1. Domestic Water Requirements

Purpose	No. of Persons	Water required (L/Capita)	Total Requirement (LPD)
Clubhouse Bar and Lounge Area (major load during sporting events, conferences, holidays)	500 guests - Maximum load expected -	60 ¹	30,000
Administrative, engineering and kitchen areas			
Total water requirement		30,000 L/day or 30 cubic meters / day	

1 Average water consumption in rural setting based on the Philippine Environment Monitor by the World Bank.

Non-Domestic Water Supply

Non-domestic water supply requirement is required mainly for the golf course's irrigation and landscape. The peak water requirement is estimated at around 1,200 cubic meters per day or at 36,000 cubic meters per month as presented in **Table 1-2**. This estimate considers the dry months in November to April of the year.

Table 1-2. Non-Domestic Water Requirement

		Water Requirement
Cubic Meters per Day (cmd)		Cubic Meters per Month (cm/m)
Golf Course - Irrigation	820	24,600.00
Landscape - Irrigation	350	10,500.00
Landscape - water features	30	900.00
Total	1200 (45 Has)	36,000.00

1.5.2.6 Drainage

The project will install a well-engineered drainage pipeline system that is critical to the project's operation. Storm water drainage will be designed for 100 year maximum rainfall and used for planning and installation of all drainage mainlines, catch basins, lake overflows

and outfalls. A 2-3% slope is generally provided so that surface storm drainage is rapid in order to remove excess water from the course. All excavated areas will be kept smooth and well drained at all times during construction. All swales and depressions will be maintained to provide positive drainage to designated collection points.

Drainage will be installed by embedding a 10 cm perforated drainpipe in a trench and filled with gravel. The water draining into the perforated pipe will be utilized for irrigation process.

1.5.2.7 Soil Erosion and Siltation Management Controls

In order to minimize erosion and siltation during construction, construction of engineered fills, rip-rap silt fences, and silt traps rolled erosion control products like netted blankets or turf reinforcement mats or geotextile covers shall be used. Garland drains followed by series of filter bunds will be installed and provision made for addition of Polyelectrolyte so as to ensure that no sediment goes outside the site. The topsoil will be removed during the clearing and grubbing process and stockpiled and siltation control measures will be taken.

A siltation pond will be installed to strategic locations to control run-off, to and from adjacent areas and also contribute to all-weather characteristics of the course. Drainage patterns throughout the property naturally will serve as the basis for the drainage plan of the Project.

1.5.2.8 Safety and Emergency Facilities

Safety and emergency facilities, equipment, policy/program, and corresponding manpower complement will be operationalized during the project's operation. A designated health center, to be located in the clubhouse area, will be established to attend to golfers and employees' minor health concerns during emergency situations.

More importantly, the company will strengthen its prevention controls by implementing safety guides, policies, and programs that will be strictly adhered to by golfers, tourists, and company personnel. Sufficient and efficient safety equipment, devices and PPEs will also be in-place to ensure that untoward incidents are addressed and avoided. Further, as part of the requirement of the DOLE-OSHA, the company will establish and operationalize an Emergency Response Team that will be responsible for and respond to any emergency situations.

1.5.3 Pollution Control Devices and Waste Management System

1.5.3.1 Wastewater Generation

The principal source of wastewater will be from the operation and maintenance of the Clubhouse facility. Particularly, wastewater effluent from the clubhouse will be generally from toilet, kitchen, laundry and floor cleaning. All the wastewater from these sources will be collected through a network of sewerage pipes and channelized through the sewer network to a sewage treatment plant.

Sewerage system of the clubhouse facility will consider the following:

- Kitchen waste will be connected to grease trap prior to its connection to the main sewerage system;
- Provision of access into the sewer system to allow periodic cleaning;
- Installation of sufficient plumbing vents to allow the release of sewer gases from the sewer system.

1.5.3.2 Solid Waste Generation

The project will generate solid waste as a result of day-to-day operation of facilities, particularly the clubhouse, and the maintenance of the golf course area. The composition of the generated solid waste will be biodegradable, recyclable, and residual from the clubhouse and agricultural waste generated from the golf course area as a result of trimming and maintenance of trees and grasses.

Solid waste generation is estimated at a peak of 200 kg/day during operation phase considering a peak season of 500 combined project personnel, golfers, and guests. The estimate is based on the 2016 National Solid Waste Management Commission (NSWMC) data where an estimated average per capita waste generation is 0.40 kilograms per day for both urban and rural.

The Project will comply with solid waste management regulations stipulated in the Ecological Solid Waste Management Act of 2000. Solid wastes generated by the project will be segregated at source according to biodegradable, recyclable, residual, and agricultural wastes. Biodegradable and agricultural wastes and other compostable materials will be managed by composting. Compost material generated will be utilized as soil conditioner for the in-house plant nursery. Recyclable wastes will be collected and managed in the project's Materials Recovery Facility (MRF) which will be later on disposed or sold to waste-recycling facilities in the Province or in the Region. On the other hand, residual waste or solid waste materials that are non-compostable and non-recyclable will be disposed ecologically through a long-term disposal facility such as the sanitary landfill. Residual waste will be managed and stored properly prior to collection by the Local Government Units (LGU). Generated residual waste of the project will be disposed, through the LGU, at the existing Sanitary Landfill of the City of Legazpi.

1.6 Process and Technology

There is not much change in the technology for golf courses except on the design of the course based on heatmaps and GIS and on the type of golf balls.

1.6.1 Sewage Treatment

The principal sources of sewage/effluent within the golf course will be from toilet, kitchen, and laundry facilities and as a result of cleaning and gardening activities in the clubhouse and maintenance area. All the wastewater from these sources and activities will be collected through a network of sewerage pipes and manholes and channelized through the sewer network to the proposed sewage treatment facility such as a Septic Tank/Chamber. The manholes will provide access into the sewers to allow periodic maintenance, monitoring and cleaning. Ample ventilation to the sewers, to prevent formation of sulfur dioxide and hydrogen sulfide, will be provided. The sewerage system is proposed for the project will have the following design considerations:

- Sewage shall be discharged properly to channelized pipe system directly to treatment facility.
- Kitchen waste will be connected to a grease trap prior to its connection to the sewerage system.

1.6.2 Description of the Operation and Maintenance of Facility

The operation and maintenance of the 18-hole golf course will be under the management of the Mayon KJ Realty Development, Inc and the golf course superintendent will oversee the application of fertilizers and pesticides.

Maintenance of greens includes regular trim work and is quite labor intensive. The quality of turf can hugely impact the playability, maintenance, irrigation and drainage of the greens. The selection of an acceptable Root-zone (sand/soil mix) material is critical to the overall success of the project. Generally, a 250 mm depth of material is required in the putting area to provide an adequate Root-zone layer that will hold sufficient moisture for turf growth, while also draining adequately. Naturally occurring sand blended with organic matter such as Peat moss, coir fibre, rice hulls, composts and animal manures will be used in order to meet the physical requirements.

1.6.2.1 Turf Grass Maintenance

Propagation of sod and maintenance of the golf course require regular application of fertilizer. For Tees Greens and Fairways rate of application will vary depending on the concentrations of nitrogen found in the soil and the loading which is expected from the use of water for irrigation. Once the turf is established and is in use Potassium will be necessary for wear and stress tolerance, tolerance to saline conditions, drought resistance and disease resistance of the turf. Micronutrients are sometimes not available for plant uptake. Micronutrients such as Iron (Fe) should be applied at 0.45 kg/ 100 m² /month to provide a quick-green up without promoting a growth surge. Magnesium (Mg) is good for colour retention and Manganese (Mn) plus Zinc (Zn) are key nutrients for activating the salinity tolerance mechanism. These minor elements should be monitored and applied where necessary. The rate of application of these micronutrients will be dependent on the levels of the concentrations of these elements found in the soil.

The rough areas will need minimal maintenance and therefore the fertilizer requirements for these areas will be lower than the Tees, Greens or Fairways. To prevent the roughs from going off colour due to minimal Nitrogen applications it is recommended that low maintenance Calcium Nitrate should be applied. Minimal amounts of Potassium will be applied to the rough areas where necessary.

The fertilizers to be used should only be specific substances that are approved by the Fertilizer and Pesticide Authority (FPA). Prior to the application of fertilizers, soil samples will be taken and tested in the laboratory. Fertilizer formulations to be used are based on the specific deficiencies of the soil. For example, soils lacking in phosphorous (a nutrient needed in the development of roots) will use agricultural grade fertilizers (quick release). To minimize the possible contamination of groundwater by nitrate, controlled-release fertilizer will be utilized. Slow release fertilizers are balls of complete fertilizers coated with a permeable substance. When moistened, a small amount of nutrients leached through the coating until the encapsulated fertilizer is used up. Shelf life of these products is from 3 to 8 months.

Other chemicals to be used include pesticides, herbicides and fungicides. The application of these chemicals varies during the grow-in period of the sod and the maintenance of the turf.

1.6.2.2 Pesticide Management

A healthy turf that is fertilized, irrigated and mowed properly will out-compete many weeds. But as much as possible, weeds should be removed manually. Although hand pulling takes time and effort, the total removal of the weeds is ensured and use of chemical herbicides will

be avoided. The application of pesticide, programmed by a resident agronomist is necessary to maintain grass quality.

Only formulations certified by the Fertilizer and Pesticide Authority (FPA) will be used. All chemical containers will be labeled and disposed properly pursuant to Republic Act 6969 otherwise known as "Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990.

1.6.2.3 Aeration

The course will be aerated using motorized aeration systems. It punches holes into the turf to allow moisture, oxygen and nutrients to penetrate the soil. With a standard half-inch coring tines on the tees along with aggressive verticutting and slicing on the newer nine for thatch removal.

It breaks up thatch which hinders water absorption and root be backed combed with rake to level the ground. Cores are collected on both sides. To reduce abrasion on the tender turf, instead of using brushes or brooms following topdressing, use a push blower to blow the sand down into the holes. Greens will be aerated as follows: All eighteen holes will be aerated using .25 of an inch hollow tine and will be completed within a three day period (weather permitting). Topdressing sand will be fully and carefully incorporated into the aerification holes.

1.6.2.4 Mowing

The course will be equipped with triplex mower and/or walk-behind mower. Sand topdressing on greens will be about 10 mm/year. Irrigation of greens about 300 mm/year. Mowing of fairways about 85 times/year, and greens about 180 times/year.

GREENS:

The objective is a putting surface with smoothness, firmness, limited grain and with an overall uniformity. The greens will be closely mowed with good to excellent speed.

Green Standards:

- Greens will be mowed daily during the growing season. Heights of cut will be .35 centimeters with smooth rollers and can be lowered to .30 centimeters.
- Greens will be hand mowed weekdays and after heavy rainfall. They will be double-triplex mowed on weekends cut to maintain relative speed objectives. Grooming and / or verticutting will be used periodically to control grain and keep it at acceptable levels.
- Greens will be rolled on Saturdays and Sundays, if needed, to maintain minimum speed objectives.
- Greens speed will be measured Wednesday and Friday via the Stimpmeter in order to maintain minimum speed objectives. These readings will be included into the Superintendent's monthly quality report.
- Growth regulator will be applied as an aid to increase green speed, reduce excessive growth and increase turf density.
- Relative Green Speed Minimums (weather permitting):
 - Regular Play: 120 inches of roll in methods prescribed by USGA minimum.
 - Weekend Play: 132 inches of roll in methods prescribed by USGA minimum.
 - Tournament Play: 138 inches of roll in methods prescribed by USGA minimum.

- Greens will be topdressed bi-weekly for smoothness, firmness and to control thatch. Additional topdressing may be required for preparation of tournament conditions.
- Greens will be irrigated as little as possible to promote deep rooting, drought tolerance, and minimal disease problems. Greens will be firm and the soil dry whenever possible.
- Greens will be checked daily with hole-cups being changed as needed.
- Greens will be monitored to determine if they can remain open for play. All efforts will be taken to ensure a minimum of nine holes will be open for play. The general rule is that the greens will remain open whenever possible. Alternate greens will be required when weather conditions dictate that severe damage will occur if greens are played on.
- Greens apron and collars will be maintained with adequate and consistent cushion of rough from collar to bunker. Collars will be mowed at .437 of an inch and will be lowered to .375 of an inch. The collars will generally be 30 inches wide.

TEES

The objective is a teeing surface that is smooth, firm, level and without weeds. Tees will be closely mowed and consist of predominately bentgrass. Ryegrass will be introduced in high wear areas. A conscientious effort will be taken to maintain our tees to resemble greens only cut slightly higher.

Tee Standards:

- Tees will be mowed at .437 of an inch and lowered to .375 of an inch. Tees will generally be mowed four days a week depending on growth.
- The turfgrass quality will take priority over competition from tree roots, shade and restricted air circulation. Trees will be thinned and pruned on an as needed basis to ensure the highest quality of turf.
- Divots will be attended to daily; accessories will be checked daily for service.
- Tees will be aggressively aerated in the spring and fall using a John Deere 1500 Aerator with .75 of an inch hollow tines. Topdressing sand will be incorporated into aeration holes.
- Tee blocks will be checked daily and changed as needed to utilize the greatest amount of teeing space.

1.7. Description of Project Phases (Activities)

The stages of development and the time for each activity are listed in **Figure 1-5**. The project has started its construction and is proposed to be completed by the year 2021.

Table 1-3: Mayon Imperial Golf Club Project Activity/ Item of Work

YEAR	1				2			
ACTIVITY	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.Planning/permit/survey								
2. Mob. of personnel and equipment								
3. Earthwork								
4. Preparation of Golf Course								
5. Installation of Sod								
6. Construction of Club House and Maintenance Area and								

Facilities								
7. Test run								
8. Operation and Maintenance								

1.7.1 Pre-Construction Phase

To arrive at a final decision regarding the design of the project, the developer works closely with the golf course architect at this stage. The developer's engineers estimate and revise the project costs and construction timetable based on the evolving designs, which include locating key points such as center lines and golf course boundaries. Minor field adjustments are made to improve the golf course by integrating and preserving the natural features of the terrain in the design.

The proponent secures all the necessary requirements relative thereto from the concerned government agencies. Initial mobilization and transport of construction equipment and supplies to the project site are undertaken. Golf course superintendent and other key personnel will be hired to ensure that proper management practices will be implemented during operation. Employment of workers who are preferably local residents (e.g., laborers, carpenters, etc.) for the construction phase of the project also starts at this stage.

The pre-construction phase ends with the clearing and grubbing of the golf course. This is done in stages to avert the unnecessary loss of natural features that contribute to the character of the golf course. All trees and other unique areas of vegetation that are to be preserved will be protected from disturbance, or tagged for relocation at a later stage. As soon as possible, a turf grass nursery will be developed on a flat and suitable location. After a golf hole area is cleared, the topsoil will be carefully removed and stockpiled in a strategic location before grading activities begin.

1.7.2 Construction Phase

1.7.2.1 Clearing and Grubbing

The establishment of the golf course will require the removal of vegetation. This will include, clearing, under-brushing, and grubbing. Clearing will involve the removal and disposal of trees and brush. Under-brushing is the removal and disposal from treed areas of undergrowth, deadwood, and surface debris. Grubbing is the excavation and disposal of boulders, rock fragments and debris, and stumps and roots uncovered in the ground surface.

1.7.2.2 Grading, Excavation and Filling

The site will be graded, excavated and filled to elevations. Before the area is filled the entire course will be lined with a geotextile material to prevent the leaching of fertilizers, herbicides and pesticides to ground water resources. Fill will be sourced to raise elevations and create features using large earthmovers. In the design of the course, there will be an evenly balanced cut and fill: where material is excavated or cut in one area (to create a lake or sand bunker), an equal amount of material will be used in other areas to create mounds or elevated tees. The natural drainage of the area will be enhanced and developed. Intersections between differing slopes will be accomplished by smoothly rounded transition

curves and the man-made grades will taper into the existing grades to create a natural appearance.

All slopes around tees, greens, bunkers, and mounds will not be greater than 5:1. Cut and fill slopes in fairways, roughs and non-use areas will not exceed 3:1.

1.7.2.3 Development of Course Drainage

Drainage trenches will be dug in a herringbone or semi-herringbone pattern spaced so that the water will not have to travel more than 6 meters to reach a tile drain. Trenches shall be 20 cm wide and a minimum 30 cm deep, the bottom of which shall produce a constant grade of not less than a 0.5% slope. Washed gravel of 9.5 to 6.4 mm in diameter will be evenly spread 7 cm deep at the bottom of all trenches. On top of gravel layer, the perforated drainpipe will be laid. The drainpipe, 10 cm in diameter, will be made of plastic material. All pipe joints shall be connected by impervious sleeves. Then the trenches will be filled with 10 cm of gravel. The drain tile will be joined to one or more conduit pipes, which exit the green at its low point. The conduit pipes shall extend to the river, streams or other non-play areas.

1.7.2.4 Installation of the Irrigation System

The irrigation system for the golf course will also be installed during the preparation of the area for the golf course. Water from the effluent collection ponds will be administered to the golf course via subsurface or drip irrigation system. Where sprinklers are to be used these will not be higher than one (1) meter.

1.7.2.5 Grassing and Landscaping

After the installation of irrigation and drainage systems, the disturbed areas will be prepared and planned with the recommended types of turf grass.

Areas that are susceptible to erosion will be planted for extra protection. All areas planted with turf grass will be fertilized with the proper mixtures of fertilizers. Achieving "soil balance" during the grow-in phase will be the first line of defense against turf grass disease. This will translate to reduced fertilizer and pesticides use during the maintenance phase. The areas of the course that will receive the most play are the greens, which will be fumigated prior to grassing to ensure optimum conditions for the turf grass growth. The golf course will also be landscaped with trees, shrubs, and other plant material to provide the desired visual quality.

1.7.2.5 Construction of Infrastructures

Associated golf course infrastructure (e.g., golf perimeter fence, concrete paths, clubhouse etc.) will undergo parallel construction with the golf course following construction methods and health and safety procedures. Asphalt or concrete cart and maintenance paths, 2.5 and 3.0 meters wide, respectively, will be constructed. Proper project management will determine the optimum scheduling of construction activities to ensure the completion of all facilities in time for the opening of the golf course.

1.7.3 Operational Phase

The operation and maintenance of the 18-hole Mayon imperial golf club will be under the management of the Mayon KJ Realty Development, Inc.

- Putting greens, fairways, tees and approaches are mowed nearly daily or several times per week. Use of triplex instead of walk-behind mower saves time and labor. Sometimes, putting greens are rolled to improve surface smoothness. Mowing roughs is required multiple times a week, using large rough mowers.
- Bunkers require frequent raking, manually or mechanically.
- Changing hole locations to distribute traffic.
- Moving tee markers to avoid excessive wear. Some tees require regular divot repairs.
- Trash cans, ball washers and other accessories are emptied, filled or cleaned almost daily.
- Fertilizer application, pesticide management, and aeration are the other maintenance activities to be conducted during operation stage.

The golf course superintendent will oversee the application of fertilizers and pesticides.

1.7.4 Decommissioning and Abandonment Phase

This phase is not given so much significance as the project is expected to operate for a very long period of time. This project, however, requires thorough maintenance and strict supervision to sustain its requirement in reaching its desired lifespan.

In case that the project will cease its operation for any reason, respective authorities and concerned agencies shall be informed 30 days prior to abandonment. The abandonment will follow standard policies and guidelines and shall involve implementation or restoration measures to bring the areas as close as possible to its original condition. The area shall be left free of any hazardous materials and in a manner acceptable to DENR standards.

There are, however, activities that have to be decommissioned as postconstruction requirement, as follows:

1.7.4.1 Removal or Disposition of Temporary Structures and Facilities

All temporary facilities installed during the construction phase of the project shall be dismantled or removed from the project site once the project is completed.

1.7.4.2 Abandoning Temporary Roads

The temporary access road from the existing road to the construction area that will be constructed during the construction phase of the project will later be paved and used for the road network of the completed project; hence, there will be minimal abandonment, if any.

1.7.4.3 Relocation and/or Termination Plans for Project Facilities

All heavy equipment used during the construction phase of the project will be pulled-out after project completion. Hired workers except for the permanent personnel of the Project Contractor will be terminated or maybe relocated to other projects of the company.

1.8 Manpower

1.8.1 Manpower Requirement

A total of 75 skilled and unskilled workers will be employed during the construction phase and 50 workers during its operation.

It is anticipated that approximately fifty (50) persons will be employed during the site preparation and construction phase of the golf course and approximately twenty – five (25) persons will be directly employed during the site preparation and construction phase of the clubhouse and maintenance area for project management, civil, sanitary, mechanical and electrical works.

During operations approximately twenty (20) persons will be employed for golf course maintenance, consisting of a Superintendent, Lead man, Operators, Technicians and Utility Workers. and thirty (30) persons employed to the clubhouse once the golf course and its auxiliary activities are in operation., as Administrative personnel, Waiters/Waitresses, Bartenders, Security Guards, Technicians, Golf Caddies and utility workers.

1.8.2 Scheme for Sourcing Staff

Priority hiring to locals from the host barangay and neighboring LGUs whose skills and experience meet the project's specific needs. A local hiring scheme will be established in close coordination with the concerned barangay Local Government Units (LGUs). In general, the proponent will provide a list of anticipated job requirements with corresponding qualifications to the concerned barangay LGUs. These potential opportunities will be promoted by the barangay LGUs in their respective jurisdictions and potential applicants will be forwarded to the proponent, for further review and evaluation by the Human Resources office. Consultations shall be made with the LGUs and host communities to finalize a scheme for hiring residents from host communities. Qualified local residents will be given priority in hiring. For technical positions not available in the host communities, the proponent reserves the option to source its manpower requirements elsewhere.

1.9 Indicative Project Cost

Preliminary estimated cost of the Project is Php 67,500,000.00.