Project Description for Scoping

Proposed Pagbilao Cement Plant with Waste Heat Recovery Project

Barangay Ibabang Polo

Pagbilao, Quezon

Submitted to:

Environmental Management Bureau

Submitted by:

Ionic Cementworks Industries, Inc.

January 2019

DOCUMENT REVISION HISTORY

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PROJECT DESCRIPTION

[1] **Ionic Cementworks Industries, Inc. (Ionic)** intends to put up a cement plant complex in Brgy. Ibabang Polo, Pagbilao, Quezon. The cement processing plant will have a clinker production capacity of 4.0 MMTPY. **Table 1-1** shows the details of the project, the Proponent and the EIA Preparer.

Table 1-1: Proposed Project, Proponent and EIA Preparer Details

PROJECT NAME	**Pagbilao Cement Plant with Waste Heat Recovery Project**
PROJECT LOCATION	Brgy. Ibabang Polo, Pagbilao, Quezon
PROJECT AREA	25 hectares
PROJECT TYPE	Cement Plant
PROJECT CAPACITY	2 x 2.0 MMTPY Cement Production for a total of 4.0 MMTPY
PROJECT PROPONENT	**Ionic Cementworks Industries, Inc.** SMC Head Office Complex, 40 San Miguel Avenue, Mandaluyong City Tel. No.: (02) 632-3397 *Authorized Representative:* ***Mr. Ferdinand K. Constantino*** *President*
EIA PREPARER	**LCI Envi Corporation** Unit 8L-M, Future Point Plaza 3, 111 Panay Avenue, South Triangle, Quezon City Tel. No.: (02) 442-2830 Fax No.: (02) 961-9226 ***Jose Marie U. Lim, MSc.*** *EIA Team Leader*

1.1. PROJECT LOCATION AND AREA

1.1.1.Project Location

[2] The proposed cement plant complex will be constructed in Brgy. Ibabang Polo, Pagbilao, Quezon. The general location map of the proposed project is shown in **Figure 1-1**. Furthermore, **Figure 1-2** shows the geographic coordinates defining the boundary of the proposed project site.

1.1.2.Project Area

[3] The cement plant complex will be situated in a 25-hectare lot area owned by Ionic Cementworks Industries, Inc. in Brgy. Ibabang Polo, Pagbilao, Quezon.

1.1.3.Accessibility of the Project Site

[4] The proposed project site is approximately 150 kilometers away from the **Ionic** head office located in Mandaluyong City. The site can be easily travelled by any type of land vehicle. Pagbilao, Quezon is about a 4-hour drive from Mandaluyong City. The project site can be accessed through South Luzon Expressway (SLEX) and Southern Tagalog Arterial Road (STAR). From San Jose exit, continue onto San Jose – Ibaan – Batangas Road, then take a left to Lipa – Ibaan Road, and another left to Rosario – Ibaan Road. Continue onto Rosario – San Juan – Candelaria Road for 27km. Then, turn right to Quezon Eco-Tourism Road and continue for 25km. Then, turn right onto Pan-Philippine Highway and continue for another 7km. Turn right onto the barangay road about 9km from the Pagbilao Municipal Hall. Drive for 13km until the project site. **Figure 1-3** shows the route to the project site.

1.1.4.Vicinity and Impact Areas

5 The Project Site is bounded on all sides by grasslands. Tayabas Bay, the closest body of water, is located about 300m west of the project site.

6 The study area for the EIA includes the direct and indirect impact areas. The direct impact area (DIA) includes the area to be occupied by the project footprint, while the indirect impact area (IIA) includes the areas surrounding the cement plant and the nearby communities that may be affected by the project. Tayabas Bay is also within the IIA. **Figure 1-4** shows the DIA and IIA.

7 The impact area delineation was based on the location of settlements surrounding the project. The adjacent barangay was included in the impact zones since portions of which will be directly affected both by the construction and operation of the cement plant. The said delineation will be validated and shall also be supported by the initial runs of the air quality model which will predict possible areas to be affected by the emissions from the stack of the cement plant.

1.2. Project Rationale

8 With the increased investments in the residential, non-residential, and infrastructure sector, the Construction Market in the Philippines is expected to grow significantly. Cement is an essential material for the construction industry and national development; a substantial demand for cement is expected to be experienced in the country over the next few years due to, among other factors, major planned construction projects.

9 The Proposed Pagbilao Cement Plant Project shall be undertaken to sustain the increasing demand of cement in the country. Development of the new facility will ensure that this demand can be met and will therefore contribute significantly to the sustainability of the construction industry.

1.3. Project Alternatives

10 As part of project preparatory studies, a study of alternatives was undertaken. All locations considered were subjected to a Site Assessment Analysis. The criteria then considered for determining the preferred options include:

- Functionality of the site location, referring to accessibility and mobility relative to the presence of a transport system to the market and resources needed for the cement plant to operate
- Compatibility between and with various uses of adjacent lands and associated activities they serve
- Consistency with natural resources plans and policies, and environmental regulations, that guide the affected communities
- Relatively stable peace and order situation in the choice area
- Input and participation from local stakeholders and appropriate regional and national agencies
- Cost effectiveness, referring to the value returned to the proponent for the investments to be made, and the contributions to the national and local governments, and the other stakeholders, including contributions to social development and management, environmental protection and enhancement, safety and health, rehabilitation and decommissioning.

Figure 1-1: General Location Map of the Proposed Cement Plant Complex

FIGURE NO.:	FIGURE TITLE:
1-1	General Location Map of the Proposed Cement Plant Complex

PROJECT PROPONENT:	PROJECT NAME & LOCATION:	EIA Report Preparer:
Ionic Cementworks Industries, Inc.	Proposed Pagbilao Cement Plant with Waste Heat Recovery Project Brgy. Ibabang Polo, Pagbilao, Quezon	LCI Envi Corporation

Figure 1-2: Site Coordinates

FIGURE NO.:	FIGURE TITLE:
1-2	Site Coordinates

PROJECT PROPONENT:	PROJECT NAME & LOCATION:	EIA Report Preparer:
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Figure 1-3: Route to Project Site

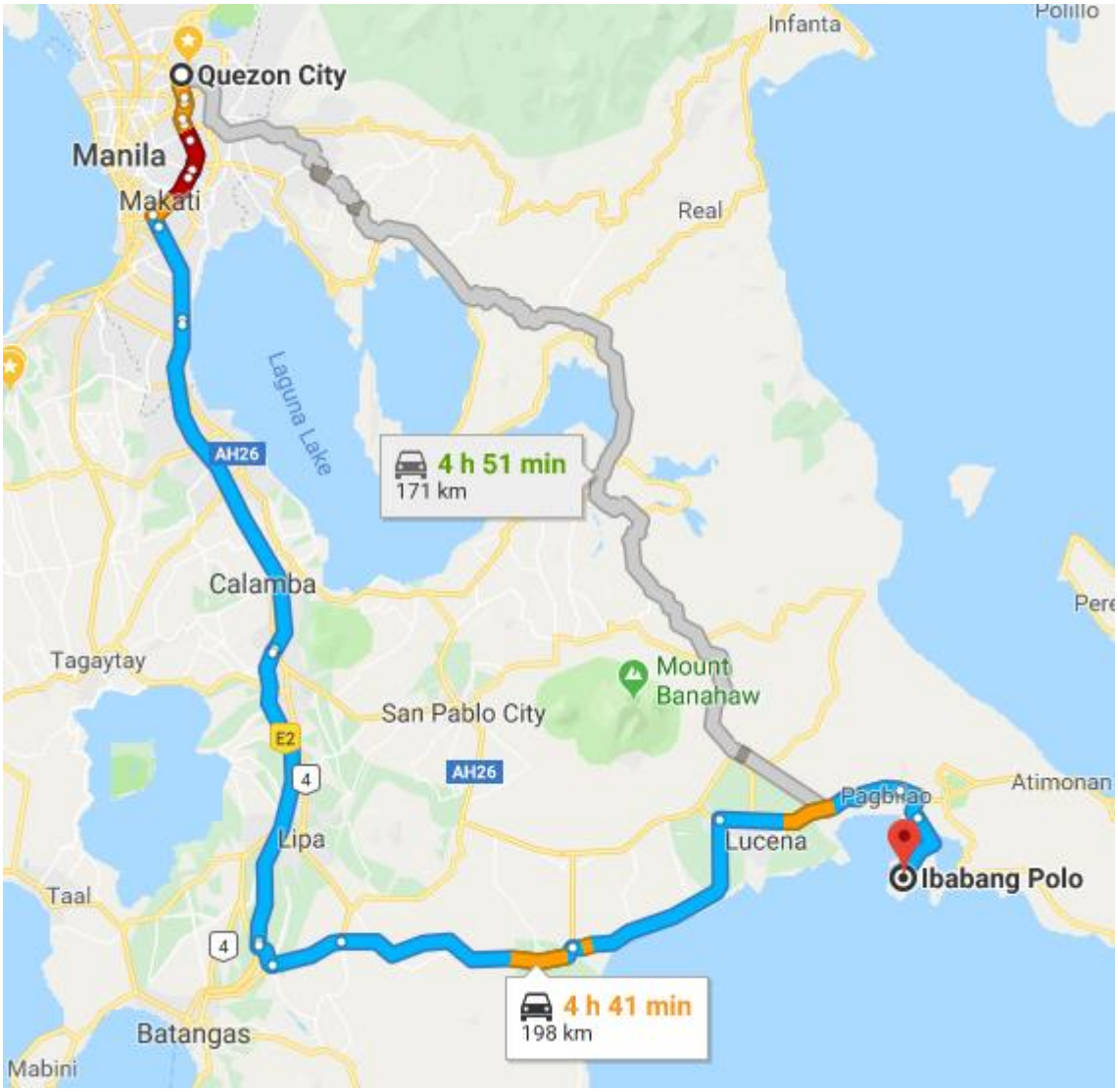

FIGURE NO.: 1-3	FIGURE TITLE: Route to Project Site	
PROJECT PROPONENT: Ionic Cementworks Industries, Inc.	**PROJECT NAME & LOCATION:** Proposed Pagbilao Cement Plant with Waste Heat Recovery Project Brgy. Ibabang Polo, Pagbilao, Quezon	**EIA Report Preparer:** LCI Envi Corporation

Figure 1-4: Direct and Indirect Impact Areas

FIGURE NO.:	FIGURE TITLE:
1-4	Direct and Indirect Impact Areas

PROJECT PROPONENT:	PROJECT NAME & LOCATION:	EIA Report Preparer:
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1.3.1.Site Selection

11 The site in Ibabang Polo was selected since this was already owned by **Ionic**. The zoning of the project site is suitable for industrial purposes.

1.3.2.Technology Selection

12 **Ionic** chose to implement dry cement production process over the wet cement production process because dry process offers more advantages in terms of resource efficiency. Wet process consumes significantly more water compared to dry process. Less coal will also be used for dry process since less heat is required for the kiln. Dry process is also more energy efficient when coupled with a waste-heat recovery facility since heat from the kiln can be converted to energy, which can be used for the cement plant.

13 One of the disadvantages of using dry process as opposed to wet process is the air emissions. Dry process generally yields more dust, although this can easily be controlled by watering the area.

1.3.3.Resources

Water Resource

14 **Ionic** will be build a deep well to serve as water source for the cement plant.

Raw Materials

15 Several limestone reserve within Pagbilao, Quezon is currently being studied. Sources of other raw materials such as coal, pozzolan, and gypsum are still being investigated.

1.4. Project Components

1.4.1.Major Components

16 The project components for the clinker plant and the cement grinding facility is summarized in **Table 1-2.**

Table 1-2: Project Components of the Proposed Cement Plant

Components	Equipment	
Clinker Plant (2 x 2.0 MMTPY)		
	Line 1	**Line 2**
Storage	Raw Material Storage with Stacker and Reclaimer, 100,000 MT	Raw Material Storage with Stacker and Reclaimer, 100,000 MT
Raw Mill System	400-500 TPH vertical roller mill or roller press, inclusive of dosing silos and weigh feeders	400-500 TPH vertical roller mill or roller press, inclusive of dosing silos and weigh feeders
Coal Milling	80,000 MT Storage 50 TPH Vertical Roller Mill with pulverized coal silos and bag filters for coal mill exhaust gases	80,000 MT Storage 50 TPH Vertical Roller Mill with pulverized coal silos and bag filters for coal mill exhaust gases
Kiln System	5,000 TPD preheater-kiln-clinker cooler with bag filter for preheater exhaust gases 2 x 25,000 MT capacity clinker silo Waste heat recovery power plant with electrostatic precipitator for clinker cooler exhaust gases	5,000 TPD preheater-kiln-clinker cooler with bag filter for preheater exhaust gases 2 x 25,000 MT capacity clinker silo Waste heat recovery power plant with electrostatic precipitator for clinker cooler exhaust gases
Cement Grinding Facility (2 x 2.0 MMTPY)		
	Line 1	**Line 2**
Additives Storage	50,000 MT capacity with stacker and reclaimer	50,000 MT capacity with stacker and reclaimer

Components	Equipment	
Grinding System	260 TPH Vertical Roller Mill inclusive of dosing silos and weigh feeders	260 TPH Vertical Roller Mill inclusive of dosing silos and weigh feeders
Cement Storage	4 x 10,000 tons capacity	
Cement Packing and Dispatch	3 x 2,400 bags per hour Rotary Packers and Bulk Loading Facilities and Truck Scales	4 x 2,400 bags per hour Rotary Packers and Bulk Loading Facilities and Truck Scales
Support Facility		
Water Source	Deep well	
Air Pollution Control	Bag house filters Electrostatic precipitators Dust collectors	
Wastewater Pollution Control	Siltation ponds Sewage Treatment Plant	
Support Facilities	• Warehouses • Administration Building and Staff House • Parking and Truck Marshalling Area • Clinic and Fire Stations • Utility Building	

17 The mineral requirements for the proposed cement plant are shown in **Table 1-3.** The requirement of the extracted limestone for the cement plant is estimated at 4.95 MMTPY. The material balance of the clinker production is presented in **Figure 1-5**, while the material balance of the cement grinding facility is on Error! Reference source not found..

18 The proposed cement plant layout is presented in **Figure 1-6.**

Table 1-3: Mineral Requirements

Minerals	Mineral Requirement (TPY)
Limestone	4,950,000
Silica + Shale	1,200,000
Gypsum	280,000
Coal	288,000
Pozzolan and other additives	720,000

Figure 1-5: Material Balance for the Clinker Plant (4.0 MMTPY)

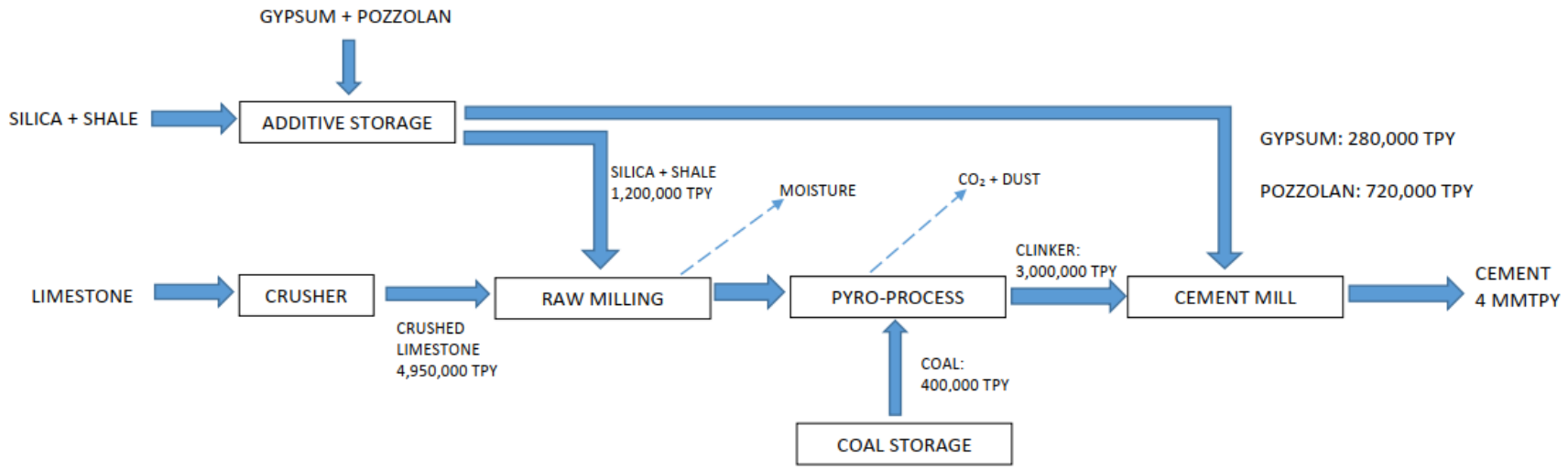

FIGURE NO.:	FIGURE TITLE:
1-5	Material Balance for the Cement Plant (4.0 MMPTY per line)

PROJECT PROPONENT:	PROJECT NAME & LOCATION:	EIA Report Preparer:
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Figure 1-6: Site Layout of the Proposed Cement Plant

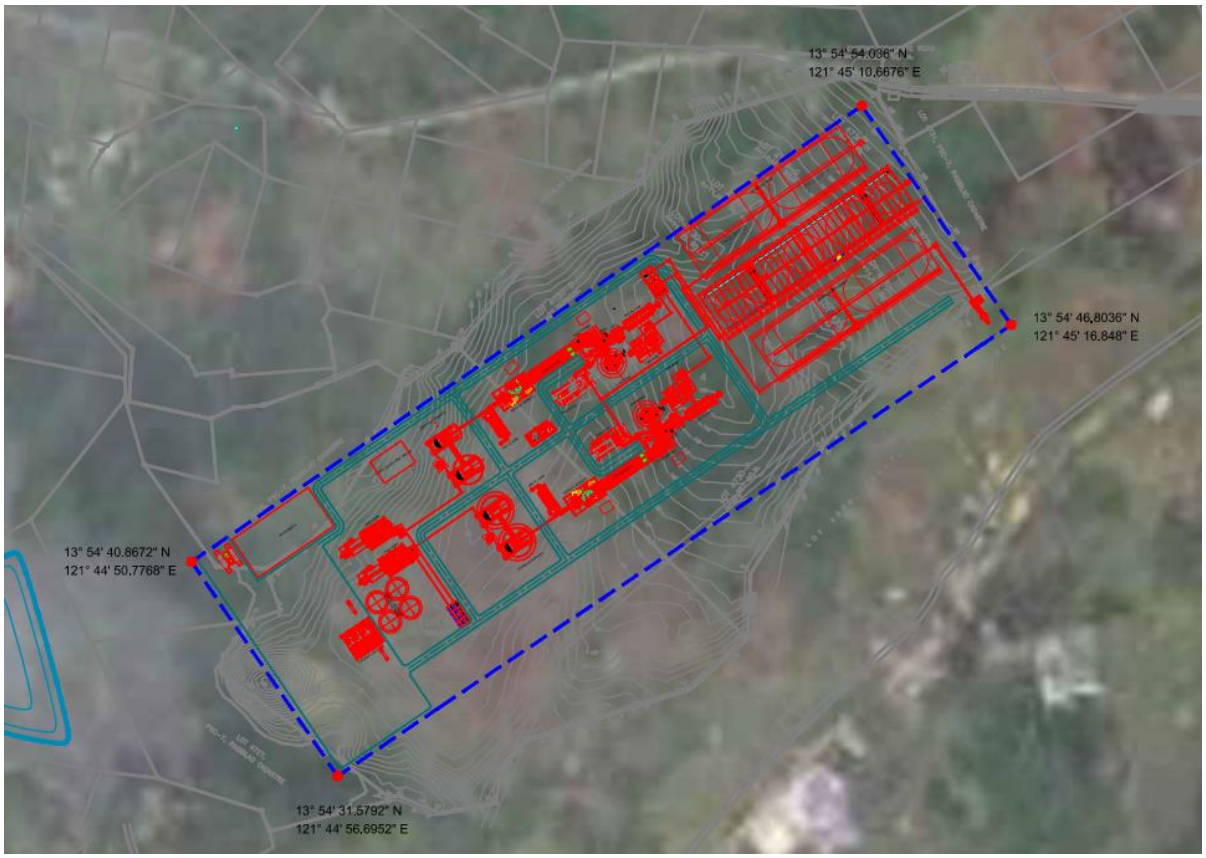

FIGURE NO.:	FIGURE TITLE:
1-6	Site Layout of the Proposed Cement Plant

PROJECT PROPONENT:	PROJECT NAME & LOCATION:	EIA Report Preparer:
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1.4.2.Project Utilities

19 The following are the facilities that will be constructed to support the cement plant.

- Warehouses
- Administration Building and Staff House
- Utility Building
- Parking and Truck Marshalling Area
- Water and Wastewater Treatment Facilities
- Clinic and Fire Stations
- Power Substation

20 Temporary facilities, such as re-purposed container vans which will serve as on-site office and accommodation for workers, sanitary facilities with septic tank (will be emptied-out and condemned after construction is completed), and temporary sub-station will be installed to provide power supply during, will be built during construction phase.

Water Supply and Demand

21 Water for cement plant production and other purposes such as domestic water supply for workers and road watering will be sourced from deep wells to be constructed within the project site, while water for the waste heat recovery facility will be sourced from the nearby Tayabas Bay. The proposed project is estimated to use 4,290 m^3/day of water. Since the cement plant employs a dry-process, the water consumption during the operation will be limited for domestic use and waste heat recovery.

Figure 1-7: Water Balance

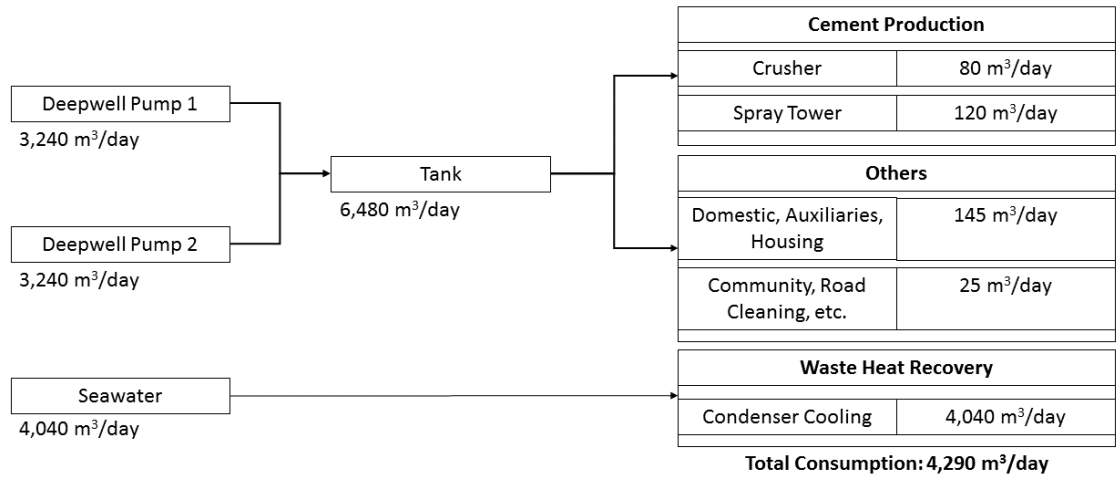


FIGURE NO.: 1-7	FIGURE TITLE: Water Balance	
PROJECT PROPONENT: Ionic Cementworks Industries, Inc.	**PROJECT NAME & LOCATION:** Proposed Pagbilao Cement Plant with Waste Heat Recovery Project, Brgy. Ibabang Polo, Pagbilao, Quezon	**EIA Report Preparer:** LCI Envi Corporation

Power Supply and Demand

22 The proposed project is expected to consume about 40-50 MW of electricity for each line of cement production; total capacity is expected to be a maximum of 100MW. A waste heat recovery will be constructed inside the plant to support the power requirement of the project.

Waste Heat Recovery Power Generating Plant

23 Waste Heat Recovery System is a scheme to utilize the valuable heat exhausted from the pyro-processing plant and convert it to electrical energy using the thermodynamic principle of a Rankine Cycle. This system employs four major equipment, such as the Boiler, Steam Turbine, Condenser, and Feed Water Pump, to take effect the energy conversion and power generation.

24 In the case of the pyro-processing plant, it was observed that the enormity of waste gas volume and temperature available for heat optimization has a great potential to deliver electrical power that is sufficient in sustaining the energy requirement of some auxiliary machineries and utilities of the plant.

1.4.3.Pollution Control Devices

Air Pollution Control

25 It is crucial to minimize the increase in ambient particulate levels by reducing the mass load emitted from the stacks, from fugitive emissions, and from other sources. Collection and recycling of dust in the kiln gases is required to improve the efficiency of the operation and to reduce atmospheric emissions. For control of fugitive particulate emissions, ventilation systems should be used in conjunction with hoods and enclosures covering transfer points and conveyors. Drop distances should be minimized by the use of adjustable conveyors. Dusty areas such as roads should be regularly sprinkled with water to reduce dust generation.

26 The operations of the air pollution control system are described in the following sections:

Bag Filters

27 Bag filters are installed around the plant to regulate the escaping gases from the system. The bag filters are designed to de-dust the gases to eliminate the build-up of particulates in the ducts and pipes and also preventing emission of gases with too much dust in the air. The bag filters have guaranteed efficiency of 99.99% in eliminating the dust. The bag filters are provided with a fan, driven by an electric motor, to regulate volumetric flow, gas temperature, and static pressure. The table below summarizes the bag filters that will be installed in the plant.

Bag Filters
Photo Source: Suppliers' Brochure

28 Bag filters will be installed the following locations:

- Conveyor transfer points
- Silos
- Crushing plants
- Material receiving hoppers
- Coal milling systems
- Pre-heater

Water Spray System

29 The correct temperature of flowing gas into the bag filter is assured further with the aid of water spray system. Water injection not only reduces the temperature of the gas but also increases the conductivity of the dust laden gas that enhances the efficiency of the bag filter as a dust collector. The system is controlled and triggered automatically based on temperature reading of the outlet gases from the mill. Raw meal is fed into the mill at a rate and amount based on the differential pressure over the grinding chamber.

Electrostatic Precipitators

30 Electrostatic precipitators will also be installed to control and minimize emission of dust and particulate matter. This will be used to treat clinker cooler exhaust gases.

Water Pollution Control

31 Cement plants employ a dry process; hence, the wastewater generated by the plant is limited to domestic sources and run-off from drainage. The run-off is only observed during the wet season, and there is no discharge during the dry season.

32 A siltation pond will receive the run-off, which is mostly from drainage and road washing during rains. The pond retains the water until most of the dust particulates and suspended solids settle at the bottom of the pond. Typically, this pond is dry. After heavy downpour, water from the drainage system within the cement plant accumulates in the pond. Under normal precipitation, the pond can retain the water until it evaporates. In order to maintain the efficiency of the pond, frequent desilting must be implemented (e.g. once every quarter). The domestic wastewater will be treated by a sewage treatment plant that will also be constructed inside the plant.

1.5. Process/Technology

33 The general process diagram of the cement production is shown in **Figure 1-8**. The following subsections will discuss further the clinker production and cement grinding.

Figure 1-8: Process Diagram of Cement Production

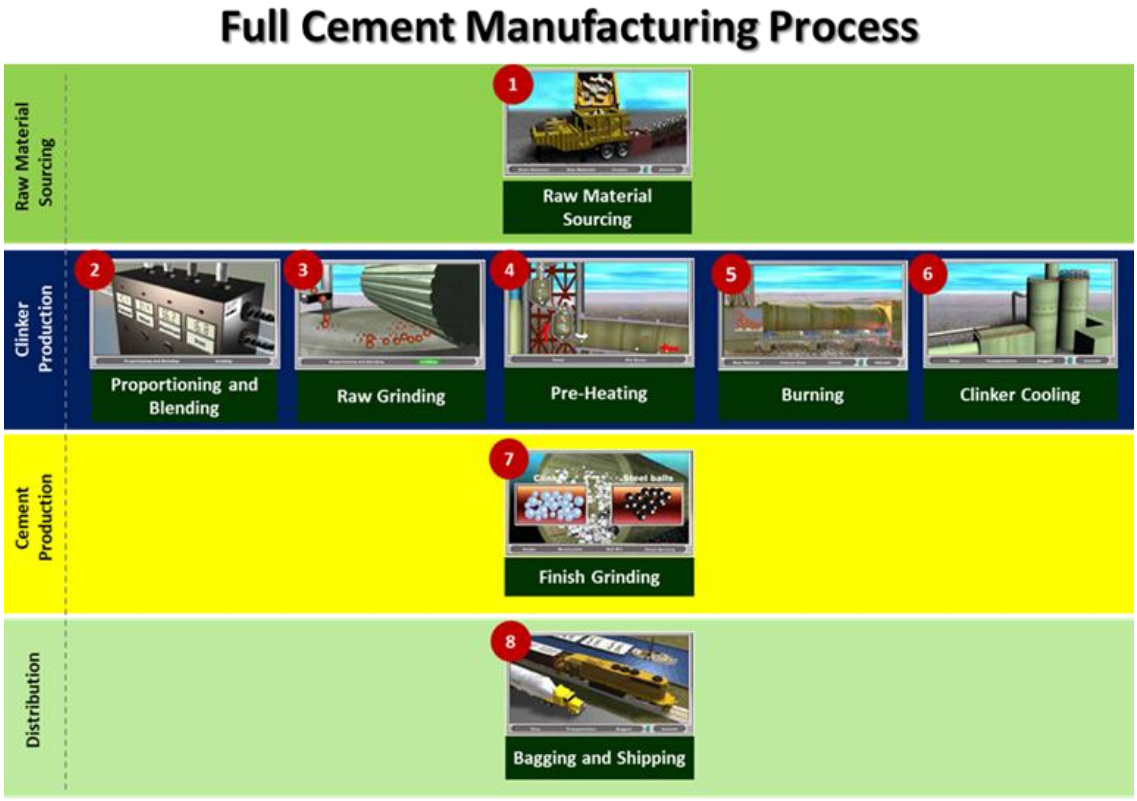


FIGURE NO.: 1-8	FIGURE TITLE: Process Diagram of Cement Production	
PROJECT PROPONENT: Ionic Cementworks Industries, Inc.	PROJECT NAME & LOCATION: Proposed Pagbilao Cement Plant with Waste Heat Recovery Project Brgy. Ibabang Polo, Pagbilao, Quezon	EIA Report Preparer: LCI Envi Corporation

1.5.1.Clinker Production

Raw Material Storage

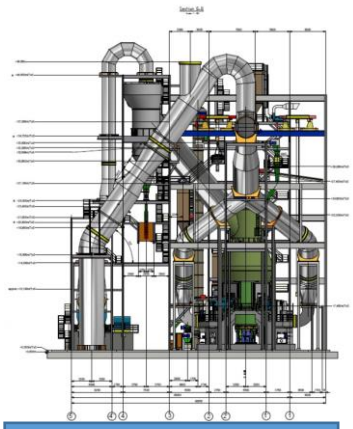
34 The storage bins are in a rectangular store yard together with the cement additives.

Store Yard
Photo Source: Suppliers' Brochure

35 The bins are mounted on load cells for exact determination of the filling level. Extraction of materials from the bin is done via dosing belt weigher. All raw materials are proportioned in requisite quantity through weigh feeders. The weigh-feeders make up the raw mix based on the actual set point. A collecting belt conveyor receives the material from the different dosing belt weighers and conveys the raw mix to the raw mill system.

Raw Material Grinding

36 The proportioned raw materials are transported by belt conveyor to the raw mill for grinding into fine powder. The raw materials will be dried and grinded using roller press system to produce the raw meal. One unit of 400 tph roller mill per line will be used for the raw material grinding. The size reduction of the materials takes place under high pressure between the two rotating rollers.



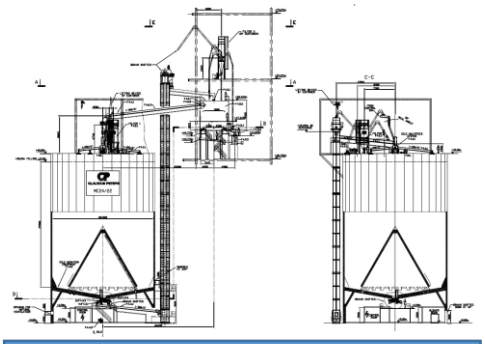
Raw Mill
Photo Source: Suppliers' Brochure

37 A high efficiency classifier is installed in the mill in order to reach the necessary raw meal fineness. A belt conveyor transports the coarse material rejected from the mill to a recirculation bucket elevator for its reintroduction to the mill feed conveyor. The raw meal product is transported by means of air slides and bucket elevator to the raw meal homogenizing silo. On the raw mill output, before the raw meal elevator, a continuous sampling device is installed to allow checking of the product quality in the laboratory.

38 Drying also takes place in the mill by using the exit gas of the pre-heater. The raw mill system and the kiln system are in close balance in terms of the waste gas from the pre-heater. A three-fan system, consisting of raw mill fan, kiln ID fan and filter fan will be envisaged for the raw mill system. Ductwork configuration will be installed to allow hot gas by-pass between mill inlet, mill filter, and circulating air between mill outlet and inlet ducts. Water is injected into the mill and all the necessary equipment are installed to stabilize the grinding bed if necessary and to cool down the hot gas.

Raw Meal Homogenizing

39 The raw meal will be transported to the corrective silo or the homogenizing silo by means of air slides, bucket elevator (belt) and one distribution system where blending will take place. The raw meal homogenizing silo will have a capacity of 15,000 tons per line. The fluidization/extraction air for the homogenization is supplied by the air blowers.



Homogenizing Silo
Photo Source: Suppliers' Brochure

40 The homogenized raw meal will be fed to the kiln fee bin for pre-heating. Two bucket elevators will be set for transporting raw meal into pre-heater. The kiln feed bin is located underneath the homogenizing silo. The raw meal is extracted from the homogenizing silo by means of discharge air slides and dosing valves for emergency shut off and flow regulation. The kiln feed bin has a capacity of 5,000 tons/day. At the feed bin discharge, a dosing impact flow meter controls the raw meal feed rate to the pre-heater. A discharge on the kiln feed bin will be installed to bypass the dosing system in case of maintenance or failure. The kiln feed bin will be mounted on the load cells to keep it at a constant weight level.

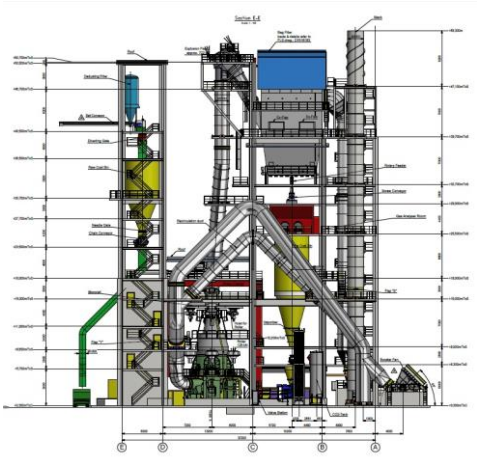
41 On the kiln feed transport line, before the elevator, a continuous sampling device will be installed to allow checking of the raw meal quality. Transport of samples to the laboratory will be done manually. For kiln start and emergency reason it will be possible to divert the raw meal from the pre-heater feeding on top of the pre-heater back to the homogenizing silo (Raw Meal Recirculation).

Coal Unloading and Conveying

42 Coal is stored in a coal yard with 40,000 tons capacity. The coal is stacked by means of a 300 tons/hr capacity stacker and reclaimed by a 100 tons/hr reclaimer.

Coal Grinding System

43 Coal from storage yard is transported to the raw coal feed bins via belt conveyor. Weigh feeders under the feed bins will extract the coals to the pulverizing system. Vertical roller mill with capacity of 40 tons/hr will be used to grind the raw coal. The product fineness for fine coal is less than or equal to 12%.



Coal Mill
Photo Source: Suppliers' Brochure

44 An auxiliary hot gas generator is used for the mill start up. Shut-off dampers on the hot gas ducts are provided in order to enable a safe maintenance of the mill while the kiln is in operation.

45 The qualified coal powder going out the mill with airflow is collected by anti-explosion dust collector and conveyed to the pulverized coal bins by screw conveyor. Considering the security, there will be explosion-proof housing valve, CO_2 fire-fighting system and water fire-fighting system.

Fly Ash Application and Bottom Ash Disposal

46 Fly ash that will be generated by the operation will be collected and recycled as substitute for clinker in the cement production. Fly ash addition will reduce clinker consumption per ton of cement and potential benefit of cement strength. Reduction of specific power consumption, potential capacity increase (fly ash feeding after mill) and subsequently reduction of production cost per bag is justification for fly ash addition. On the other hand, the bottom ash will also be collected and transported to the ash storage bins via trucks for disposal.

Pre-heater Exhaust Gas Treatment

47 Kiln gas from pre-heater top stage is sucked through down comer by kiln pre-heater fan and is given through raw mill or mill bypass to the main bag filter and filter fan to main stack and to coal mill also. The pre-heater fan is equipped with hydrodynamic coupling as variable speed device in order to save power energy. Kiln vent gas is used during compound operation (raw mill on) for the drying of raw material in raw mill. Depending on required drying of raw material in mill, the hot gas flow to mill is controlled; the rest are bypassed at mill.

Pre-heater
Photo Source: Suppliers' Brochure

48 During direct operation (raw mill off), all kiln gases are transported via mill bypass direct to main bag filter and stack. Cooling of the kiln gas in a dedicated air conditioning tower is done in that case down to approx. 150°C—to use more cost-effective filter bags.

49 Emergency fresh air intake before main filter is installed to cool down the pre-heater exhaust gas during direct operation and up-set conditions. The main filter is of jet-pulse design with the possibility of on-line maintenance. The main filter exhaust fan, which is ducted to a steel stack of enough height, emits gases to atmosphere. It is equipped with variable speed device in order to save power energy. The main stack is supported to the pre-heater structure.

50 The kiln dusts, collected in the kiln bag filter are transported by a series of drag chain conveyors to a common drag chain conveyor. The kiln dusts, coming from air conditioning tower after the pre-heater fan, where the hot gas are cooled down by water spraying, collected by an open screw conveyor and discharged either to the dust transport of the kiln filter via a series of drag chain conveyors, or in case of temperatures problem in the air conditioning tower, the slurry is discharged to a second outlet of the screw conveyor and then to a truck or container. An electric slide gate will close the system to prevent incoming of false air during normal operation

Kiln Feeding System & Pre-heater Tower

Rotary Kiln
Photo Source: Suppliers' Brochure

51 Cement clinker is made by pyro-processing of kiln feed into the preheater-kiln system. The system consists of a multi-stage cyclone pre-heater, combustion chamber, riser duct, rotary kiln and grate cooler. Presented in **Figure 1-11** is the diagram for the cement clinker processing.

52 The pre-heater system consists of a string five stages pre-heater cyclones fitted with a pre-calciner fired with ground coal. The raw meal feeding pre-heater at the gas inlet of cyclone 1# inlet or cyclone 2# inlet are made via a bucket elevator, an air slide and rotary valve. Under each rotary valve, slide gates are installed in order to protect them against overheating. Material ducts between the pre-heater stages are equipped with pendulum flaps and splash box. The raw meal enters into the pre-calciner from stage 4. Tertiary air is fed into the sides of the pre-calciner. The pre-calciner ensures a complete combustion of the pulverized coal. The tertiary air comes from the kiln hood. The air quantity is adjusted by the damper installed in the TAD (Tertiary Air Duct). A staircase and a service/good lift for passengers and maintenance (handling of bricks and spare part) are included in the pre-heater structure.

53 A sufficient number of air blasters are provided to all the necessary air blasting points to avoid blockages and to provide nominal stable kiln system operation. The air blasters are fed from a dedicated air buffer tanks connected to the plan compressed air network and by a specific distribution system. A sufficient number of air blasters are provided to all the necessary air blasting points to avoid blockages and to provide nominal stable kiln system operation. The air blasters are fed from a dedicated air buffer tanks connected to the plan compressed air network and by a specific distribution system.

54 The kiln system consists mainly of inlet chamber, kiln pipe, kiln hood, sealing systems, kiln drive and supports. The rotary kiln size will be Φ4.8×72m with capacity of 5,000 tons/day, designed for the solid fuel coal, fitted with variable speed girth gear and pinion drive. Kiln maintenance is done by mobile crane. The kiln shell surface in the area of sintering zone will be cooled by forced air ventilation system.

55 The main burner and pre-calciner burners are fed by pulverized coal continuously and without pulsations. The pulverized coal bins are equipped with one discharge outlet for each set of burner for the pre-heater and kiln. The ground pulverized coal is sent by weight feeders and roots blowers systems to the burners. A kiln shell scanner is installed for kiln shell (full length) temperature monitoring.

Clinker Cooling

56 The grate cooler to be used has a capacity of 6,000 tons/day. The clinker temperature from clinker cooler outlet is about +65°C above ambient temp. In order to crush big size clinker, there is a roll crusher at the cooler outlet and the crushed clinker particle size is less than 25mm. Cooled clinker is conveying to clinker silo by pan conveyor.

Clinker Cooler
Photo Source: Suppliers' Brochure

57 Part of the high temperature exhaust gas from the grate cooler is used as secondary air for kiln firing, part of them is dragged to AQC future, another part of them is used as combustion-supporting air in pre-calciner through tertiary air duct; the rest exhaust gas shall be led into the atmosphere after treating with heat-exchanger and bag filter. The dust emission is less than 30mg/Nm^3. Dust collected by bag filter is conveyed to clinker silo through chain conveyor together with clinker from cooler.

Clinker Transport and Storage

58 An inclined deep pan conveyor will be installed under the clinker cooler crusher discharge, for transporting of the clinker to the clinker silo. Two units of clinker silo with 25,000 ton capacity each will be constructed.

Clinker Silo
Photo Source: Suppliers' Brochure

59 This deep pan conveyor will feed a distribution box, which feeds the cooled clinker to the clinker silo. Clinker silo will have extraction galleries underneath which will take the clinker with belt conveyors system to the cement mill. All transfer points at this area will still be properly de-dusted by enough bag filters.

Support Facilities

60 Warehouses, administration building and staff house, utility building and parking and truck marshalling area will be constructed to support the operation of the cement plant. Clinic, fire station and power substation will also be constructed as support facilities.

1.5.2.Cement Grinding

Raw Materials Receiving and Storage

61 Clinker will be delivered by at least 2 maritime vessels of Panamax Class, in addition, about 2 to 3 smaller vessels will transport gypsum. The port stay of these maritime vessels will be 20 days per month. These will then be conveyed to silos for storage. The other raw materials will be delivered by trucks and stored in the longitudinal storage. An overhead stacking conveyor with travelling tripper will distribute the materials along the length of the storage hall.

Longitudinal storage with mechanical reclaimer
Photo Source: Suppliers' Brochure

62 Fly ash will be delivered by truck bulk carriers and transferred and then pneumatically conveyed to storage silo.

Material Feeding into the Mill

63 Clinker will be extracted from the bottom of the silos and conveyed to a feed bin from where it will be dosed by a weigh feeder and then further conveyed to an elevator then fed into the grinding mill.

64 The other raw materials will be mechanically reclaimed by a reclaimer and conveyed to feed bins from where it will be dosed by weigh feeders for conveying and feeding into the grinding mill. Fine raw materials such as fly ash will pass thru a weigh feeder before feeding into the mill.

Typical Cement Weigh Feeder
Photo Source: Suppliers' Brochure

Cement Grinding

65 The materials will be ground in a vertical roller mill. They will be pulverized as they are crushed in between the four rollers pressing on a rotating table. Hot air is injected from underneath the nozzle ring outside the periphery of the rotating table. This jet of hot air dries the materials and the fine particles are entrained by the gases exiting thru a rotating classifier at the upper portion of the mill body. There is internal recirculation of the particles that could not pass thru the internal classifier. The coarse particles are rejected out of the mill and are re-circulated into the mill for re-grinding. The finer particles pass thru the classifier and are carried by the exit gases that will pass thru a bag filter where the finished cement will be separated by the bags and collected at the bottom of the bag filter and subsequently conveyed into the cement silos. There is internal recirculation of the particles that could not pass thru the internal classifier.

Cement Storage and Dispatch

66 Cement in the four cement silos are extracted at the bottom by sets of air slides and is conveyed to the bins of the rotary packing machines. Each of the three roto-packers has eight spouts which fill the bags as the machine rotates. The filled bags containing 40 kilograms of cement are conveyed to trucks on where they will be loaded manually.

67 Cement may also be dispatched in bulk to bulk carriers from a separate bulk cement bin thru expandable bellows. Cement may also be dispatched in jumbo bags with 1,000 kilograms net content. The jumbo bag loading facility will be located under the cement silo. Loading of cement into bulk carriers is controlled by the weight of cement already loaded into the bulk carrier.

1.6. Project Size

68 The Proposed Pagbilao Cement Plant will have a total clinker production of 3,000,000 tons per year. The cement plant complex will be constructed in a 25-hectare lot area in Brgy. Ibabang Polo, Pagbilao, Quezon owned by **Ionic**.

69 This ECC application includes the proposed cement plant with waste-heat recovery facility; the limestone quarry operation is not part of the current ECC application.

1.7. Project Phases

1.7.1.Pre-Construction

70 Site preparation and clearing will be done prior to the construction phase. Initial development of the area includes the construction of road networks for increased accessibility and easier transport of materials and supplies. This phase of the proposed project will also involve the acquisition of the necessary documents before actual construction, such as ECC, Tree Cutting Permit, Building Permits, and PTO Application.

1.7.2.Construction

71 Immediately thereafter, the development of the area shall follow. This involves civil works and installation of cement plant facilities and other support facilities. The equipment to be used will be purchased and assembled on site. Proper occupational safety and health procedures would be implemented to ensure the welfare of the workers.

1.7.3.Operations

72 Major activity of the plant entails the 24/7 operation of the cement production. Strict observation of occupational health and safety procedures during construction will be followed.

1.7.4.Abandonment

73 An abandonment plan shall be drafted prior to construction. Any hazardous material and chemicals will be handled and disposed of through DENR-accredited contractors and treaters to avoid any contamination with the immediate environment.

1.7.5.Project Schedule

74 The target project schedule for the proposed cement plant is shown in **Table 1-4.** The project is currently conducting the pre-feasibility study and ECC application. Detailed engineering is scheduled from the 1st to the 3rd quarter of 2020, while civil works is scheduled from the 2nd

quarter of 2021 until the 2nd quarter of 2022. Commercial operation is expected to commence in the 2nd quarter of 2023.

Table 1-4: Proposed Project Schedule

Activity/Milestone	2019				2020				2021				2022				2023			
1. Pre-feasibility study & ECC application																				
2. Detailed Engineering																				
3. Construction (Civil works)																				
4. Installation of equipment including pollution control devices																				
5. Start-up & Commissioning																				
6. Commercial Operation																				

1.8. Manpower Requirements

75 **Ionic** will give priority hiring to locals whose skills and experience match the project's specific needs. The proponent will also provide the necessary training of locals for possible hiring as the need arises. Around 1,000-1,500 workers will be employed for the construction of all necessary project components and facilities. The proponent will then hire an estimated 250-300 personnel, which includes engineers and skilled workers who will operate the cement plant facility 24/7. **Table 1-5** summarizes the manpower requirements throughout the development phases of the proposed project.

Table 1-5: Manpower Requirement

Project Phase	Estimated Manpower Requirements	Tasks to Perform	Skill Requirement/s
Construction	1000-1500	• Civil works, architectural, and electro-mechanical works.	Engineers, project managers, skilled and non-skilled laborers
Operation	250-300	• Oversee the entire operations of the proposed Project, including emergency situations; Ensuring the safety and welfare of its personnel • Maintain conformity of the proposed Project to relevant government regulations, including tax payments, ECC compliance, etc. • Promote and uphold a harmonious relationship with the host community	Management and administration skills; over-all knowledge on the operation including key environmental, labor, and local ordinances
Abandonment	50	• Implement the abandonment plan	As required

1.9. Project Cost

76 Indicative cost for the expansion project (quarry and cement production) is estimated to be **Php7,000,000,000.00**. These will include the following:

- Detailed engineering studies and designs, including the feasibility study (FS) and acquisition of necessary government permits and licenses;
- Land acquisition and site preparation;

- Construction of project components and facilities;
- Procurement of necessary equipment and materials;
- Environmental management and protection, air pollution devices and water treatment facilities; and,
- Environmental monitoring activities.

Section 2
Preliminary Identification of Environmental Impacts

77 To address the potential environmental impacts of the proposed project, an environmental management plan will be prepared, presenting the proposed mitigation and/or enhancement measures that can be employed during the different phases of the project development. **Table 2-1** presents the preliminary environmental management plan.

Table 2-1: Preliminary Identified Environmental Aspects with corresponding Impacts and Prevention/Mitigation/Enhancement Measures

Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact/s	Prevention/Mitigation/Enhancement Measures
PRE-CONSTRUCTION PHASE			
Institutional Arrangements	People	Convergence of different government and private agencies	▪ Regular meeting and or communications must be maintained to coordinate all activities and eventualities of the project.
Socio-economic	People	Employment opportunities	▪ Advance notice of hiring should be given to residents of host communities
Solid Waste	Land	Expected generation of construction debris and other solid wastes	▪ Identification of a designated dumping site. ▪ Formulation of an effective solid waste management plan
CONSTRUCTION			
Site grading and earth moving	Land	Modification / Alteration of topography	▪ Limit grading and leveling to the exact location where earth moving is necessary. ▪ Soil be piled on low lying areas ▪ Setting aside of top soil for future greening
Site grading and earth moving	Land	Water logging	▪ Construct temporary drainage system at project sites that have potential to contaminate water resources.
Site grading and earth moving **Civil Works**	Water	Surface water pollution and deterioration from solid and liquid wastes that have lodged into the body of water and suspended particles as transported by surface runoff and/or wind.	▪ Provide embankment to stabilize slopes prior to earth moving activities ▪ Constant watering of soil pile or providing cover to the soil pile such as tarpaulin or equivalent.
Influx of workers	Water	Ground and surface water contamination from improper disposal of wastes, percolated wastewater, sludge and fecal matter.	▪ Provision of temporary sanitation facilities, e. g., toilet and bathing facilities at the construction site. ▪ Provision of solid waste storage facilities such as steel drums and plastic bags which must be disposed regularly at designated placed approved by LGU
Mobilization of construction equipment and materials	Air and Noise	Degradation of air quality	▪ Formulation and implementation of construction impact management plan ▪ Ambient air quality and noise level monitoring
Mobilization of construction equipment and materials	Air and Noise	Noise pollution coming from machines and equipment	▪ Maintain motor engine and other mechanically moving parts in its prime condition

Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact/s	Prevention/Mitigation/Enhancement Measures
Mobilization of construction equipment and materials	Air and Noise	Vibrations	▪ Conduct construction activities during normal working hours ▪ Machines should be placed on shock absorbing mountings ▪ Reduce working hours/days by proper scheduling of construction activities
Hiring of workers	People: Local Employment	Increase in local employment	▪ Prioritized hiring of qualified local residents; GAD sensitivity
Increase in taxes and revenues	People: Local Economy	Improvement in local infrastructure and social services	▪ Diligent imbursement of taxes and revenues
Accidents	People: Public Safety	Possible occurrence of construction-related hazards	▪ Provision of environmental health and safety training prior to construction
OPERATIONS			
Accidental oil spill	Land/Water	Soil/water contamination	▪ Formulation and strict implementation of emergency management plan ▪ Soil quality monitoring
Cement Plant Operations	Water	Soil erosion caused by rainwater runoff in cement plant site and quarry site	▪ Operate and maintain sedimentation ponds to prevent particulates to be washed out by rainwater ▪ Maintain rainwater drainage systems and siltation ponds ▪ Constant and periodic monitoring of ground and surface water
Cement Processing	Air	Dust generation during cement processing Increased levels of TSP, SO_2, NO_x brought about by vehicle and equipment emissions	▪ Operate and maintain filter bags and separators in the equipment ▪ Proper maintenance should be done for the vehicles and equipment
Generation of domestic wastewater/ oily wastewater	Water	Degradation of groundwater quality	▪ Provision of oily wastewater treatment system ▪ Formulation and strict implementation of waste management plan ▪ Water quality monitoring
Influx of workers	People: Waste Management	Generation of sewage/solid waste	▪ Formulation and strict implementation of waste management plan

Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact/s	Prevention/Mitigation/Enhancement Measures
Influx of workers	People: Population	Change in population size and distribution	▪ Prioritized hiring of qualified local residents ▪ Coordination with the local public employment service office
Influx of workers	People: Social Services	Overburdening of public social services	▪ Prioritized hiring of qualified local residents
Influx of workers	People: Health	Introduction of disease between migrant and local workers	▪ Medical certificate as part of employment requirements ▪ Formulation and implementation of safety and health program ▪ Provision of health and sanitation facilities within the plant site ▪ Monitoring of occurrence of unusual health problems that may be associated with the project
Influx of workers	People: Public Safety	Fire hazard	▪ Provision of fire protection system
ABANDONMENT			
Decommissioning	Land	Soil contamination	▪ Formulation and strict implementation of Abandonment Plan with emphasis on control of sedimentation and prevention of soil contamination
	Land	Increase in biodiversity due to rehabilitation activities	▪ Positive impact; No mitigation required
Disposal of wastes	Land	Possible occurrence of spills and contamination	▪ Formulation and implementation of waste management plan
Demolition and abandonment activities	Air	Generation of dust and noise	▪ Watering during dismantling activities to minimize dust generation ▪ Proper vehicle maintenance ▪ Limiting noise-generating activities during daytime ▪ Ambient air quality and noise level monitoring
Decommissioning activities	People	Possible local disturbance or damage through increased road traffic, noise, etc.	▪ Formulation and implementation of decommissioning impact management plan
Hiring of workers for demolition and abandonment activities	People	Increase in local employment during abandonment; Development of new skills	▪ Prioritized hiring of qualified local residents

Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact/s	Prevention/Mitigation/Enhancement Measures
Loss of jobs/employment	People	Reduction in service opportunities for local contractors with established contracts with the project (e.g., maintenance service providers, site transport services, etc.)	▪ Formulation and implementation of Abandonment Plan ▪ Effective human resources management through consultative planning and communication
	People	Out-migration of affected project staff to seek job opportunities elsewhere	