PROJECT DESCRIPTION FOR SCOPING

Eagle Cement and Quarry Area Expansion Project

San Ildefonso, Bulacan

Submitted by:

Submitted to:

Environmental Management Bureau – Central Office)

An Environmental Report By:

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PROJECT DESCRIPTION

1 **Eagle Cement Corporation** is currently operating a cement plant in San Ildefonso, Bulacan with a total production capacity of 6.0 million metric tons of cement per year (MMTPY). The cement plant consists of three lines with a cement production capacity of 2.0 million metric tons per year each line.

2 **Eagle Cement Corporation** was granted ECC 9609-002-105C on April 29, 1998 for its quarry operations and cement manufacturing activities. However, there were no activities for several years after the ECC acquisition, due to delays in planning and assessment of the site. An EIS updating was conducted in 2004 to extend the validity of the ECC for the 2005 initial project activities. This ECC covers the operation of the Line 1 of the cement plant. The plant has been completed and started normal operation in July 2010.

3 In 2013, **Eagle Cement Corporation** added a second cement line to increase the plant's production capacity from 2.0 MMTPY (cement) to 4.0 MMTPY. The existing ECC for the cement plant was amended last September 30, 2013 with **ECC CO-1307-0023** to include the addition of the second cement line. Line 2 of the cement plant started its operation in 2013.

4 In 2018, **Eagle Cement Corporation** amended its ECC to increase its annual cement production capacity to 6 million metric tons by constructing a third line. The amended ECC was granted last April 17, 2018 with **ECC-CO-1712-0020**. Line 3 is already operating since 2018.

5 As part of its commitment to improve cement production for a sustainable and greener environment, Eagle is pursuing the use of energy efficient processes and sustainable alternative energy resources. With this, the proponent proposes to use alternative fuels such as waste oil and refuse derived fuels (RDF) to reduce the use of coal in their operation. The existing kilns of the cement plant will be equipped to handle alternative fuels.

6 **Eagle Cement Corporation** also aims to increase its annual cement production capacity to **8.6 MMTPY** but no additional cement line will be constructed. The following will be done to increase the annual cement production capacity:

- The clinker production capacity of the three existing kilns will remain the same but the proponent will outsource the additional clinker required.
- To process the additional clinker into cement, the proponent will optimize the capacities of its existing facilities specifically the cement grinding system, cement silo and cement packing. The operating days of these facilities will also be extended to increase its output.
- The proponent also intends to produce a grinding aid called Gallium 300 to improve the grinding capacity of the cement plant. Eagle Cement currently produces this grinding aid for its own use, but now intends to mass produce and sell the product to consumers such as Northern Cement Corporation in Pangasinan.
- The proponent will also use additional alternative raw materials such as high carbon fly ash for clinker formation and pulverized limestone and fly ash as additive on cement grinding to support the increase of the cement production.

7 Also, under **ECC-CO-1712-0020** is the quarry operation of Eagle Cement Corporation. At present, the proponent is extracting 7.1 MMTPY of limestone from its quarry to supply the requirements of the cement plant. The quarry operation is under MPSA-181-2001-III that was issued last December 9, 2002. The MPSA was initially owned by Rock and Ore Industries, Inc. but was

transferred to Eagle through a deed of transfer and assignment last March 29, 2004. The existing quarry areas are in Parcel 14 and Parcel 15.

8 The proponent proposes to use Parcels 6, 9, 11 and 12 of MPSA-181-2001-III as additional quarry areas but the annual extraction rate of the limestone as declared in the ECC will remain the same. The objective of the proposed additional quarry areas is to ensure enough supply of the limestone in the future.

9 **Table 1-1** shows the details of the project, the Proponent, and the EPRMP Preparer.

Table 1-1: Basic Information on the Proposed Project, Proponent, and EIA Preparer

Name of Project	**Eagle Cement and Quarry Area Expansion Project**	
Project Location	Brgy. Akle, San Ildefonso, Bulacan	
Project Category & Type (based on Annex A of MC 2014-005 Guidelines)	Cement Plant with Quarrying	
Project Size	**Cement Plant**	
	Existing Capacity	**Proposed New Capacity**
	6.0 MMTPY Cement	8.6 MMTPY Cement
	Quarry	
	Existing Extraction Rate: 7.1 MMTPY limestone	
Project Area	**Cement Plant**	
	Existing: 50 hectares	
	Quarry	
	Existing Area	**Proposed New Area**
	67.4 hectares	121.32 hectares
Proponent Name	Eagle Cement Corporation	
Proponent Authorized Representative	**Mr. John Paul L. Ang** CEO	
Proponent Address and Contact Details	153 Epifanio Delos Santos Avenue Barangay Wack-Wack, Mandaluyong City Metro Manila, the Philippines Telephone no.:(+63-2) 3013453 Fax no.: (+63-2) 7239283	
EIA Preparer (Consultant)	**LCI Envi Corporation**	
Preparer Contact Person	**Engr. Jose Marie U. Lim, MSc.** EIA Team Leader	
Preparer Address and Contact Details	Unit 8L-M Future Point Plaza 3 111 Panay Avenue, South Triangle Quezon City, Metro Manila, Philippines Tel. No.: (632) 442-2830 Fax No.: (632) 961-9226	

1.1 Project Location and Area

1.1.1 Project Location

10 The general location map of the proposed project is shown in **Figure 1-1.** The cement plant of Eagle Cement Corporation is in Brgy. Akle, San Ildefonso, Bulacan. The geographic coordinates defining the boundary of the existing cement plant the cement plant is shown in **Table 1-2**.

Table 1-2: Coordinates of the Eagle Cement Plant

Point	Latitude	Longitude
Existing Cement Plant		
1	15° 3'10.36"N	121° 4'2.03"E
2	15° 3'7.48"N	121° 4'2.56"E
3	15° 3'7.70"N	121° 4'12.95"E
4	15° 3'9.25"N	121° 4'13.93"E

11 The locations of the MPSA and the quarry area are shown in **Figure 1-2** while the geographic coordinates are presented in **Table 1-3.**

12 The existing quarry areas of Eagle Cement Corporation are Parcel 14 in Brgy. Akle and Parcel 15 with quarry areas located in Brgy. Akle and Brgy. Talbak.

13 For the proposed additional quarry areas, Parcel 6 is in Brgy. Akle while Parcels 9,11 and 12 are in Brgy. Talbak.

Table 1-3: Coordinates of the MPSA-181-2002-III and Quarry Areas

Corner	Latitude	Longitude
Parcel 4		
1	15°06'15.00"	121°03'45.00"
2	15°06'19.619"	121°03'45.00
3	15°06'21.11"	121°03'43.54"
4	15°06'22.48"	121°03'44.85"
5	15°06'23.32"	121°03'45.00"
6	15°06'24.24"	121°03'45.01"
7	15°06'25.88"	121°03'43.90"
8	15°06'28.472"	121°03'42.94"
9	15°06'29.69"	121°03'43.89"
10	15°06'30.00"	121°03'45.00"
11	15°06'30.00"	121°04'00.00"
12	15°06'15.00"	121°04'00.00"
Hectarage=29.6		
Parcel 5		
1	15°06'23.15"	121°04'15.00"
2	15°06'30.00"	121°04'15.00"
3	15°06'30.00"	121°04'20.01"
4	15°06'26.60"	121°04'30.00"
5	15°06'23.15"	121°04'30.00"
Hectarage=7.8307		
Parcel 6		
1	15°06'00.00"	121°04'15.00"
2	15°06'15.00"	121°04'15.00"
3	15°06'15.00"	121°04'30.00"
4	15°06'00.00"	121°04'30.00"
Hectarage=20.6480		
Parcel 9		
1	15°05'30.00"	121°04'15.00"
2	15°05'45.00"	121°04'15.00"
3	15°05'45.00"	121°04'30.00"
4	15°05'30.00"	121°04'30.00"
Hectarage=20.6447		
Parcel 11		
1	15°04'52.05"	121°04'30.00"
2	15°05'00.00"	121°04'30.00"
3	15°05'00.00"	121°04'37.48"
4	15°04'55.45"	121°04'42.04"
Hectarage=5.9347		
Parcel 12		
1	15°04'45.00"	121°04'36.58"
2	15°04'49.56"	121°04'36.58"
3	15°04'55.45"	121°04'42.04"
4	15°04'55.51"	121°04'45.00"
5	15°04'45.00"	121°04'45.00"
Hectarage=6.7411		

Corner	Latitude	Longitude
Parcel 13		
1	15°04'45.41"	121°04'56.33"
2	15°04'56.81"	121°04'56.33"
3	15°04'56.81"	121°05'06.48"
4	15°04'45.41"	121°05'06.48"
Hectarage=10.6195		
Parcel 14		
1	15°03'59.51"	121°04'09.45"
2	15°03'59.68"	121°04'09.14"
3	15°04'00.76"	121°04'09.01"
4	15°04'03.61"	121°04'02.51"
5	15°04'04.23"	121°04'09.10"
6	15°04'04.98"	121°04'09.05"
7	15°04'06.64"	121°04'08.32"
8	15°04'07.76"	121°04'08.80"
9	15°04'10.26"	121°04'08.35"
10	15°04'11.05"	121°04'08.21"
11	15°04'12.93"	121°04'07.71"
12	15°04'14.21"	121°04'08.48"
13	15°04'18.45"	121°04'07.65"
14	15°04'19.52"	121°04'07.49"
15	15°04'20.12"	121°04'05.24"
16	15°04'21.94"	121°04'05.70"
17	15°04'20.83"	121°04'06.25"
18	15°04'10.58"	121°04'14.96"
19	15°04'01.87"	121°04'17.23"
Hectarage=12.00		
Parcel 15 - A		
1	15°03'15.079"	121°04'41.335"
2	15°03'39.246"	121°04'35.958"
3	15°03'41.440"	121°04'50.632"
4	15°03'22.534"	121°04'53.659'
5	15°03'30.073"	121°04'41.135"
Parcel 15 - B		
1	15°03'15.079"	121°04'41.335"
2	15°03'14.620"	121°04'52.072"
3	15°03'06.527"	121°04'51.618"
4	15°03'06.986"	121°04'40.881"
5	15°03'15.079"	121°04'41.335"
Parcel 15 - C		
1	15°03'06.736"	121°04'31.397"
2	15°03'05.535"	121°04'29.132"
3	15°03'02.995"	121°04'27.494"
4	15°03'02.633"	121°04'26.522"
5	15°03'02.571"	121°04'25.117"
6	15°03'01.769"	121°04'24.144"
7	15°03'02.401"	121°04'23.278"
8	15°03'03.245'	121°04'16.488"
9	15°03'04.421"	121°04'14.313"
10	15°03'08.813"	121°04'13.527"
11	15°03'08.813"	121°04'12.376"
12	15°03'14.410"	121°04'12.376"
13	15°03'14.410"	121°04'12.377"

Corner	Latitude	Longitude
14	15°03'17.364"	121°04'28.623"
15	15°03'06.736"	121°04'31.397"
Parcel 15 - D		
1	15°03'23.213"	121°04'12.488"
2	15°03'26.956"	121°04'14.227"
3	15°03'28.974"	121°04'13.959"
4	15°03'30.000"	121°04'13.619"
5	15°03'30.000"	121°04'28.386"
6	15°03'25.665"	121°04'28.404"
7	15°03'23.213"	121°04'12.488"
Hectarage=55.3538		
Total Area = 169.3725 ha		

1.1.2 Project Area

14 The existing cement plant of Eagle Cement Corporation occupies a total land area of 50 hectares. No additional project area is required for the increase of cement production and the construction of additional facilities.

15 The quarry of Eagle is within MPSA 181-2002-III with a total area of 169.4 hectares. The existing quarry areas of the proponent are under Parcel 14 and Parcel 15 of MPSA 181-2002-III which covers 67.35 hectares. The proposed additional quarry areas are in Parcel 6, Parcel 9, Parcel 11 and Parcel 12 with a total additional area of 53.97 hectares. With this, the new total quarry area will become 121.32 hectares.

1.1.3 Project Impact Areas

16 The study area for the EIA includes the direct and indirect impact areas. The project impact area generally consists of the ~50-hectare project footprint of the cement plant complex and the quarry areas as the direct impact area (DIA), and the areas in the immediate vicinity of the project site in the host barangay as the indirect impact area (IIA). In accordance with the guidelines provided in DAO 2017-15, the delineation of the direct and indirect impact areas will be updated as follows:

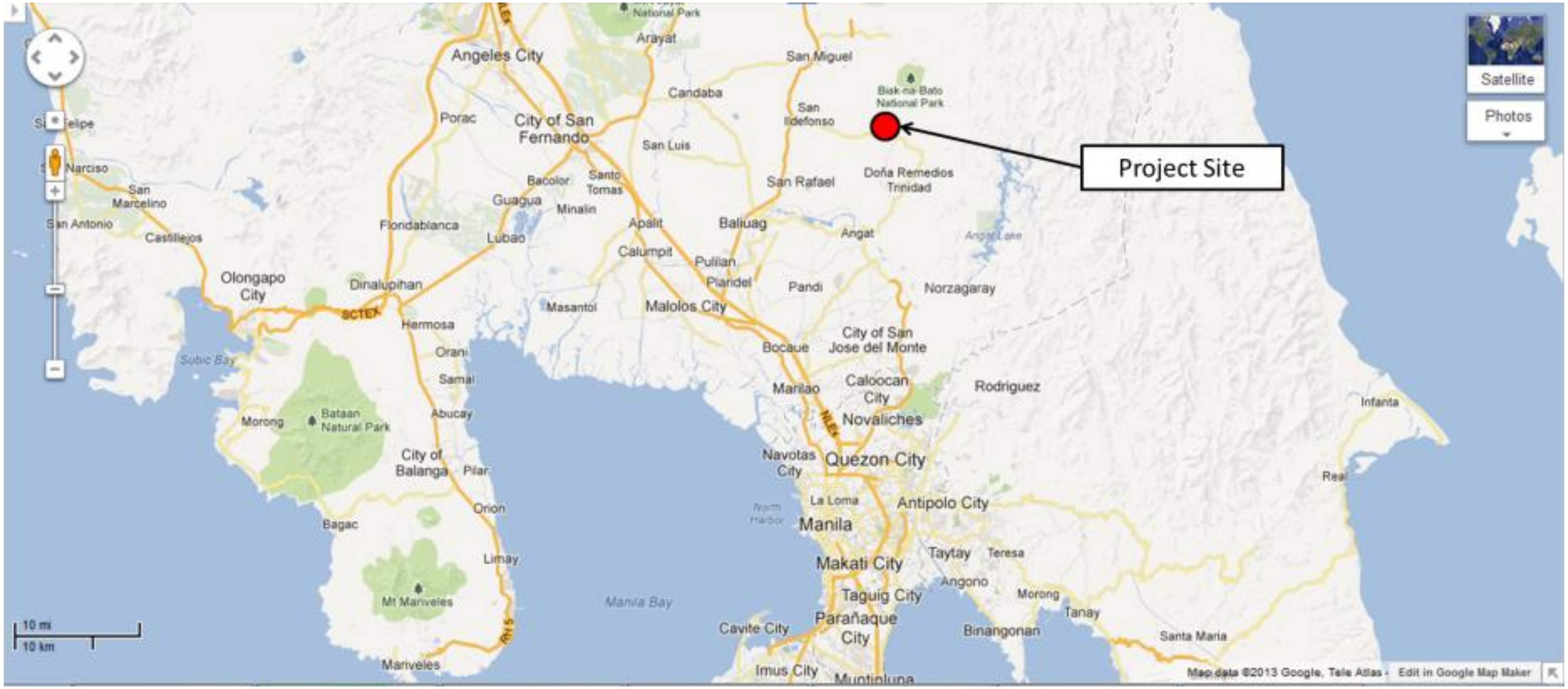
- For the Land component, the direct impact area (DIA) pertains to the areas that will be cleared and developed for the operation of the quarry, which are identified in **Section 1.4**. The DIA also includes the current route of the truck, heavy equipment and other vehicles utilized for plant and quarry operations.
- For the Water component, the DIA refers to the groundwater that supplies the water requirement of the project.
- For the Air component, the DIA extends to the front of the plant site to include areas that will be greatly affected by stack emissions, as supported by the air dispersion modelling. The identified DIA are supported by the current locations of the monitoring stations for the existing lines and the environmental assessments conducted for the expansion line, particularly by the runs of the air quality model, which predicted the possible areas to be affected by the emissions from the stack.
- For the People component, the IIA encompasses the communities in the host Municipality of San Ildefonso particularly Brgy. Akle and Brgy. Talbak (host barangay) which are expected to benefit from the employment, business opportunities, taxes, and other potential socio-economic contributions of the project.

17 The impact area delineation for the proposed project is graphically presented in **Figure 1-2**.

1.1.4 Accessibility of the Project Site

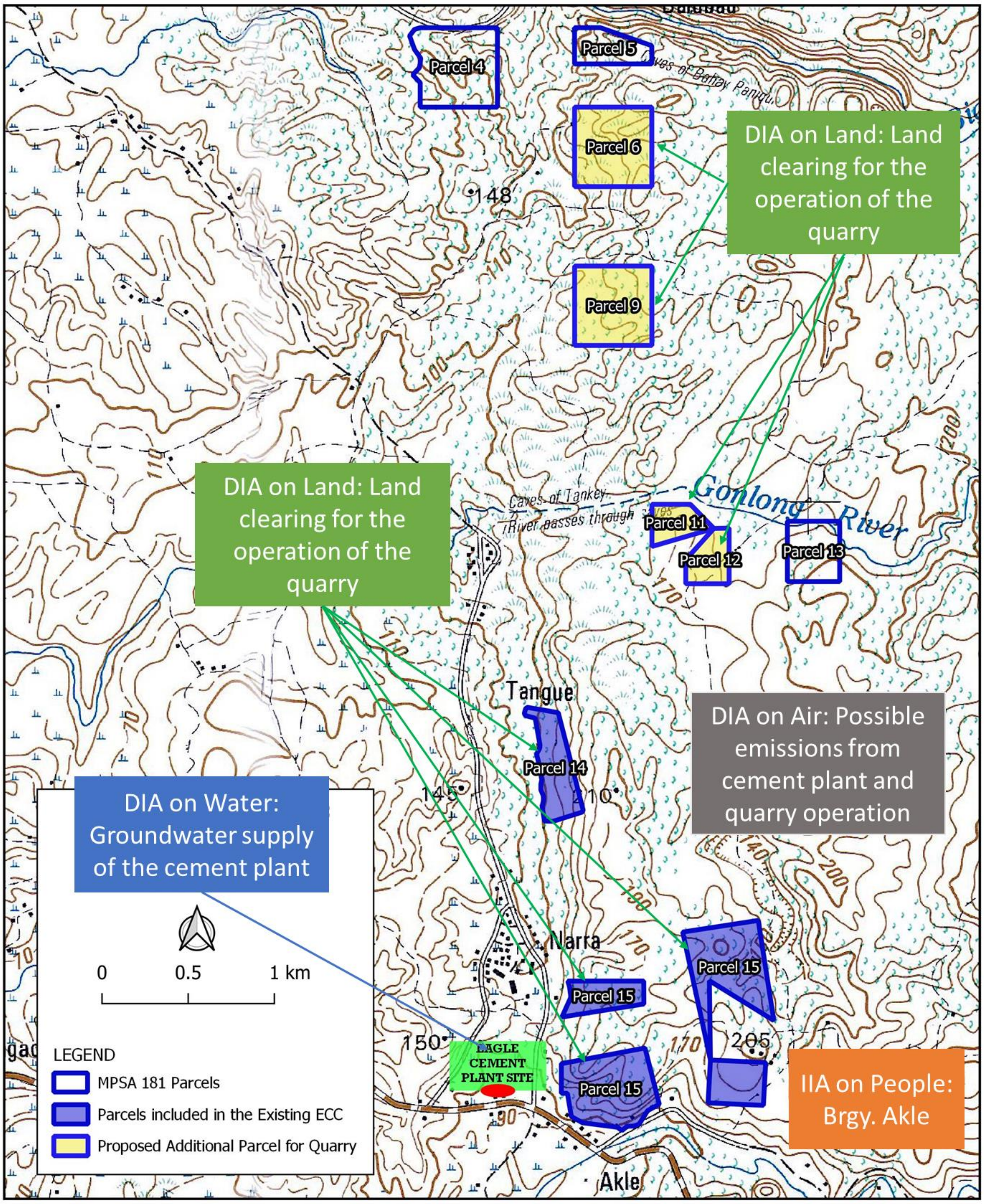
18 The Project Site is bounded on the west by the Municipality of Candaba in Province of Pampanga, on the east by Doña Remedios Trinidad, Bulacan, on the north by the Municipality of San Miguel in Bulacan and on the south by the Municipality of San Rafael also in Bulacan.

Figure 1-1: General Location Map of the Project



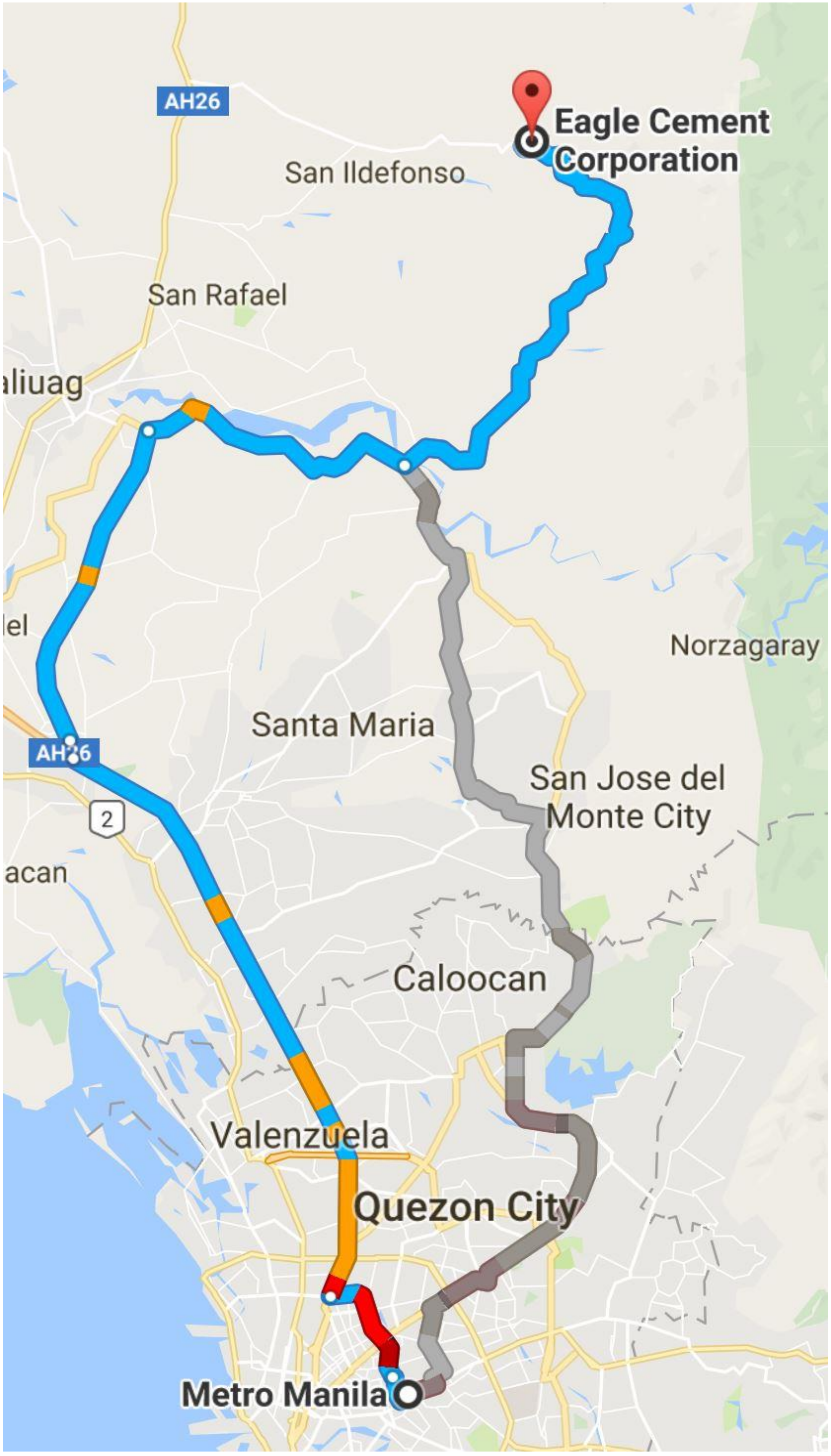
PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **GENERAL LOCATION MAP OF THE PROPOSED PROJECT**	FIGURE NO.: **1-1**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Area Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: MAP GENERATED IN QGIS BASE MAP: NAMRIA

Figure 1-2: Primary and Secondary Impact Areas



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: PRIMARY AND SECONDARY IMPACT AREAS		FIGURE NO.: 1-2
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: Eagle Cement and Quarry Expansion Project Brgy. Akle, San Ildefonso, Bulacan	SOURCE: MAP GENERATED IN GOOGLE EARTH	

Figure 1-3: Accessibility Map of the Proposed Project Site



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
Eagle Cement Corporation	ACCESSIBILITY MAP OF THE PROPOSED PROJECT SITE	1-3

EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	MAP GENERATED IN GOOGLE MAPS

1.2 Project Rationale

19 The proposed expansion of the Eagle Cement Corporation's cement plant is in line with the goal of the national government to build infrastructure, as cement is a major construction material. Public and private developments hinge on the steady supply of cement. Furthermore, higher supply of cement leads to lower prices. Cement is almost universal in terms of building applications—ranging from government projects such as low-cost socialized housing, public elementary schools and hospitals, highways and bridges, and to privately-funded endeavors such as condominiums, commercial centers, and individual housing units.

20 It is important to maintain the supply of cement to maintain its prices. If supply of cement curtails, higher prices of cement may impede the progress of infrastructure projects, which may then lead to cutting of basic social services. A solution to low supply of cement is importation, but this solution undermines the local economy. Establishing cement manufacturing facilities in the country us important to provide a reliable supply of cement, lessen the dependence on imported cement products, and to assure competitive prices that supports local economy.

21 Also, the proponent intends to use alternative fuels to reduce the usage of coal in their operation. The use of waste as alternative fuel in cement production has numerous environmental benefits such as:

- Will reduce the use of non-renewable fossil fuels, such as coal, and reduce the environmental impacts associated with coal mining. The use of waste as alternative fuel will contribute towards lowering of greenhouse gases emissions by reducing waste materials to be incinerated in municipal waste incinerators.
- The use of waste as alternative fuel is technically sound, since the process basically destroys the organic components and retains the inorganics, such as insoluble residues, ashes and silicates, and integrates these to the product. Cement kilns have a number of characteristics which make them ideal installations for alternative fuels to be vaporized and burnt safely. The following characteristics are high operating temperature, long residence time, presence of oxidizing atmosphere and alkaline environment, high thermal inertia, retention of ash in clinker and the continuous supply of fuel.
- Concrete made from cement manufactured using alternative fuels will have the same properties as concrete made from cement manufactured using fossil fuel as the heavy metal concentrations in concrete are not significantly changed by the use of alternative fuels. It is expected that quantities of leached metals will be immeasurable and significantly below levels allowed for drinking water.

1.3 Project Alternatives

22 Alternatives analysis is carried out to determine the most favorable alternative considering such factors as economic viability, technical feasibility, magnitude and extent of impacts on environment and people. The project is analyzed as the preferred alternatives while assessing "without the project" alternatives or "do nothing alternatives.

1.3.1 Site Selection

23 There are no alternative sites that were considered since the proposed additional components for the use of the alternative fuels and raw materials will be constructed to support the existing operation of Eagle Cement Corporation and is located inside the existing cement plant complex.

24 The proposed additional quarry areas that will be utilized are still within the MPSA. These additional parcels will also support the requirement of the cement plant. No other sites were considered.

1.3.2 Technology Selection

25 No additional cement line will be constructed. The operation of the existing cement lines will be optimized to increase its cement production capacity. The existing kilns will also be equipped to handle alternative fuels.

1.3.3 Resources and Alternative Fuels

26 Possible alternative fuels that can be used as alternative fuel include industrial wastes such as: used tires, rubber, paper waste, waste oils, waste wood and paper sludge. The use of alternative fuels is subject to its availability and to limits on handling.

27 The proponent will submit its technical position on its use of alternative fuels to EMB and secure the necessary permits from appropriate agencies prior to implementation.

1.3.4 No Project Option

28 If the proposed expansion of the cement plant will not be pursued, the cement market will be affected. Cement prices may be higher if the supply does not meet the current demand. The market may also resort to buying of imported cement instead of the local cement if the supply is low. Also, the existing operation of the cement plant and quarry in the project area will still continue.

29 **Table 1-4** compares the environmental impacts of constructing and operating the proposed expansion of the project as opposed to the no-project scenario.

Table 1-4: Comparison of Anticipated Environmental Impacts of Project Alternatives

ALTERNATIVES	ANTICIPATED ENVIRONMENTAL IMPACTS
Proposed Expansion of Cement Plant	• **Land:** Solid waste generation may be higher due to use of more resources and employment of more personnel. • **Water:** Construction and operation of larger facilities may have higher water supply requirement that may, in turn, result to higher wastewater generation. • **Air:** Possible increase in dust emissions from the cement processing may also adversely affect ambient air quality in the project area if not properly mitigated. • **People:** The expansion will provide more job opportunities to the local community. There will also be an increase on the local taxes and revenues. Additional budget will also be allocated for the SDP and SDMP programs of Eagle However, dust generated from the cement plant may cause adverse health effects to the community and workers if not properly mitigated.
No-Project Scenario	• **Land:** Quarrying activities to supply raw materials will continue. Adverse impacts due to quarrying will still be experienced. • **Air:** The ambient air quality in the area, as well as the source emissions from the facilities of Eagle Cement Corporation are within DENR standards. • **Water:** The current operation will continue to consume water for industrial and domestic uses. Water use will increase because of growing population and hence water consumption or stress on groundwater will not likely be associated with their operations. • **People:** The no-project scenario entails loss of additional local employment, service opportunities and local taxes and revenues. Additional budget for the SDP and SDMP activities will not be realized.

1.4 Project Components

1.4.1 Major Components

30 The existing project components of the three cement lines of the Eagle Cement Corporation are summarized in **Table 1-5** while **Figure 1-4** shows the plant layout.

Table 1-5: Existing Project Components of Eagle Cement Corporation

Component	Existing Line 1 (2.0 MMTPY)	Existing Line 2 (2.0 MMTPY)	Existing Line 3 (2.0 MMTPY)
Quarry Operations			
Limestone crushing system	1,000 tons per hour (tph) capacity with an impact hammer crusher	1,500 tons per hour (tph) capacity with a double rotor hammer crusher	
Stacker	Circular 1,000tph capacity	Rectangular store with 1,500tph capacity	Rectangular stacker with 600tph capacity and 650 tph capacity
Clay Crusher	300tph with hammer crusher	400tph with double-toothed roller crusher	
Reclaimer	1 unit	1 unit	2 units
Storage Bins	280 m^3 limestone; 280 m^3 shale, 300 m^3 silica and 280 m^3 pyrite	500 m^3 limestone; 250 m^3 shale, 250 m^3 silica and 100 m^3 pyrite	500 m^3 limestone; 250 m^3 shale, 250 m^3 silica and 100 m^3 pyrite
Cement Plant Operations			
Ball mill	380tph	400tph or 2x 200tph roller press system	400tph or 2x 200tph roller press system
Homogenizing Silo	15,000mt	Raw meal silo 15,000mt	Raw meal silo 15,000mt
Clinker	5,000 TPD clinker with grate cooler will be replaced by an IKN Pendulum Grate Cooler	5,000 TPD with IKN Pendulum Grate Cooler	5,000 TPD clinker with IKN Pendulum Grate Cooler
Clinker Silo	2 units with capacity of 25,000 mt each and 800mt for the off-spec clinker storage	2 x 25,000 MT clinker silo	2 x 25,000 MT clinker and 800mt for the off-spec clinker storage
Cement Proportioning Station	CPS with 4 bins use for clinker, limestone, pozzolan and gypsum/enhancer storage (400t, 250t, 250t and 200t for each material respectively)	CPS with 4 bins use for clinker, limestone, pozzolan and gypsum/enhancer storage (400t, 250t, 250t and 200t for each material respectively)	CPS with 12 bins use for clinker, limestone, pozzolan and gypsum/enhancer storage (400t, 250t, 250t and 200t for each material respectively)
Cement Grinder	Ball mill capacity of 130-135tph and roller press capacity of 675-780tph	Cement grinder with ball mill system with O-SEPA400 separator and PPDC (Pulse-Plenun Bag Dust Collector) system	3 units Vertical Roller Mill with 270tph and >300tph capacity
Cement Silo	15,000 mt capacity	15,000mt storage capacity	3 x 15, 000MT storage capacity

Component	Existing Line 1 (2.0 MMTPY)	Existing Line 2 (2.0 MMTPY)	Existing Line 3 (2.0 MMTPY)
Waste Heat Recovery	6.1 MW Waste Heat Recovery	6.11 MW Waste Heat Recovery System	6.1 MW Waste Heat Recovery
Water Source	3 existing deep wells		
Air Pollution Control	Cyclone separators and bag house filters	Cyclone separators and bag house filters	Cyclone separators and bag house filters
Wastewater Pollution Control	Siltation ponds	Siltation ponds	Siltation ponds

31 Shown in the table below are the cement components that will be optimized to increase the cement production capacity. The total rated capacity and operating days of these facilities will be increased to meet the new production capacity.

Table 1-6: Project Components to be Optimized

Component	Existing Rate	Optimized Rate (TPH)
Cement grinder	1,050 TPH or 6.0 MMPTY cement	1,300 TPH or 8.6 MMTPY cement
Cement packing house	150 million cement bags per year	26,750 bags per day 182.75 million cement bags per year

1.4.2 Facilities

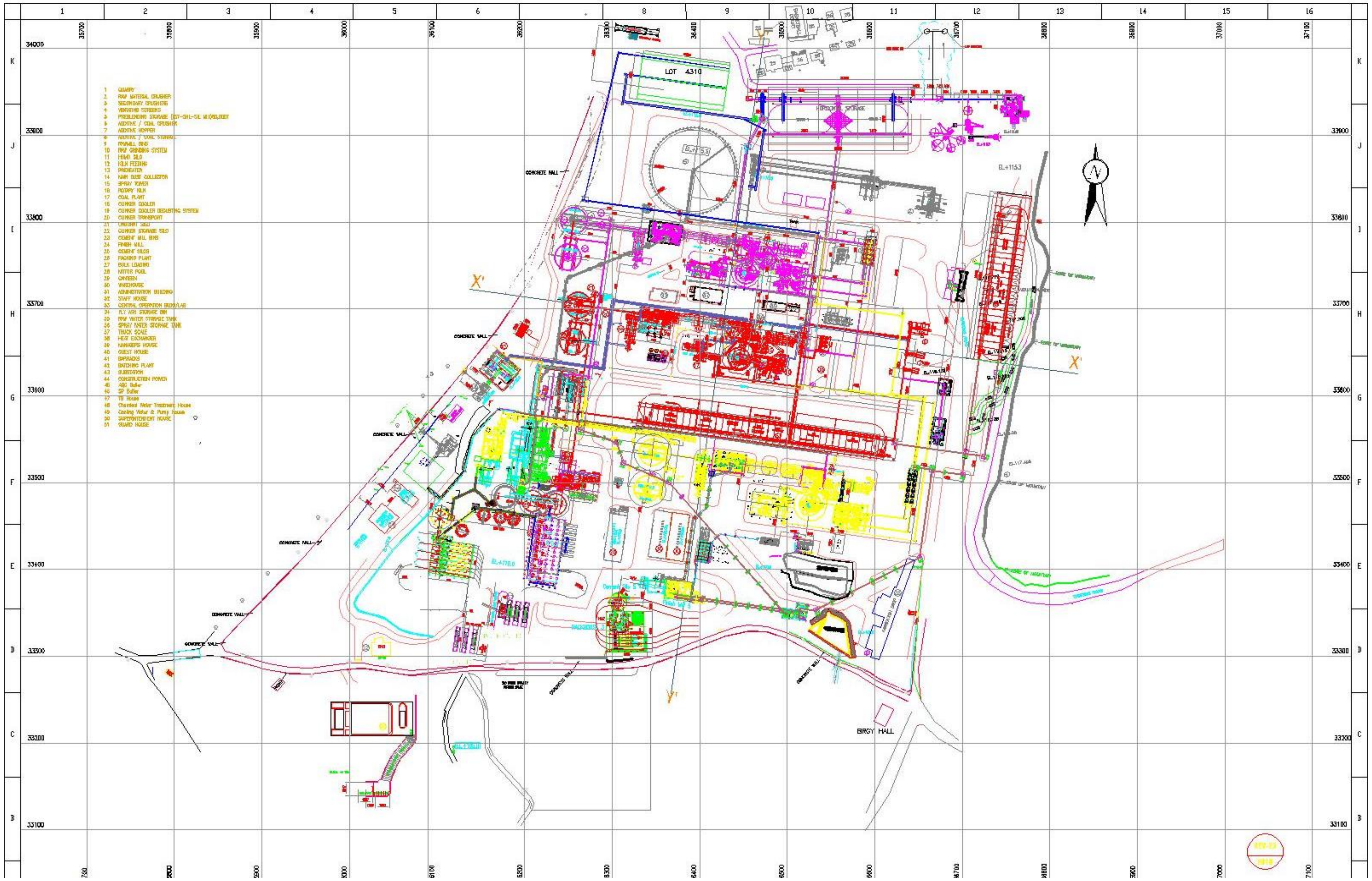
32 Warehouses, administration building and staff house, and parking and truck marshalling area are part of the support facilities of the cement plant. Medical clinic, fire station and power substation are also part of the cement plant complex.

33 The quarry operation also has Explosives Magazine (warehouse/storage facility) to specifically store explosives that are used in the blasting activities. The storage facility for the ANFO is owned and managed by the Eagle's quarry contractor. This facility was constructed based on the guidelines set by the Bureau of Fire Protection (BFP), the Philippine National Police-Firearms and Explosives Division (PNP-FED) and DAO 2000-98 to primarily decrease the risk of accidental explosion to people and property.

1.4.3 Waste Heat Recovery Power Generating Plant

34 Eagle Cement Corporation is presently using waste heat recovery (WHR) system as additional power source of the cement plant. Each cement line has WHR system with average electrical power capacity of 6.11 MW per line and can supply 25 to 30% of the power consumption of the plant. 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 components: the Boiler, Steam Turbine, Condenser, and Feed Water Pump. These components are used for energy conversion and power generation.

Figure 1-4: Plant Layout



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **PLANT LAYOUT**	FIGURE NO.: **1-4**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

1.4.4 Pollution Control Devices

1.4.4.1 Air Pollution Control

35 The priority in the cement industry is to minimize the increase in ambient particulate levels by reducing the mass load emitted from the stacks, from fugitive emissions, and from other sources.

36 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 using adjustable conveyors. Dusty areas such as roads should be regularly sprinkled with water to reduce dust generation.

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

Dust Collectors

38 Limestone run-of-mine undergoes crushing and size classification without introduction of water, unlike the comminution of construction aggregates and gold and copper ores. Dust collectors are installed to control the emission of fugitive dust into the air. A blending storage facility for limestone is enclosed in a form of a dome to protect against wind and rain to help minimize accumulation of airborne particles. Inside the storage, the screened limestone is heaped in piles. Stacking and reclaiming mechanism is done by a bridge scraper that runs through the length of the limestone pile at variable speed so as to adjust the withdrawal rate for production requirement.

Bag Filters

39 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. Highly-efficient bag filters are provided, running at moderate speed for long service life. Vane damper works to control gas flow and as well as with the cascade speed control of the bag filters fan motor.

40 The exhaust hot gases pass through the bag filters to trap the suspended particulates in the gas, before it is released into the atmosphere; a bag filter fan provides the suction power. The gas passes through the gas conditioning tower to attain lower gas temperature based on the requirements of the bag filters. A recirculation duct is also provided in the gas conditioning tower to make sure that gases flowing to the bag filters are adequately cooled down by water injection system and that the carbon monoxide level is at low concentration. The passing gas is cycled back to the conditioning tower whenever the desired temperature is not met. The bag filters have guaranteed efficiency of 99.99% in eliminating the dust.

41 For the proposed cement grinding facility, a new bag filter will be installed. It will have a capacity of 262 m^3/min with cloth area of 242 m^2.

42 **Table 1-7** enumerates the existing air pollution control facilities installed in the cement plant.

Table 1-7: List of Existing Air Pollution Facilities in Eagle Cement Plant

Air Pollution Source	Air Pollution Control Facility	Specification
Primary Crusher	Bag Filters	Capacity: 30, 000m³/hr Model: GIR 6x18R16C-H3000-BC Type: Pulse Jet (Bags & Cages) Air to cloth ratio: 1.1 m³/m²-min Operating temp.: 50-80 °C Filter area: 440.7 m²
Vibrating Screen	Bag Filters	Model = GIR 6x24R16C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity = 40,000 m³/hr Filter Media = Polyester Felt Air to cloth ratio = 1.14 m³/m²-min Filter area = 586.3 m² Bag Size = Ø160 x 3000 mm L
Secondary Crusher	Bag Filters	Model = GIR 6x14R14C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity = 20,000 m³/hr Filter Media = Polyester Felt Air to cloth ratio = 1.1 m³/m²-min Filter area = 300 m² Bag Size = Ø160 x 3000 mm L Total No. of Bags = 196
Belt Conveyor	Bag Filters	Model = GIR 6x5R10C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity = 5,000 m³/hr Filter Media = Polyester Felt Air to cloth ratio = 1.09 m³/m²-min Filter area = 76.5 m² Bag Size = Ø160 x 3000 mm L Total No. of Bags = 50
Additive Crusher	Bag Filters	Maker/Model = Gemcore/ GIR 6x10R12C-H3000-BC Type= Pulse Jet (Bags & Cages) Capacity= 12,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Filter area= 183.6m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 120
Transport conveyor to additive storage	Bag Filters	Model = GIR 6x5R10C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Transport conveyor to RM feed bins	Bag Filters	Model = GIR 6x5R10C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C

Air Pollution Source	Air Pollution Control Facility	Specification
		Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Raw feed transport belt conveyor	Bag Filters	Maker = Gemcore Type = Pulse Jet Capacity=5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min
Homosilo discharge	Bag Filters	Capacity = 4,800m3/hr Dust air quantity: ~50-100g/m3 Filter Surface= 71m2 Air/cloth ratio= <1.2m3/m2min
Kiln Feeding Bin	Bag Filters	Model = GIR 6x5R10C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity= 6,600m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Kiln Feeding	Bag Filters	Capacity = 4,800m3/hr Dust air quantity: ~50-100g/m3 Filter Surface= 71m2 Air/cloth ratio= <1.2m3/m2min
Clinker Cooler Discharge	Bag Filters	Model = GIR 6x5R10C-H3000-BC Type = Pulse Jet (Bags & Cages) Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Clinker Silo 1	Bag Filters	Capacity= 36, 000m3/hr Filter Media= Polyester Felt Bag Size= Ø160 x 3000 mm L Air to cloth ratio= 1.09 m³/m²-min
Clinker Silo 2	Bag Filters	Capacity= 36, 000m3/hr Filter Media= Polyester Felt Bag Size= Ø160 x 3000 mm L Air to cloth ratio= 1.09 m³/m²-min
Clinker Silo 1 discharge	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Clinker Silo 2 discharge	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min

Air Pollution Source	Air Pollution Control Facility	Specification
		Operating temperature= 40-60°C Filter area= 76.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Transport conveyor 13-65	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m^3/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min Operating temperature= 40-60°C Filter area= 76.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Feed bins	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m^3/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min Operating temperature= 40-60°C Filter area= 76.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Roller Press	Bag Filters	Maker= NFF Model = GIR 6X4R14C-H3000-BC No. compartment= 3 Total No. of Bags= 90 Filter Media = Polyester Felt Length = 3, 000mm Dia = 160mm Gas Flow= 35, 000m3/hr
Finish Mill 2 feed transport	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m^3/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min Operating temperature= 40-60°C Filter area= 76.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Top of clinker bin	Bag Filters	Type = Pulse Jet (Bags & Cages) Capacity= 5,000m^3/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min Operating temperature= 40-60°C Filter area= 76.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Cement Grinding	Bag Filters	Capacity= 262 m^3/min Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min Operating temperature= 40-60°C Filter area= 242.5m^2 Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Cement Silo 1	Bag Filters	Capacity= 5,000m^3/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m^3/m^2-min

Air Pollution Source	Air Pollution Control Facility	Specification
		Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Cement Silo 2	Bag Filters	Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Air slide transport to Cement Silo	Bag Filters	Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Air slide transport to Bulk Silo	Bag Filters	Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Finish Mill 2 Fly Ash Bin	Bag Filters	Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Bulk Silo	Bag Filters	Capacity= 5,000m³/hr Filter Media= Polyester Felt Air to cloth ratio= 1.09 m³/m²-min Operating temperature= 40-60°C Filter area= 76.5m² Bag Size= Ø160 x 3000 mm L Total No. of Bags= 50
Pack House (Bag filter at Roto Packer)	Bag Filters	Type = Pulse Jet Filter Media = Polyester, Water Repellent Length = 3,375 mm Diameter = 165 mm Design Pressure = 6.5 bar Gas Flow Rate = 17,800 Am3/h Max. Permissible Temp = 120°C Total No. of bags = 120
Pack House (Bag Filter at BE)	Bag Filters	Type = Pulse Jet Filter Media = Polyester, Water Repellent Length = 3,350 mm Diameter = 165 mm Design Pressure = 6.5 bar

Air Pollution Source	Air Pollution Control Facility	Specification
		Gas Flow Rate = 6,200 Am3/h Max. Permissible Temp = 120°C Total No. of bags = 120
Transport Bag Filter	Bag Filters	Gas Flow Rate: 17,200 m^3/h Filter area: approx. 192 m^2 Air-to-cloth ratio: max. 1.6 m^3/m^2 x min

Water Spray System

43 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 on the basis of 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.

Coal Handling

44 The crushed coal stored in storage facility undergoes grinding and drying by a ball mill. The mill basically consists of chamber for grinding and drying and a dynamic separator. Coal grinding is accomplished by using steel balls. The oversize or coarse is conveyed back to the grinding chamber while the undersize or fines is directed up the cyclone and bag filters before delivery to the coal dust bin. The ground coal, called "fine coal," is fed to the pre-calciner and rotary kiln as fuel. The separator is equipped with a frequency speed-controlled motor to ensure that the finished fine coal is controlled automatically through the differential pressure over the grinding chamber. Its drying process is controlled automatically through the outlet temperature of the gases coming from the pre-heater or hot gas generator.

45 The raw coal is simultaneously dried and ground using the hot gas from the cyclone pre-heater. Exhaust gas from the coal mill passes through the bag filters. The regulated flow of gas in the milling system is maintained by redirecting the filtered gas partly, while the fraction thereof containing a maximum concentration of 50 mg/Ncm is discharged into the atmosphere. In this system, the bag filter operates under a slight over-pressure which prevents infusion of oxygen to the bag filter.

Specifications:

- Treated Gas Volume 180,000m^3/hr
- Design Pressure 8,000 Pa
- Gas Temperature 120°C max
- Dust Load 450g/Nm^3 max
- Dust Emission 50mg/Nm^3
- Filtering Area 3,000m^2
- Collecting Efficiency 99.99%

1.4.4.2 Water Pollution Control

46 Since processes for cement production and quarry operation are dry processes, wastewater generated will be limited to domestic wastewater and from surface run-off only. Domestic wastewater is handled by the septic tanks that are installed in the plant. Siltation ponds are

constructed within the cement plant and quarry areas to pre-treat the collected surface run-off. The ponds retain the water until most of the dust particulates and suspended solids settle at the bottom of the pond.

47 Temporary siltation ponds are constructed inside the quarry area to capture the rainwater which may contain eroded soils that are washed off during heavy rainfalls. Effluent from these temporary siltation ponds will flow to a 114-meter channel line and open culvert going to the siltation ponds inside the cement plant site before disposal.

48 The cement plant has three existing siltation ponds, shown in **Figure 1-5**. During rainfalls, the rainwater flows to the existing drainage system inside the plant going to the siltation ponds. The Eagle Cement Corporation currently has a drainage system within the plant as shown in **Figure 1-6**. The capacities of the existing siltation ponds are shown in **Table 1-8**.

Table 1-8: Water Pollution Control in Eagle Cement Plant

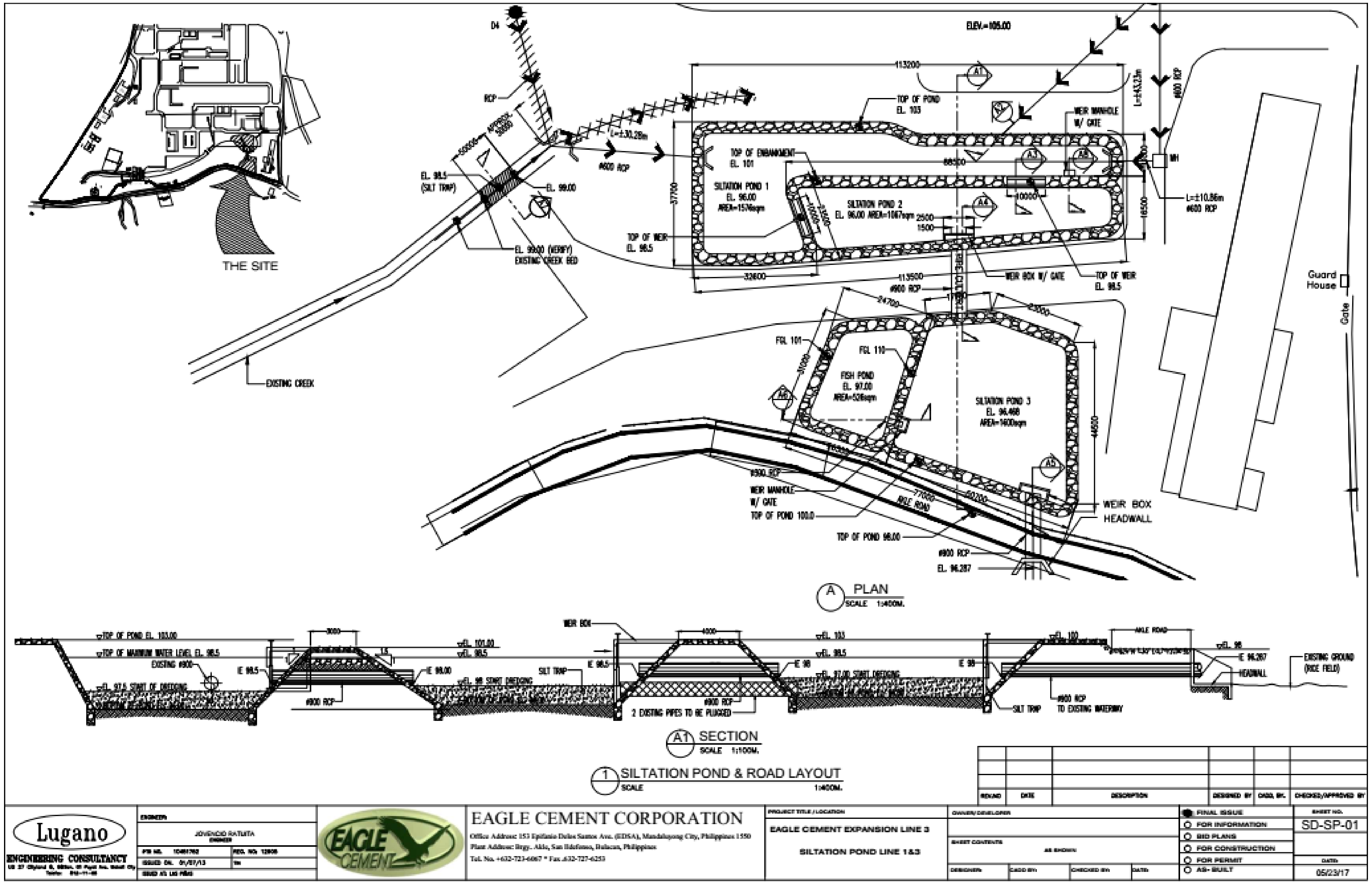
Water Pollution Control	Capacity (m^3)
Siltation Pond 1	3,940
Siltation Pond 2	2,668
Siltation Pond 3	4,000

49 During dry season, the pond is mostly dry. However, during wet season, the ponds contain surface run-off from the drainage as well as the effluent from the temporary siltation ponds in the quarry area. The ponds are able to hold the water until it precipitates. The effluent of the ponds is disposed to the nearest creek. Prior to disposal, the quality of the effluent is monitored in terms of Total Suspended Solids (TSS), color and pH.

50 The existing water pollution control of the cement plant will be utilized by the expansion. The expansion project will not increase the amount of surface runoff that will be generated; hence, there is no need to increase the size of the siltation ponds. The existing drainage system of the cement plant already considered the expansion. The siltation pond will also be used by the company for water impoundment.

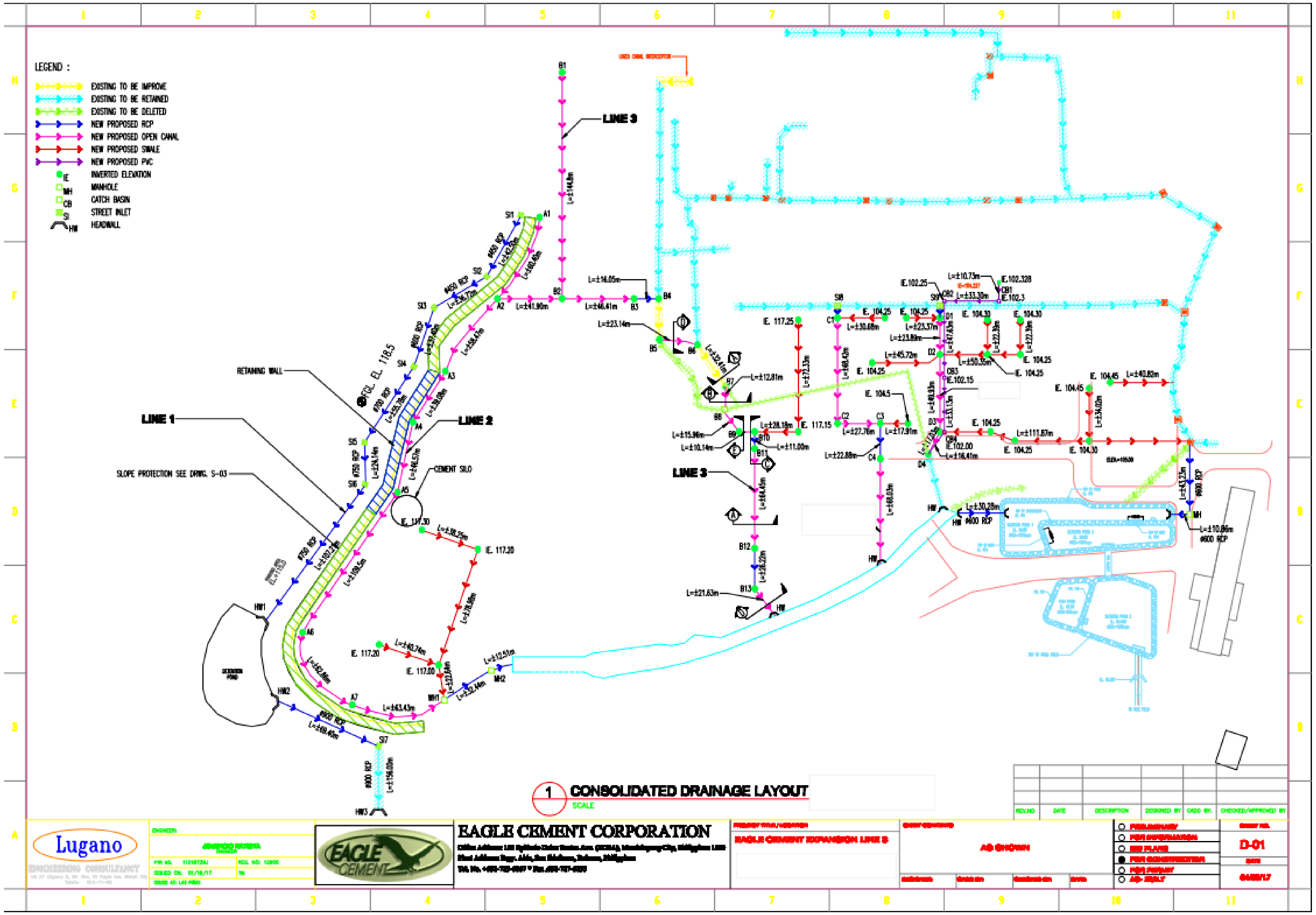
51 In order to maintain the efficiency of the ponds, a more frequent desilting of the ponds will be observed. Silts in the drainage are also regularly removed.

Figure 1-5: Location of the Siltation Ponds



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
Eagle Cement Corporation	**LOCATION OF THE SILTATION PONDS**	**1-5**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

Figure 1-6: Drainage Plan



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
Eagle Cement Corporation	**DRAINAGE PLAN**	**1-6**

EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	PROJECT PROPONENT

1.4.4.3 Solid Waste Control

52 A temporary solid waste storage area will be provided in the site during construction. All solid wastes will be properly segregated and disposed. Designated spoil disposal area will also be provided. All of these will be located inside the project site

53 Eagle is implementing its solid waste management plan. Solid wastes from the office, dormitory/kitchen and other facilities are segregated as to bio-degradable or not and will be disposed of accordingly with the help of the municipal government. Eagle has a Materials Recovery Facility (MRF) and designated scrap yard. Designated solid waste management area is also provided on-site.

1.4.4.4 Chemical and Hazardous Waste Control

54 The operation of the cement plant is generating controlled chemicals wastes and hazardous materials in its operation. Eagle has secured necessary permits in accordance to the guidelines under DAO 1992-29, the Implementing Rules and Regulations of Republic Act 6969, the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990.

1.5 Process/Technology

55 The process flow diagram of a full cement manufacturing process is shown in **Figure 1-7.**

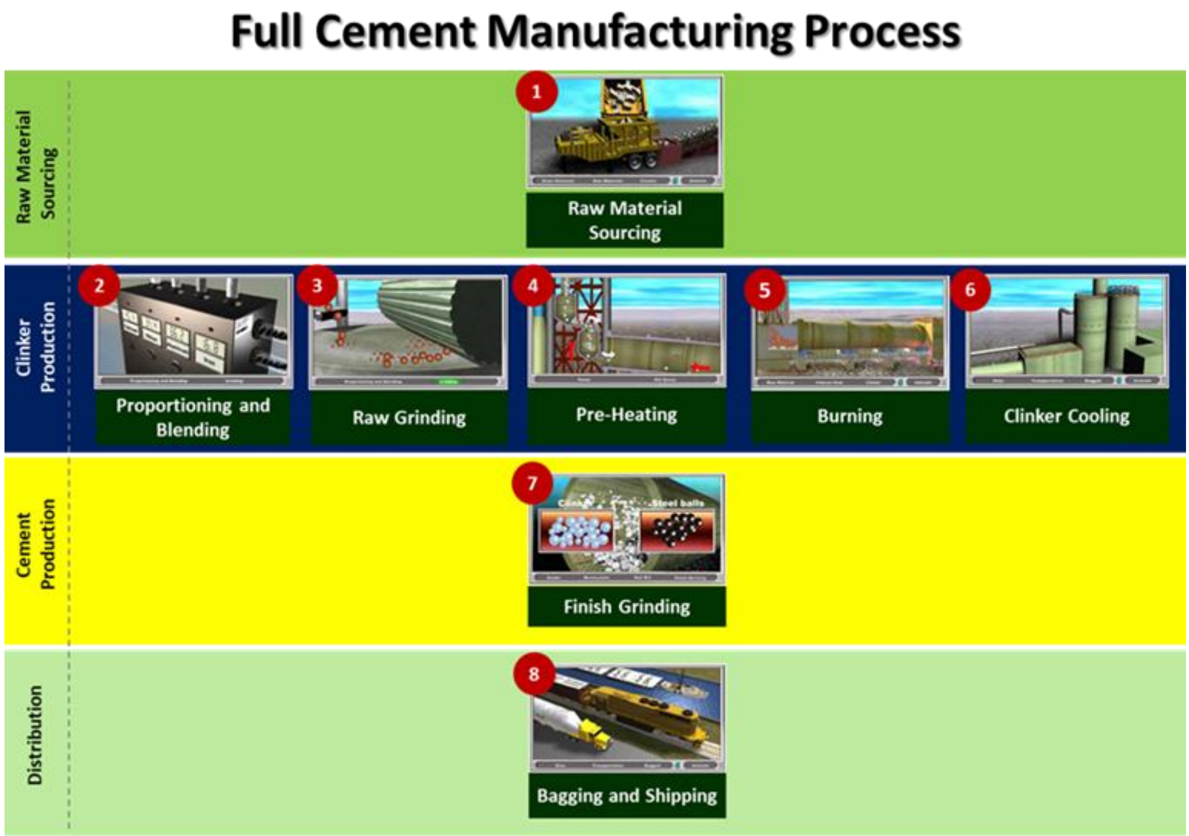
56 The amount of raw materials that the cement plant will be utilizing to produce 8.6 MMTPY of cement is summarized in **Table 1-9**. The clinker production of the existing kilns will remain the same thus, the limestone requirement that will be supplied by the Eagle quarry operation will be the same. The additional clinker needed to produce the new cement capacity will be outsourced. As mentioned, the proponent will also be using alternative raw materials and additives to support the new cement production capacity.

Table 1-9: Raw Material Requirements of the Cement Plant

Minerals	Mineral Requirement (MTPY)
Limestone	7,451,220
Silica	728,640
Shale	722,304
Pyrite	166,320
Gypsum	490,200
Pozzolan	705,888
Fly Ash (ARM)	551,776
Pulverized Limestone (ARM)	344,860
High Carbon Fly Ash (ARM)	46,115
Other Clinker Source	1,254,400

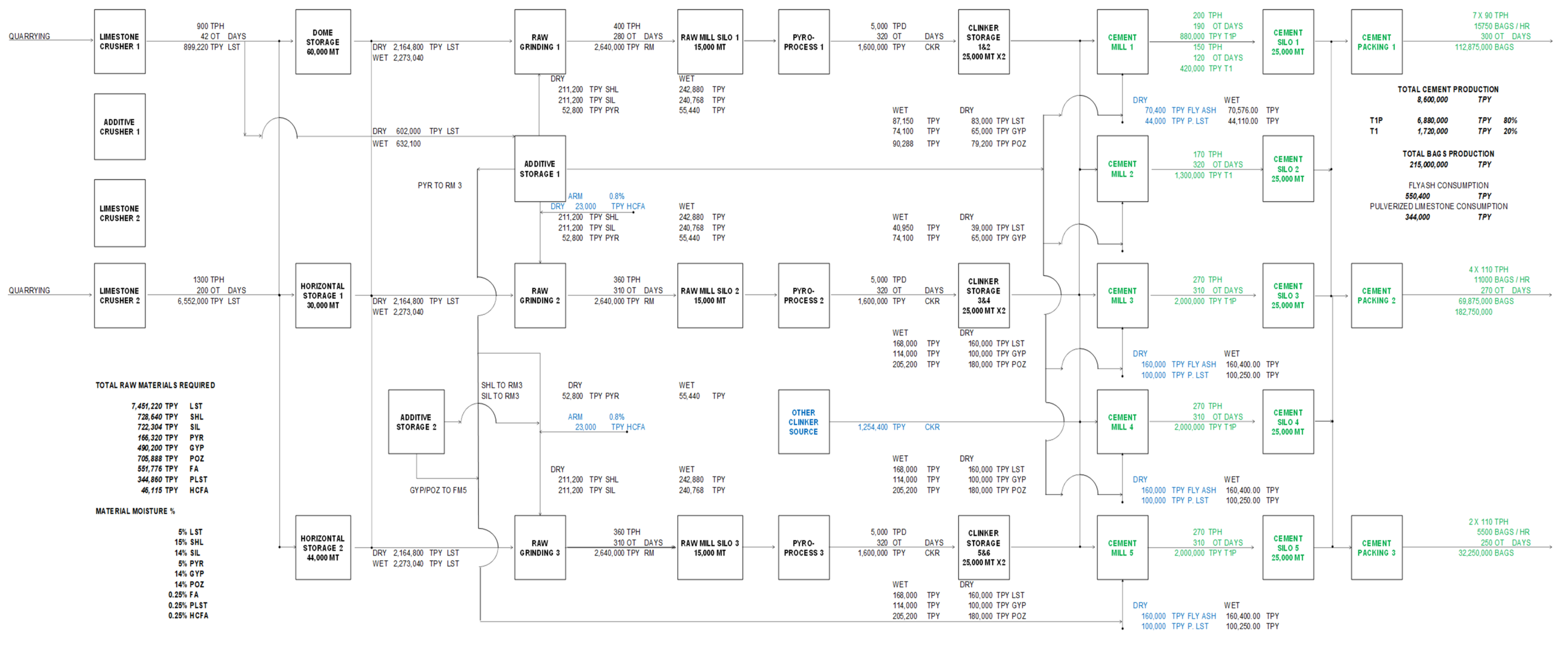
57 The material balance diagram of the Eagle Cement Plant considering the new proposed cement production capacity is shown in **Figure 1-8.** Presented in the material balance are the proposed alternative raw materials (in blue) and additional clinker to be outsourced (in blue) needed. The existing facilities (in green) such as the cement mill, cement silo and cement packing will be optimized to increase their capacities to process the additional clinker and ARM into cement. For other components, the capacity will remain the same.

Figure 1-7: Process Diagram of Full Cement Production



PROJECT PROPONENT:	FIGURE TITLE:		FIGURE NO.:
Eagle Cement Corporation	**PROCESS DIAGRAM OF FULL CEMENT PRODUCTION**		**1-8**
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:	
LCI ENVI CORPORATION	**Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	PROJECT PROPONENT	

Figure 1-8: Material Balance for Eagle Cement Plant



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **MATERIAL BALANCE FOR EAGLE CEMENT PLANT**	FIGURE NO.: **1-10**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

1.5.1 Quarry Operation

1.5.1.1 Limestone Crushing and Conveying

Existing Limestone Crushing and Conveying

58 For the Line 1, crusher has a capacity of 1,000 tons per hour with an impact hammer crusher. The mined limestone is dumped in receiving hoppers, one for low grade limestone and a one for high grade limestone. Using apron feeder, limestone is fed to the crusher. The crushed material is transported to the circular storage.

59 For Line 2, the limestone crushing system's capacity is 1,500 tons per hour with a double rotor hammer crusher, which is located in the quarry. The mined limestone is dumped in the two-receiving hopper through open trucks. Two heavy-duty apron feeders are located under every receiving hopper for two grades limestone feeding. Limestone from apron feeder is fed to Wobbler Feeder. The crushed limestone, fine materials from Wobbler and spillage from apron feeder is being discharged to the belt conveyor and finally be conveyed to the limestone pre-blending storage.

60 The dust produced during crushing and in all the transfer points is being collected by bag filters and the emission concentration will not be more than 30 mg/Nm^3.

1.5.2 Limestone Pre-blending and Conveying

Existing Limestone Pre-blending and Conveying

61 The crushed limestone is transported via belt conveyors which is stored and pre-blended in a circular storage by means of a stacker with 1,000 tph capacity for the Line 1 and rectangular store yard for Line 2 with 1,500 tph stacker capacity. The limestone is extracted from the pre-blended bed by means of a reclaimer of 800-900tph capacity. For Line 3, a storage with stacker of 1,500 tph capacity and reclaimer capacity of 600 tph will convey the crushed limestone.

62 The limestone storage capacity for the whole plant is 60,000MT, 2 x 15,000 MT and 2 x 20,000 MT rectangular store yard. Limestone is then transported to the raw mill feed bin via belt conveyors.

1.5.3 Clay Crushing & Conveying

Existing Clay Crushing and Conveying

63 The clay requirement for Line 3 is being crushed via Line 1 or Line 2 clay crusher system. The additive/clay crusher capacity for Line 1 is 300tph with hammer crusher and 400tph capacity with a double-toothed roller crusher for Line 2. The additive/clay materials are dumped in the receiving hopper through open trucks. A heavy-duty apron feeder is located under the receiving hopper. From the apron feeder, clay materials are crushed. The crushed clay and spillages from apron feeder are

discharged to a belt conveyor and are transported to existing stockpile by means of other belt conveyors.

64 The dust produced during crushing as well as in all the transfer points are collected by bag filters and the emission concentration will not be more than 30 mg/Nm^3.

1.5.4 Additive, Coal Storage and Conveying

65 The first additive storage house is a 45,000MT semiportal storage equipped with a stacker. It stores shale, silica, copper slag, pozzolan, gypsum, limestone cement additive and raw coal.

Existing Additive Coal-storage and Conveying

66 Another additive storage house was constructed with 28,000 MT capacity. It was constructed to support the operation of Line 3. It houses shale, pozzolan, gypsum and limestone cement additive. It is equipped with stacker, a tripper car with a capacity of 650 TPH, and reclaimer, a side scraper type with 400 TPH capacity.

1.5.5 Cement Processing Plant

1.5.5.1 Raw Meal Feeding System

67 The table below shows the existing storage bins of limestone, shale, silica and pyrite for Lines 1, 2 and 3 Raw Mill Lines.

Storage Bins	Line 1 (m^3)	Line 2 (m^3)	Line 3 (m^3)
Limestone	280	500	500
Corrective Limestone			500
Shale	280	250	250
Silica	300	250	250
Pyrite	280	100	100

68 The bins are mounted on load cells for exact determination of the filling level. Bag filters are used for de-dusting of bins and the discharge area. Extraction of materials from the bins are done via dosing belt weigher. The weigh-feeders make up the raw mix based on the actual set point. A collecting belt conveyor receives the materials from the different dosing belt weighers and conveys the raw material mix to the raw mill system. A self-cleaning metal separator (belt magnet) and metal detector are installed over the collecting belt. All the dust from transfer points are collected by bag filters and the emission concentration will not be more than 30 mg/Nm^3.

1.5.5.2 Raw Meal Grinding

69 For Line 2 and 3, 2 units of 210 tph roller press system are used for its raw meal grinding. The mill feed belt conveyor transfers the material into a pneumatic actuated diverter chute, which passes the material either to a collector bin for the removal of tramp metals or to the mill via an appropriate heavy-duty airlock valve. In order to prevent mill damage, the raw mill feed system is equipped with a suitable metal detection device. The mill feed materials containing the tramp metal are deviated from the mill feed conveyor through an air actuated deflection gate and collected into a surge bin. The same deflection gate is being used to empty the mill and/or feed bins if required.


Existing Raw Meal Grinding

70 The materials collected in the surge bin are extracted by means of a variable speed belt conveyor, which also equipped with a metal detector controlling a diverting chute. The speed of the belt conveyor is maintained as low as possible in order to increase the metal removal efficiency. Only the material containing the metal is diverted to a tramp metal bin, the remainder is returned to the mill feed via the mill recirculation system, ensuring that minimum raw material is wasted in the process of removing tramp metal from the mill feed circuit.

71 The reject bin at the mill inlet is equipped with load cells. The raw material grinding takes place in a roller press. 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 is being envisaged for the new raw mill system. The exit gas of the pre-heater is being used for drying in the mill and material transport.

72 Ductwork configuration to allow hot gas by-pass between mill inlet, mill filter, and circulating air between mill outlet and inlet ducts are installed.

73 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.

74 A high efficiency classifier is installed in the mill in order to reach the necessary raw meal fineness. The raw material feed rotary airlock into the mill delivers material to the mill and also provides an effective seal to prevent air entering the mill through the feed system. A belt conveyor transports the coarse material rejected from the mill to a recirculation bucket elevator for its reintroduction to the mill feed conveyor.

75 In case of emergency shutdown, the raw mill is being emptied and the rejected material is being fed into the bin by a spillage conveyor under the mill, equipped with air lock, an elevator, a mill feed belt and a two way chute. Four cyclones are installed for removing material from mainstream of gas. To ensure the achievement of the desired quality targets and high uniformity, the chemical composition of raw mix in front of the raw mill is on-line controlled by means of proportion system.

76 An auxiliary hot gas generator is included 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.

The capacity of hot gas generator is met with 60% capacity of mill. 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.

77 Transport of samples to laboratory is done manually. The pressure loss between mill inlet and mill fan are kept on a minimum level in order to save energy on the mill fan. The mill fan has a single speed drive with inlet modulating louver dampers with electric actuator. Recirculation system capacity is minimum 40% of mill throughput capacity.

78 The concept of mill layout is an open circuit system. The mill liners are replaced on the spot, using the swinging system which is provided in the mill design for each roller. The removing of the drive unit, rollers and other heavy parts of the mill and their replacement are performed by means of mobile cranes, as per maintenance concept already implemented in other projects.

79 Line 1 uses a tandem operation of Roller Press and Ball Mill System. The roller press is often used where energy-efficient grinding of large product quantities is required. The two rollers, rotating in opposite directions, exert very high pressure on the material, effectively crushing and weakening the particles (microscopic cracks), so that the subsequent fine grinding is easier. When used as a pre-grinding system in ball mill circuits, production increase can be achieved.

1.5.5.3 Pre-heater Exhaust Gas Treatment

Existing Pre heater Tower

80 Kiln gas from pre-heater top stage is sucked through down comer by kiln pre-heater fan. After the pre-heater fan, gas is given through raw mill or mill bypass to the main bag filter and filter fan to main stack. Part of kiln gas is given after pre-heater fan 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.

81 During direct operation (raw mill off), all kiln gases are transported via mill bypass direct to main filter baghouse and stack. Cooling of the kiln gas in a dedicated gas conditioning tower is done in order to reduce temperature to approx. 150°C— so as not to use a very expensive filter bags.

82 Emergency fresh air intake before main filter is installed to cool down the pre-heater exhaust gas during direct operation and up-set kiln 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. A portion of the pre-heater exhaust gas is used for the coal grinding.

83 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.

84 For this reason, the new discharge screw conveyor of the cooling zones is being equipped with a reversible drive and two outlet spouts. An electric slide gate will close the system to prevent incoming of false air during normal operation.

85 The kiln dust, removed in the cyclones from the gases to the coal grinding plant, are returned to dust transport of the kiln filter by means of a series of drag chain conveyor. A motorized slide gate installed under the last drag chain conveyor to kiln feed elevator, allows the material diverted to either the homogenizing silo or the kiln feed elevator.

1.5.5.4 Raw Meal Homogenizing

86 In addition to the existing homogenizing raw meal blending silos for Line 1 and Line 2 which have a capacity of 15,000 mt each, another 15,000 mt raw meal silo was provided for Line 3.

87 The raw meal collected in the mill cyclones together with the raw meal collected in the filter baghouse during nominal mill operation are transported to the corrective silo or the homogenizing silo by means of air slides, bucket elevator (belt) and one distribution system. The raw meal product from raw mill can also transported into the pre-heater directly, by passing the raw meal homogenizing silo.

88 The kiln feed bin is located near 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.

89 The fluidization/extraction air is supplied by the aeration blowers. A separate dust collector is installed for the feed bin. The kiln feed bin has a storage capacity of 200mt. Raw meal from the corrective silo could be also transported into the kiln feed bin by means of air slides after measured by flow meter. At the feed bin discharge, a dosing impact flow meter controls the raw meal feed rate to the kiln via the pre-heater.

90 On the kiln feed transport line, before the elevator, a continuous sampling device is being installed to allow checking of the raw meal quality. Transport of samples to the laboratory is being done manually. For kiln start and emergency reason it is being 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).

91 For Line 3, a suitable number of dust collectors was installed to de-dust all transfer points on the feeding system to the homogenizing silo, on silo extraction system and on the kiln feed bin and dosing section. Another dust collector is being provided on top of the pre-heater for venting the kiln feed elevator.

1.5.5.5 Kiln Feeding System & Pre-heater Tower

92 All existing kiln feeding system have the same burning system that consists of a single string with five stages pre-heater cyclones fitted with a pre-calciner fired with solid fine coal fuel.

93 The raw meal feeding to the pre-heater are introduced at the gas inlet of cyclone #2 inlet riser via a belt bucket elevator, an air slide conveyor and rotary valve.

94 Under each rotary valve, slide gate is 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 fuel. 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 parts) are included in the pre-heater structure.

95 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.

1.5.5.6 Kiln and Tertiary Duct

96 The three cement lines have the same kiln system. It consists mainly of inlet chamber, kiln pipe, kiln hood, sealing systems, kiln drive and supports.

Existing Kiln and Tertiary Air Duct

97 The three piers rotary kiln with a size of Φ4.8m×72m and design capacity of 5000t/d, designed for the solid coal fuel, is fitted with a variable speed main drive motor, girth gear and pinion drive. Kiln maintenance are done by mobile crane. The kiln shell surface in the area of sintering zone is cooled by forced air ventilation system.

98 The main burner satisfies the fuel's requirement for the kiln and the axis of the burner are parallel with the kiln axis. Diesel is used for start-up and pulverized coal for normal operation. The main burner is fitted with hook point for maintenance.

99 The support carriage of main burner is motorized and running on the rails. The trolleys rail(s) are parallel to the kiln axis in order to keep the main burner parallel to the kiln axis in any position. Fuel split to kiln main burner and pre-calciner burner are approximately 40%: 60%.

100 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 three separate lines by Coriolis weigh feeders and roots blower systems to the burners. A temperature scanner is installed for kiln shell (full length) temperature monitoring.

1.5.5.7 Alternative Fuel Storage– RDF and Waste Oil

101 Refused derived fuel and waste oil will be used as alternative fuel in the cement plant operation. **Figure 1-9** presents the storage location of Refuse Derived Fuel, conveyed to existing Precalciner lines of Kilns 1, 2 and 3. Waste oil will be tapped to existing diesel lines while Refuse Derived Fuel will have its own standalone dosing system. **Figure 1-10** shows the flowsheet transport from storage to the Precalciner lines.

1.5.5.8 Clinker Cooling

102 In addition, with the IKN Cooler of 5,000 TPD and 5,000 TPD clinker capacities being used by Line 1 and Line 2, another IKN Cooler of 5,000 TPD clinker capacity s installed for Line 3. The grate cooler used was an IKN Pendulum Grate Cooler. The grate area is sized for a clinker outlet temperature of 80°C above ambient at 5000TPD. At this production rate, the speed of the grate cooler is design at 15spm only.

103 The IKN Pendulum Cooler is being single stage with a single hydraulic cylinder drive located under the IKN Clinker Inlet Distribution System-KIDS. The mobile frame is being suspended from the IKN Linear Pendulum Support-LPS-integrated into the under grate housing.

104 The clinker temperature from clinker cooler outlet is +65°C above ambient temp. There is a roller crusher installed at the cooler outlet to crush big size clinker and the crushed clinker particle size is less than 25mm. Cooled clinker is being convey to clinker silo by means of a pan conveyor.

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

1.5.5.9 Clinker Transport and Storage

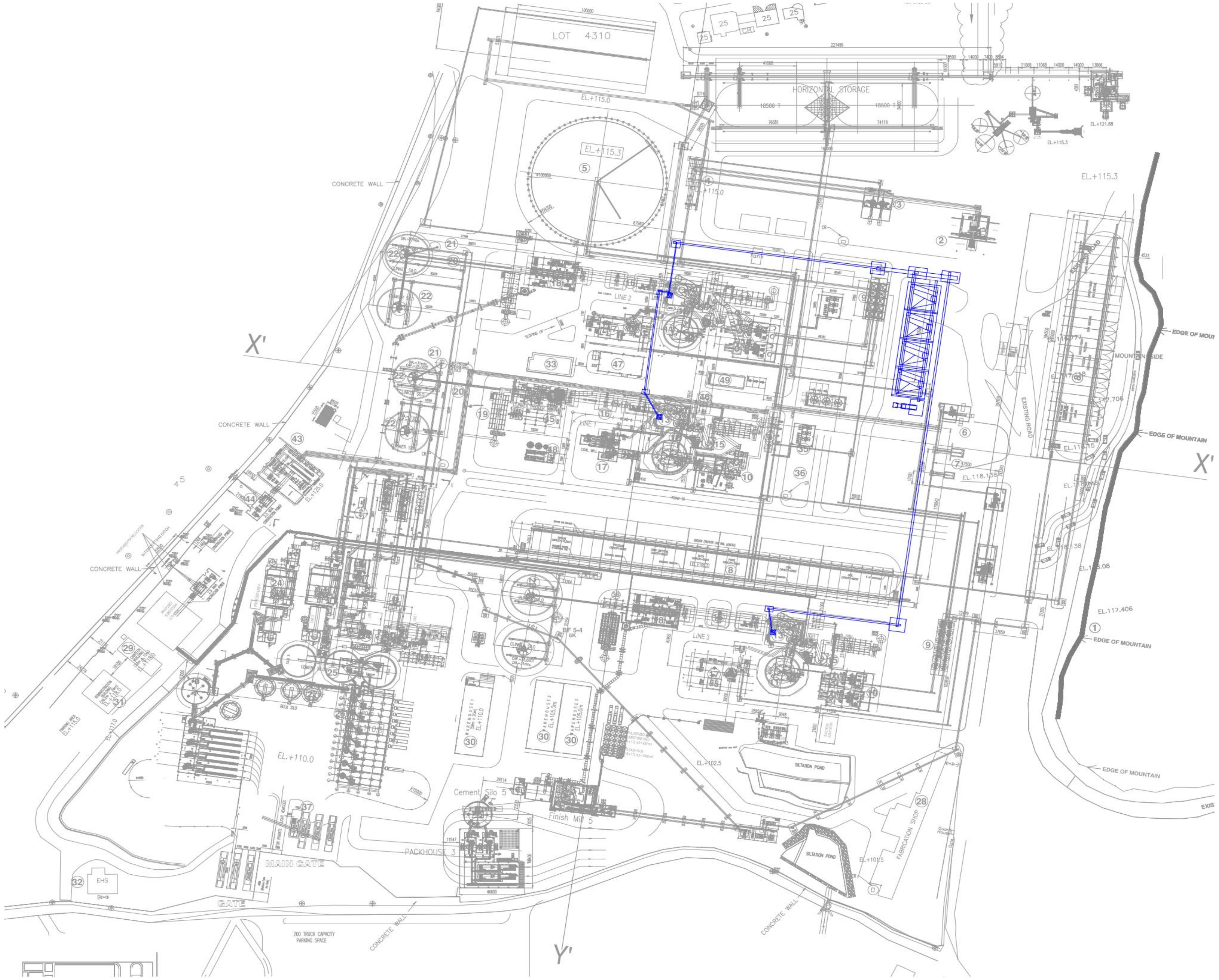
106 There are 6 x 25,000 metric ton capacity clinker silo and 800 metric ton off-spec clinker storage that are existing in the cement plant. An inclined deep pan conveyor is installed under the cooler clinker crusher discharge, for transporting of the clinker to the clinker silo.

107 This deep pan conveyor will feed a distribution box, which feeds the clinker either to the clinker silo or to off-spec clinker bin via another pan conveyor. The clinker from the off-spec bin is discharge onto trucks for clinker bulk discharging, or transport to cement material feed bin.

108 Clinker silo has three extraction galleries underneath which will transport the clinker through belt conveyor systems to the clinker bin of cement grinding mill. All transfer points at this area are properly de-dusted by enough bag filters.

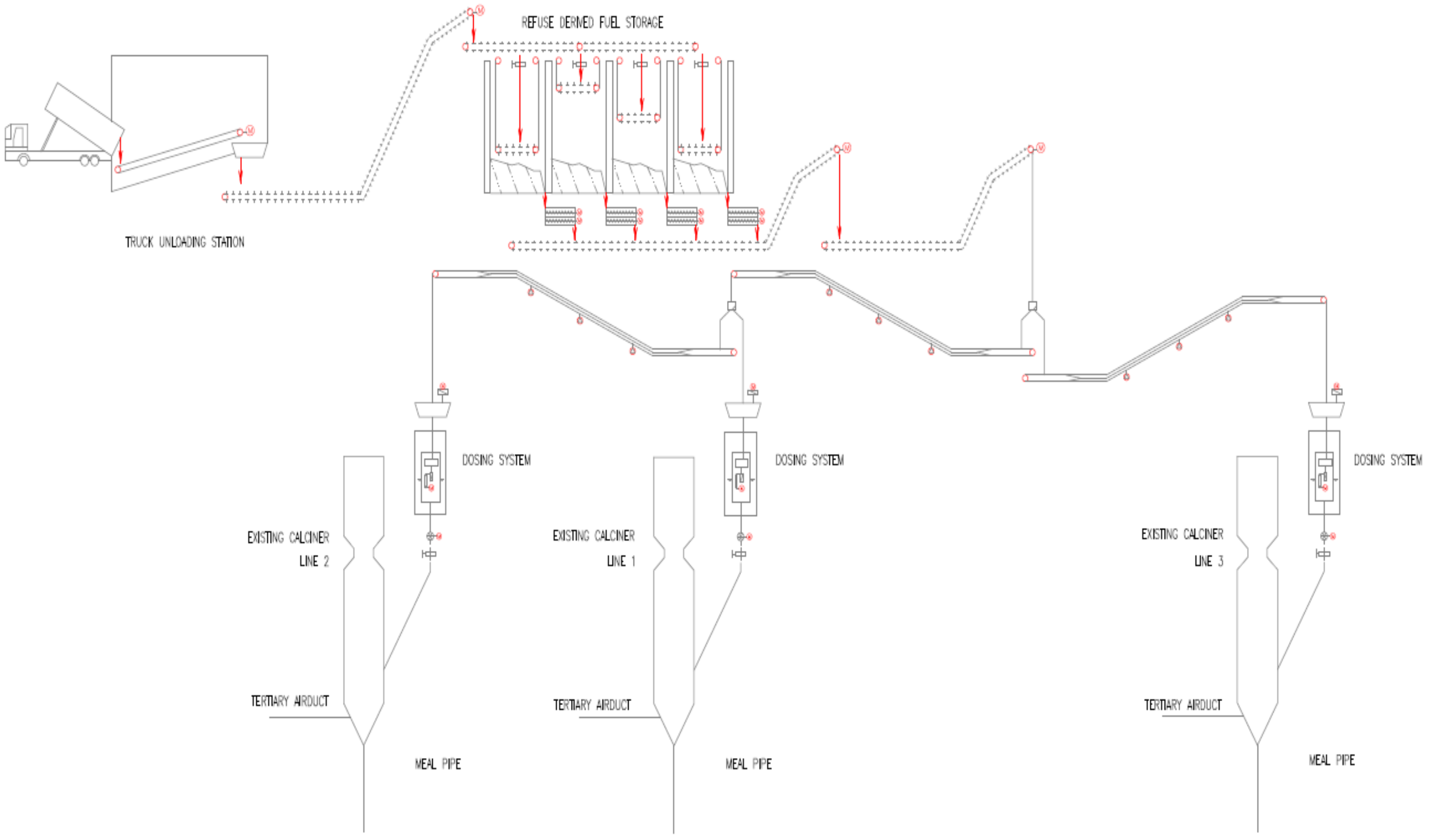
109 The aditional clinker that will be outsourced will also be stored in the existing clinker silos.

Figure 1-9: Refuse Derived Fuel Storage



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **REFUSE DERIVED FUEL STORAGE**	FIGURE NO.: **1-11**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

Figure 1-10: Refuse Derived Fuel Dosing Flowsheet



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
Eagle Cement Corporation	**REFUSE DERIVED FUEL DOSING FLOWSHEET**	**1-12**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

1.5.5.10 Cement Proportioning Station

110 There are four existing bins for clinker, limestone, pozzolan and gypsum storage for Line 1 and Line 2. Each bin has a weight belt feeder for measuring quantity of material fed to the cement grinding system. Materials shall be discharged in ratio and conveyed to cement grinding system by belt conveyors. This setup has been used for the existing cement milling plants.

111 Additional eight material bins were installed for Line 3. The bins are mounted on load cells for exact determination of the filling level. Dust filter will de-dust the top area of the bins and the discharge area. A self-cleaning metal separator (belt magnet) and metal detector is installed over the common feed belt conveyor.

1.5.5.11 Cement Grinding

Existing Cement Grinding

112 Line 1 and Line 2 have a roller press and ball mill system by which follows a different process. Materials from cement proportion station with materials from V-type separator is being fed to the feeding weighing bin and discharged to the roller press. The materials are being pre-grinded by the roller press and transported to the V-type separator by means of bucket elevator. The gas extracted from the V-type separator is being fed to SRV separator and separated. Coarse grain from SRV separator is being sent to the cement mill inlet. The gas flow exited the SRV separator is being de-dusted in a process bag filter. Part of gas coming out from bag filter goes back by bag filter exhaust fan and another part goes into V-type separator and SRV separator. Material grinded in ball mill is being feed to SRV separator for separating through bucket elevator and air slide conveyor. Finished product is being sent into bag filter by air and be collected. Others shall be circulating back to ball mill for regrinding.

113 For Line 3, there are three units of vertical roller mill, with capacities of 2x270 tph and 300 tph, installed. Materials from cement proportion station is fed directly to the vertical roller mill for grinding and be pneumatically transported to the built-in dynamic separator for classification. The fine or finished product will be transported pneumatically to the main bag filter for collection and further transported to the cement storage silo. The course material from the dynamic separator falls back to the vertical roller mill for further grinding.

114 The outsourced clinker will also be processed in the existing grinding facilities. The operation and capacity of the existing cement grinding facilities will be optimized to accommodate the additional clinker.

1.5.5.12 Fly Ash and Pulverized Limestone Application

115 Presently, cement mill is grinding Type 1P and Type 1 cement. Fly ash addition is being done to reduce clinker consumption per ton of cement and potential benefit of cement strength. Steel silo for fly ash and pulverized limestone silo were installed, with a capacity of 112m^3 storage capacity, complete with slide gates, rotary feeders and air slides.

Existing Fly Ash Storage

116 In addition to fly ash, pulverized limestone will also be used as additive to the cement. These materials increase the cement compressive strength. Furthermore, these materials are already fine products with less or no further grinding required. This means that these additives are is basically added on top of the existing capacities thus, increasing the cement produced.

1.5.5.13 Cement Transport & Storage

117 For Line 1 and Line 2, there are two existing 15,000 MT capacity cement silo. Additional three units of cement silo were constructed for Line 3. From the cement mill, the cement is transported to the cement silos by means of bucket elevator and air slides. The silos are equipped with an internal cone and a fluidization system at the bottom of silos to extract the cement. The fluidization system is being done by means of relative roots blowers. The over-all capacity of the five existing cement silos can store the proposed additional cement.

118 Dispatching out of silos is being possible to existing packing plant according to flow sheets. Cement silo will have its own de-dusting system (top and bottom sections), and its top roof is being equipped with a control pressure valve.

1.5.5.14 Cement Packaging and Bulk Storage

119 The final product will be transferred into the packhouse for packaging. Eagle Cement Corporation have 2 existing packhouse plants with 7 units of roto packer with 90 TPH capacity and 6 units of rotopackers with 110 tph capacity. Additional 2 units of packing machines with capacity of 110 t/hr capacity each is being installed in the Ventomatic Packing Plant. The bagged cement is being transported to existing truck loader by Caricatech Automatic Truck Loaders, and BSA3 Manual Truck Loader scheme. The operation of the packing machines will be optimized to achieve the proposed additional cement bags to be produced. The existing capacity of the packhouse is 150 million cement bags per year. Once optimized, the capacity will increase to 182.75 million of cement bags per year.

120 Cement may also be dispatched in bulk to bulk carriers from a separate bulk cement silo. There are 4 existing bulk silos in the cement plant with capacity of 1500 MT each.

1.5.5.15 Coal Unloading and Conveying

121 Coal is discharged into the existing hopper by truck and conveyed to the existing longitudinal storage yard by belt conveyor.

1.5.5.16 Coal Grinding System


Existing Coal Grinding system

122 Coal from existing storage yard is fed to two raw coal feed bins. Two weigh feeders under feed bin extract two grade coals to pulverizing system.

123 Coal comes into coal pulverizing system through rotary air lock. The mill can do drying, grinding and powder selecting work, the capacity is 50t/h, and the product fineness is less than 12 % residue on 90-micron sieve with a moisture content of not more than 10% as moisture in raw coal less than 23%. The heat source for drying comes from pre-heater fan outlet duct. For Line 2, Vertical Roller Mill is being used for grinding raw coal and pet coke with 55tph capacity. The product fineness for fine coal is less than or equal to 12% and 3-5% retain for pet coke on 90microns sieve. For Line 3, a Vertical Roller Mill with 45tph capacity.

124 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.

125 The qualified coal powder going out the mill with airflow is collected by anti-explosion dust collector and conveyed to pulverized coal bins by screw conveyor. There are two pulverized coal bins respectively for kiln and pre-calciner.

126 Considering the security, there are explosion-proof housing valve, CO_2 fire-fighting system and water fire-fighting system.

1.5.5.17 Truck Scale

127 Truck scale or weighbridge is mounted permanently on a concrete foundation that is used to weigh entire vehicles and their contents.

128 The truck scale is interfaced with SAP to capture the tare weight once the truck enters the company premises and the gross weight when it leaves. The difference will now be the load weight and should be within the allowable tolerance of the expected weight of the withdrawal. Capturing and comparison of load weight will validate and ensure the load of the trucks.

129 The assigned trucker will first determine its tare weight prior to loading. By this time, the Logistics Officer already assigned the expected withdrawal for the day to different truckers and should be available as part of Transportation Planning List. From the list, the assigned delivery for the trucker is identified.

130 Based on the identified assignment of delivery, the Pack House Checker facilitates the loading of cement to the truck.

131 Once the Trans-shipment Auditor confirms the load of the truck, he has received the same quantity from production to pack house/warehouse. This will make the materials available in the plant for post goods issue to customer. The total issues of Trans-shipment Auditor is being the actual production of Pack house for the day.

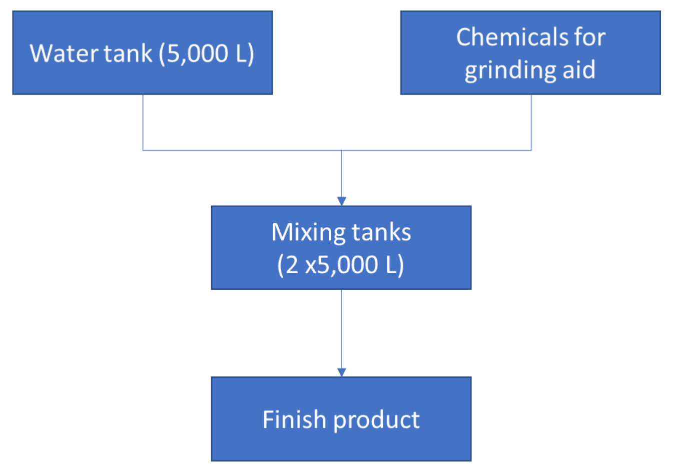
132 There are three units of weighbridge, 2 units in main gate for the raw material delivery, bulk and bagged cement withdrawal, and 1 unit at crusher area for other raw materials delivery.

1.5.6 Grinding Aid Facility

133 The proponent will use Gallium 3000 as grinding aid, a chemical additive, to improve the manufacturing process. The use of Gallium 300 allows the mill to reduce fineness and achieve lower unit power cost without sacrificing the quality of the cement that will be produced. Cement produced with Gallium 300 have a lower pack-set tendency and hence can provide advantages during loading and unloading operations.

134 A grinding aid facility will be installed and will consist of 2 units of mixer with capacity of 5,000 liters per batch. The process flow of the grinding aid facility is shown in the figure below. Raw water and chemicals will be fed to the mixer using dosing pumps and will be continuously mixed for an hour before discharging to the IBC tank. The optimum addition rate of Gallium 300 depends on the characteristics of the material and the grinding circuit and is normally assessed through industrial test run.

Figure 1-11: Process Flow Diagram for Grinding Aid Facility



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **PROCESS FLOW DIAGRAM FOR GRINDING AID FACILITY**	FIGURE NO.: **1-11**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Area Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

1.6 Project Utilities

1.6.1 Water Supply and Demand

135 The total projected water requirement for the facilities of **Eagle Cement Corporation** is 4,830 m^3/day. This projection includes water supply for the community, which is valued at 300 m^3/day. Three existing deep wells supply the requirement for water. The combined capacity of the three deep wells is 9,984 m^3/day. Considering the projected water requirement and the available supply, the excess capacity is 5,154 m^3/day.

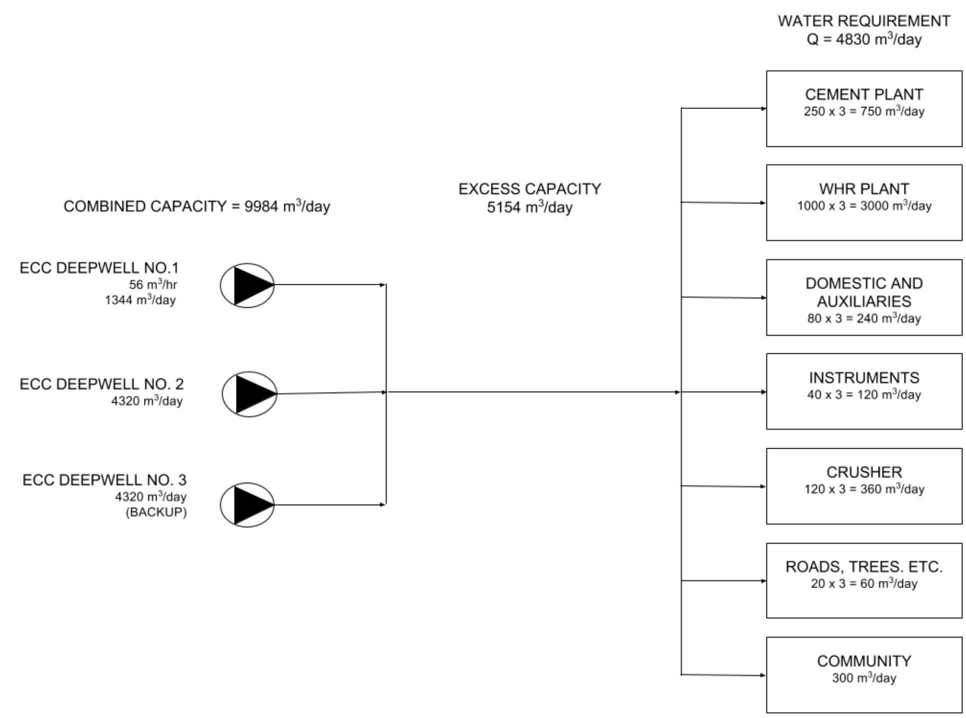
136 Monthly well production data were reviewed for the past 2 years. It was observed that the extraction rates were fairly uniform even during dry months.

137 To address some complaints of competing use of water resource, ECC has established and assisted the operation of a community deep-well in the barangay. This project conducted in cooperation with the barangay official now provided level 3 water system to the surrounding community. In the event of insufficient supply (i.e., summer and extreme dry weather), ECC will still be able to provide water supply from its existing deep wells to augment the community water supply. In addition to this, ECC is now working with the San Ildefonso Water District to develop new deep well outside of the barangay (some 2.5 kilometer upstream of Akle) to increase production capacity of the water utility in providing water to the community surrounding Eagle Cement Plant.

1.6.2 Power Supply and Demand

138 The existing total power requirement for the whole plant is approximately **82.93 MW**. It sources its power from the grid. Eagle also operates 6.11 MW of waste heat recovery system per line which can reduce the power consumption to 30%.

Figure 1-12: Daily Process Water Balance



PROJECT PROPONENT:	FIGURE TITLE:		FIGURE NO.:
Eagle Cement Corporation	**DAILY PROCESS WATER BALANCE**		**1-12**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Area Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT	

1.6.3 Alternative Fuel

139 Eagle Cement Corporation seeks to use alternative fuels to reduce the coal requirement of the operation of the existing kilns. With these, the company strives for thermal substitution rate of up to 30% of conventional fuel consumption to be compensated by alternative fuels such as waste oil and refuse derived fuels (RDF). The percentage is translated by its thermal substitution rate, hence, calorific value, concerning its utilization as an alternative source of heat. It is estimated that about 5,550,000 gallons of waste oil and 48,000 tpy of refuse derived fuel will be used as alternative fuel (see **Table 1-10**). The energy balance diagram of the cement plant with the use of alternative fuel is shown in **Figure 1-13**.

Table 1-10: Proposed Alternative Fuel

Proposed AFR	Energy Potential (Kcal per kg Clinker)	% Fuel Substitution	Total Consumption per Year	Potential Source
Refuse Derived Fuel	115	0-15%	48,000 TPY	Local source
Waste Oil	115	0-15%	5,550,000 gallons	Local source

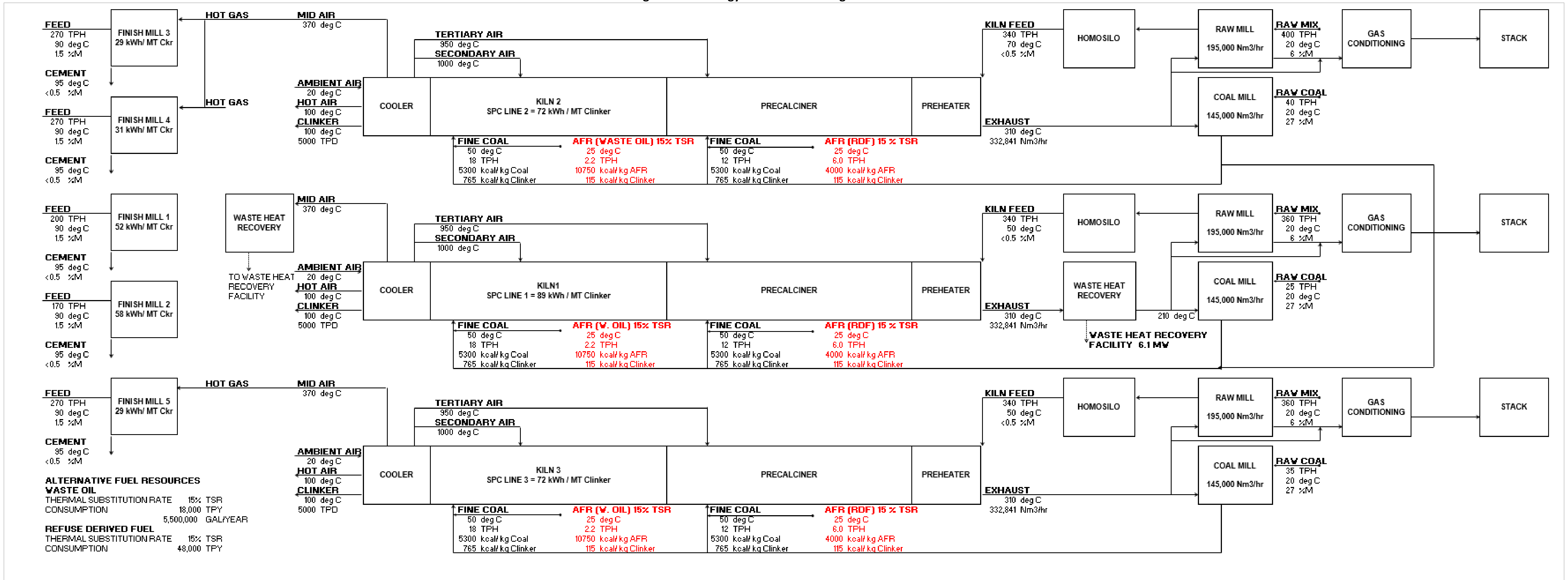
1.6.4 Alternative Raw Materials

140 In addition to the common materials in the production of clinker and cement, high carbon fly ash will be used as alternative raw material for clinker formation while pulverized limestone and flyash will be used as additive on cement grinding. **Table 1-11** present the annual consumption of the proposed alternative raw materials that will be used considering the proposed increase in the cement production capacity.

Table 1-11: Proposed Alternative Raw Materials

Proposed ARM	Total Consumption per Year (TPY)	Potential Source
High carbon fly ash	46,115	Petron Corporation
Pulverized limestone	550,400	Solid North Mineral Corporation
Flyash	344,000	Petron Corporation

Figure 1-13: Energy Balance of the Eagle Cement Plant



PROJECT PROPONENT: Eagle Cement Corporation	FIGURE TITLE: **ENERGY BALANCE OF THE EAGLE CEMENT PLANT**	FIGURE NO.: **1-13**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **Eagle Cement and Quarry Area Expansion Project** Brgy. Akle, San Ildefonso, Bulacan	SOURCE: PROJECT PROPONENT

1.7 Project Size

1.7.1 Quarry Operation

141 The primary mineral that is extracted in the quarry area is limestone with annual extraction rate of 7.1 MMTPY. There will be no additional limestone needed for the increase of the cement production since the additional clinker required will be outsourced.

142 The existing quarry areas of Eagle, as stated in the ECC, are in Parcel 14 and Parcel 15 within the approved MPSA No. 181-2002-III. At present, Eagle is using Parcel 15 for its operation.

143 The proponent also intends to use Parcel 6, Parcel 9, Parcel 11 and Parcel 12 of the approved MPSA for their quarry activities. The total available mineral in the parcels is shown in the table below. This is based on the exploration report conducted within the MPSA last 2017. With the extraction rate of 7.1 MMTPY, the estimated mine life is 26.5 years.

Table 1-12: Total Available Mineral Reserves per Parcel

Parcel No.	Mineable Reserves (Million MT)
Parcel 06	34.9
Parcel 09	14.5
Parcel 11	6.47
Parcel 12	11.2
Parcel 14	14.3
Parcel 15	106.6
Total	187.97

144 Other additives such as shale and pozzolan are being sourced from **Solid North Mineral Corporation** through its MPSA 161-2000-III. This operation secured its own Environmental Compliance Certificate.

1.7.2 Cement Production Capacity

145 The proposed new cement production capacity of the Eagle Cement Plant is 8.6 MMTPY. As mentioned, no additional cement line will be constructed. The existing facilities of the cement plant specifically the cement grinding, cement silo and cement packing will be optimized to process the additional clinker that will be outsourced to achieve the new proposed cement capacity.

1.8 Development Plan, Description of Project Phases and Corresponding Timeframes

1.8.1 Pre-Construction

146 This phase of the proposed project will involve the acquisition of the necessary documents before actual construction, such as ECC (Amendment), Building Permits, and PTO Application.

1.8.2 Construction Phase

147 The expansion of the cement plant will only include upgrading and modification of the existing project components. No additional production line or project component will be constructed for the expansion. This will only involve the re-configuration of the kiln for the use of the alternative fuel and the upgrading of some of the components that is necessary to optimize their capacities.

148 Equipment that will be constructed are storage facilities for the Refuse Derived Fuel. These facilities will be within the property of Eagle Cement.

1.8.3 Operations

149 Eagle is currently producing 6.0 MMTPY of cement and extracting 7.1 MMTPY of limestone. Once the upgrades are installed, operation capacity of the cement plant would be scaled-up. Additional skilled workers may be employed to manage the added workload. The same strict observation of occupational health and safety during construction would be followed. The start of the commercial operation of the upgraded plant will be on the second quarter of 2022 (Q2 2022).

1.8.4 Abandonment

Post-construction Decommissioning

150 All the wastes generated will be properly disposed or recycled. Construction debris and domestic wastes will be segregated, and all residual wastes will be hauled out by the Municipal waste collectors. All hazardous wastes will also be collected by DENR-registered haulers. Human wastes from the portable toilets will be properly siphoned by DENR-register desludgers. No wastes will be left in the project site.

Project Decommissioning

151 An abandonment plan shall be drafted prior to construction which shall be made consistent with the FMRDP. A new FMRDP will be submitted to MGB after the release of the ECC as required by MGB. The FMRDP shall also involve careful dismantling of the equipment and disposal of unnecessary materials. Any hazardous material and chemicals would be dismantled, handled and disposed of through DENR-accredited contractors and treaters to avoid any contamination with the immediate environment.

152 Eagle Cement shall undergo the updating process of its approved FMRDP, EPEP and SDMP as required under the Philippine Mining Act. The updating will be done as soon as the ECC is released, pursuant to the guidelines of MGB.

153 **Table 1-13** shows the closure criteria and performance standards of the existing project components of the cement plant complex and quarry areas that will be considered during decommissioning.

Table 1-13: Cement Plant and Quarry Closure Criteria and Performance Standard

Process/Component	Closure Criteria	Performance Standard
Cement Plant Complex		
• Cement Plant and Facilities (crushing/crushers, screening/screens, milling/mills, material storages, silos, kilns, truck scale, etc.).	• Stable and re-vegetated area. • Empty and clean storage area.	• 80% survival rate and self-thriving plants. • Reusable material storage area.
• Office and accommodation buildings (canteen, warehouse, administration building, staff house, guest house, contractors camp, motor pool, assay laboratory, roads, nursery, etc.).	• Unoccupied buildings, motor pool and laboratory.	• Reusable buildings, motor pool and laboratory that conforms to the government standards.

Process/Component	Closure Criteria	Performance Standard
• Silt traps/ponds, water reservoir and drainage system which includes the silt traps surrounding the complex and the water reservoir that supplies the water requirement of the cement plant.	• Silt traps/ponds backfilled and re-vegetated. • Water reservoir retained as recreation/picnic area. • Drainage system retrofitted to conform to proposed final land use.	• 80% survival rate and self-thriving plants for rehabilitated silt traps/ponds. • Effective drainage system.
Limestone Quarry		
• Active/Unrehabilitated benches before closure	• Stable and re-vegetated area.	• 80% survival rate and self-thriving plants
• Active/Un-rehabilitated Pit Bottom before closure	• Stable and re-vegetated area.	• 80% survival rate and self-thriving plants
• Siltation traps/ponds and drainage system	• Stable and re-vegetated area. • Drainage system retrofitted to conform to proposed final land use.	• 80% survival rate and self-thriving plants for rehabilitated silt traps/ponds. • Effective drainage system.
• Rehabilitated/Reforested area and Road Networks	• Retained and Maintained area.	• 80% survival rate and self-thriving plants. Operational road networks.

Table 1-14: Indicative Timeline of Activities

Activity/Milestone	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											■	■	■	■	■	■

1.9 Manpower

154 **Table 1-15** summarizes the manpower requirements throughout the development phases of the proposed project. About 60 workers will be needed for the construction of the additional support facilities for the RDF.

155 At present, Eagle Cement Corporation has a total of 966 workers for the operation of the cement plant and quarry. **Eagle Cement Corporation** currently employs men from the community as laborers and women as cooks and canteen staff. People from the community are hired in cooperation with the barangay LGU. With the proposed expansion, additional 35 workers are required.

Table 1-15: Manpower Requirement

Project Phase	Estimated Manpower Requirements	Tasks to Perform	Skill Requirement/s
Construction	60	• Civil works, architectural, and electro-mechanical works.	Engineers, project managers, skilled and non-skilled laborers
Operation	1,001	• 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

1.10 Project Cost

156 Indicative cost for the proposed project is estimated to be **Euro 2,000,000.00** or **Php 115,741,897.42**[1]. These will include the following:

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

[1] Euro 1.00 = Php 57.87 as of 7 February 2021