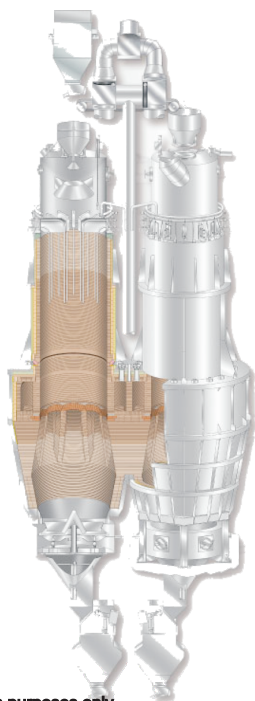


PESONA ASLI SDN BHD

PROPOSED LIME KILN PLANT IN TELUK KALUNG INDUSTRIAL ESTATE, KEMAMAN, TERENGGANU DARUL IMAN



*For illustration purposes only
(Source : Maerz Ofenbau AG)



PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT

January 2014

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PROPOSED LIME KILN PLANT AT TELUK KALUNG INDUSTRIAL ESTATE, KEMAMAN, TERENGGANU DARUL IMAN

INTRODUCTION

1. This report presents the salient findings of the Preliminary Environmental Impact Assessment study that was carried out to assess the potential environmental impacts that could arise from the construction and operation of a Lime Kiln Plant (LKP or the “**Project**”).
2. The Preliminary EIA is a requirement under Section 34A of the Environmental Quality Act 1974 as the proposed Project is under Activity **8 (d) Non-Metallic – Lime - 100 tonnes/day and above burnt lime rotary kiln or 50 tonnes/day and above vertical kiln** in the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order, 1987.
3. The Project Proponent is **Pesona Asli Sdn. Bhd.**. PASB was incorporated on 13th August 2008. The current managing director of PASB, Mr. Chan Chee Meng has 25 years of burnt lime manufacturing experience including setting of lime kiln plants in Selangor and Ipoh. He is experienced in both the local and overseas burnt lime market.

The Project Proponent’s contact detail is as follows:

Pesona Asli Sdn Bhd
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48000 Rawang, Selangor.

Contact person: **Mr. Chan Chee Meng** – Managing Director

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4. The PEIA study was undertaken by **ERE Consulting Group Sdn. Bhd.** and the Consultant’s contact details are as follows:

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5. The proposed Project will be developed in a vicinity of approximately 14.83 acres, sited at part of Lot PT 8781 (**Figure ES-1**) which has a total area of 173 acres within the Teluk Kalung Industrial Estate (TKIE) in Kemaman, Terengganu. The Project site is identified by the following coordinates:

<u>Boundary</u>	<u>Longitude</u>	<u>Latitude</u>
North West	103 ^o 25' 28" E	4 ^o 16' 58" N
North East	103 ^o 25' 37" E	4 ^o 16' 58" N
South East	103 ^o 25' 37" E	4 ^o 16' 52" N
South West	103 ^o 25' 28" E	4 ^o 16' 51" N

6. The proposed Project will be developed in **two phases**. For the first phase it will generate 500 MT/day of burnt lime product. The amount of burnt lime produce will be the same for the second phase, where the anticipated overall production amount is around 1,000 MT/day.
7. For **Phase 1**, 90% of the burnt lime (also commonly known as "quicklime") will be supplied to Eastern Steel Sdn. Bhd. (Eastern Steel), the owner of integrated iron and steel mill adjacent to the northern part of the Project site for its iron and steel making processes.
8. The **Phase 2** of the Project will be implemented in tandem with the Eastern Steel development and/or depending on the market demand from industry with similar breakdown of the product supplied is anticipated.
9. For the Phase 1, the main fuel will be **Lean Gas** (i.e. Converter Gas and Blast Furnace Gas) from Eastern Steel. Similar main fuel is anticipated for the Phase 2.
10. The TKIE is accessible by Federal Route 3, the main coastal road link to other major towns on the East Coast of Peninsular Malaysia, as well as by the Teluk Kalung Bypass Road where it facilitates the supply of raw materials. Currently, the internal road within the Eastern Steel site will be the main access to the Project site.

STATEMENT OF NEED

11. The Terengganu Structure Plan 2005-2020 outlines the policies for development for the State of Terengganu. To achieve its vision to become developed state in 2020, secondary sector (manufacturing and construction) has been given priority. The Structure Plan has identified Kemaman which is situated in Southern Zone for heavy industrial and petrochemical development.
12. The Project is also in line with Kemaman Local Plan 2003-2015 (gazetted in 2004) and Kemaman Local Plan (Amendment) 2011–2020 where in these local plans; it has earmarked Teluk Kalung and Kemaman for development of large scale heavy industry.
13. The advancement of technology enable the lime kiln to utilise the waste gases generated from the blast furnace and converter gas of Eastern Steel.

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Hence, the utilisation of waste gas is indeed a big prospect, besides of other interests.

14. In addition, the Project is not only to fulfill the lime market demand but it also helps in boosting the Malaysian economy especially in the East Coast region. Direct economic advantage includes monetary gain to the State Government by tax collection, while it will create job opportunities for the local residents, whether in the construction phase or operational phase. Indirect economic gains are expected in areas of housing and commercial provisions, as well as for the supply and services sector.

PROJECT DESCRIPTION

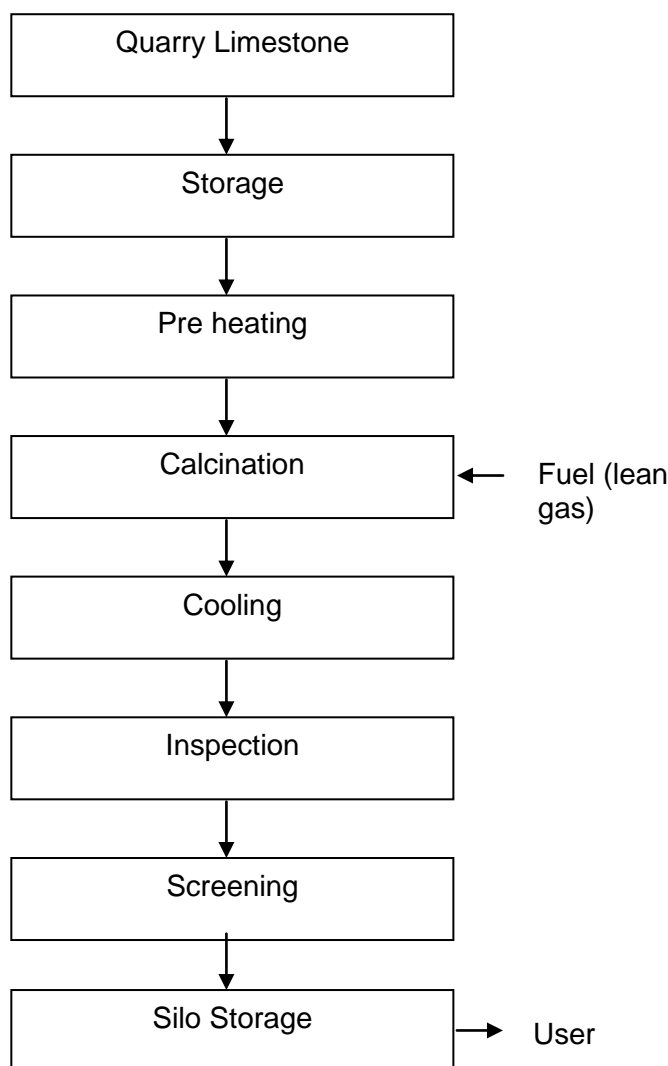
15. Pesona Asli Sdn. Bhd. has proposed to construct and operate a Lime Kiln Plant (LKP), which comprise of two units of Parallel Flow Regenerative (PFR) kilns and other auxiliary equipment to support the production of burnt lime for the usage of integrated iron and steel mill mainly Eastern Steel.
16. The Project will be carried out in phases where Phase 1 is expected to produce an approximately 182,500 MT/year of burnt lime. Upon the completion of the Phase 2, the overall production capacity of the Lime Kiln Plant will be 365,000 MT/year.
17. The feedstock which is limestone will be supplied from the local quarries to the Project site by trucks and will be stored in an open raw material storage yard. 60 m long conveyer tunnel and 22 m long conveyer belt are used in moving the raw material to the washing and screening unit.
18. The limestone will be washed and screened to remove impurities and get the required grain sizes of limestone (40-120 mm) prior feeding it into the PFR kiln. The washed limestone will be transferred to the limestone silo via a 65 m long conveyer belt at the inclination of 17°.
19. The production starts when the limestone is fed into the PFR kiln where the process of converting the limestone into burnt lime occurs by heating the limestone to the temperature between 900°C to 1,200°C. The limestone will undergo calcination process which converts it into burnt lime.
20. PFR kiln consists of two vertical shafts where fuel is supplied to only one of the shaft in each cycle. The fuel consists of mixture of converter gas and blast furnace gas (lean gas), which is sourced from the integrated iron and steel mill of Eastern Steel nearby and will be channelled through a pipeline to the plant.
21. The fuel will be supplied through multiple lances that vertically extend to the bottom of the preheating zone. Fuel is injected through these lances and evenly distributed over the cross sectional area of the shaft.
22. Combustion air is introduced under pressure at the top of the preheating zone above the stone bed where it is preheated by the stone in the

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- regenerator (preheating zone) prior to mixing with the fuel. The complete system is pressurised.
23. The air/fuel flame is in direct contact with the limestone as it passes through the burning zone from top to bottom (parallel flow heating). The off-gases leave the burning shaft and enter the off-gas shaft through the crossover channel, travelling up in counter flow to the lime stone. The off-gases transfer heat to the stone bed in the off-gas shaft and even calcine it to a small degree. The off-gases then regenerate the stone bed in the preheating zone in preparation for the next burning cycle on that particular shaft.
24. Each shaft cycles through the burning and non-burning mode at intervals of approximately 10-15 minutes. The changeover from burning to non-burning is called “reversal period”. During each reversal period a measured amount of limestone is charged to the kiln and when the kiln is depressurised, the product is discharged from the storage hopper onto vibrating feeders and conveyor belts and next into the product silo.
25. Burnt lime is discharged from both shafts continuously throughout the burning cycle by discharge tables into a pressurised hopper. Cooling air is continuously introduced at the bottom of both shafts to reduce the temperature of the product prior to being discharged into the lime storage hopper before it is distributed for the usage of integrated iron and steel mill and others.
26. Utility consumption for overall phases (**Phase 1 and Phase 2**):
- Water required for the process will be sourced from Syarikat Air Terengganu Sdn. Bhd (SATU). The Project requires about 24 m³ of initial water for limestone washing unit and 3 m³/day of water for domestic usage.
 - Electrical power consumption for the whole plant is to be mainly sourced from the TNB. The Project requires around 32.5 MW of electricity for Phase 1 and another 32.5 MW will be required for Phase 2.
 - Storage of 10,000 litres of diesel for kiln start-up use.
 - Lean gas consumption will be estimated around 485,450 MT/year.
27. Employment opportunities:
- A total of 80 workers will be required during the construction stage of Phase 1.
 - For Operational Phase, a total of 30 personnel will be employed which consists of mainly mechanical engineering background workers.
28. The construction phase will be started around February 2014 upon the approval of the EIA by DOE and also approval from various government agencies. The total construction duration for Phase 1 will take around 12 months. After the completion of the construction phase, the Project will be commissioning in January 2015.
29. The production process flow chart is shown in **Chart ES-1**.

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Chart ES-1 Process Flow Chart of Lime Manufacturing Plant



PROJECT OPTIONS

30. Project options considered for the Project include an examination of the **technology** that is selected for the Project and **site selection** for its location.
31. Technology options consider the elements of; capacity of the lime kiln, stone size and quarry yield, heat consumption and fuel usability, dust and NO_x emissions and capital costs where the parallel flow regenerative (PFR) kiln is the most feasible choice in terms of the selection criteria.
32. The site at the TKIE was selected as it met the major criteria land use compatibility, adequate buffer area from residential areas, availability of important utilities (such as water, power, etc) and ease of access and availability of supporting infrastructure (such as roads, etc.).

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EXISTING ENVIRONMENT

33. The summary of the existing environment of the Project site is described in the table below:

Item	Description
Topography	<p>Kemaman is one of the districts on the south of Terengganu. It covers an area of 253,560 hectare which is about 19.6 % of total area in Terengganu. It is bordering with Dungun district on the north and Kuantan district (in the State of Pahang) on the south. Kemaman terrain generally flat with 31.7% of it, is covered by vegetation.</p> <p>The Teluk Kalung Industrial Estate (TKIE) stretches from the area around Bukit Setongkol on the north to the coast near Kemaman Port. A large tract of the industrial area is sited on flat surface, as it was previously a swampland. Currently, the Project site is a vacant, low lying, flat area with an elevation of lower than 20 m</p>
Geology	<p>The TKIE is underlain by predominantly unconsolidated sediment from the Quaternary age. The sediment consists of clay, silt, and sandy material with accompanying lenses interbedded with main soil layers.</p>
Soil	<p>Based on the Generalised Soil Map of Peninsular Malaysia, the Project site is located on the low terraces and alluvial plains. The underlying soil of the Project site is identified as gley soils on marine clays. The main characteristic of gley soils is greyish or bluey-grey colours and orange mottling.</p>
Land use	<p>Existing land use setting: Mostly designated industrial land within 3 km radius of the Project site, some residential areas, agricultural land and peat swamp forest. Significant buffer of more than 500 m from nearest residential settlement.</p> <p>Future land use planning and development based on the Kemaman Local Plan (Amendment) 2011-2020 states that MPK has planned for more development of residential area, add numbers of public facilities such as clinic, library, mosque, post office, hall and few new commercial developments to accommodate the increase of population in the area.</p>
Climate	<p>The climatic information obtained from the nearest meteorological station of Kuantan Meteorological Station (03° 47' N, 103° 13' E) for data from 1975 to 2012. From the data obtained, it reflects that the area receives high annual rainfall and relatively uniform high humidity and temperature as summarised below:</p> <ul style="list-style-type: none"> • average annual rainfall of 2,958.8 mm • mean annual temperature of 26.5 °C • 24 hour mean relative humidity from 83.5 % to 88.9 %

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Item	Description
	<ul style="list-style-type: none"> Predominant wind directions are from north followed by southwest, south and northeast with 19.2 % of time as calm period.
Hydrology and Water Resources	<p>The Project site lies on former peat swamp which was then been reclaimed for industrial use. The site lies in one of the wettest areas of Peninsular Malaysia where mean annual rainfall recorded was about 2,958.8 mm.</p> <p>The surface runoff of the site will discharge into Sg. Ruang which subsequently flows into Sg. Cukai. The river is unguided and the flows fluctuate according to different seasons. It is subjected to tidal influence and salinity intrusion. The influence of salinity intrusion is dependent on the extent of freshwater runoff from the catchment. Intrusion is expected to reach further upstream during the dry period but is likely to be pushed seaward during the Northeast Monsoon period.</p>
Groundwater	No groundwater extraction schemes are located within the Project site or in its immediate surroundings.
Ambient Air Quality	<p>Ambient air quality monitoring was carried out once at 3 locations for TSP, PM₁₀, SO₂, and NO₂.</p> <p>Results show that ambient air quality is well within the recommended safe limits. TSP readings ranged from 45-63 µg/m³ and PM₁₀ readings ranged from 21-24 µg/m³. SO₂ and NO₂, were not detected at all locations.</p> <p>Results of TSP, PM₁₀, SO₂ and NO₂ obtained were well within the respective limit stipulated under Malaysian Ambient Air Quality Standard (MAAQS)</p>
Surface Water Quality	<p>Surface water quality sampling was carried out at three locations. Recorded pH values ranging from 6.49-7.05. DO levels recorded varied from 2.79-3.71 mg/l. BOD, COD and TSS were lower than the Class III limit. AN concentrations were ranged from 0.1-0.4 mg/l while oil and grease were not present in all samples collected.</p> <p>Water quality was determined to be within Class III of the National Water Quality Standard (NWQS).</p>
Environmental Noise Level	Environmental noise level monitoring was conducted at the Project site. Baseline noise level for the sampling location was well within the permissible noise limits of designated industrial zones which are 70 dBA at daytime and 60 dBA at night-time.
Ecology	Peat swamp surrounds the Project site with Nipah to be found along the river courses. Vegetation recorded included Pokok Bebaru (<i>Thespesia populnea</i>), Pokok Bebuta (<i>Excoecaria</i> sp.),

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Item	Description
	<p>Pokok Nyireh (<i>Xylocarpus</i> sp.), Pokok api-api (<i>Avicennia</i> sp.), Nipah (<i>Nypa</i> sp.) and Pokok Bakau (<i>Rhizophora</i> sp.).</p> <p>Common fauna found in the swamp area included the Long-tailed Macaque (<i>Macaca fascicularis</i>), Banded Leaf Monkey (<i>Presbytis melolophos</i>), Water Monitor (<i>Varanus salvator</i>), pythons (<i>Phyton reticulatus</i>), monitor lizards, toads (<i>Bufo asper</i>) and frogs (<i>Rana cancrivora</i>, <i>R. chalconota</i>, <i>Rhacophorus leucomystax</i>).</p> <p>In terms of aquatic resources, the Kemaman Fisheries Department has stated that there are no endemic fish species within the Sg. Cukai river system. Cage aquaculture can be found along Sg. Cukai particularly near the river mouth.</p>
Socio-Economy	<p>The population of Teluk Kalung Mukim is mainly Malays and has household size like many other districts in the nation. There are slightly more males than females among the populations where 60.2% of the population is within the productive ages of 15 to 64 years old. The dependency ratio for Teluk Kalung Mukim is 0.66 which is lower than for Kemaman District but higher than for the Terengganu state.</p>
Human Health	<p>Sample of 200 households were surveyed (extracted from DEIA report of the Proposed Kemaman Bitumen Refinery CDU/VDU Revamp and New Tank Farm Project at Kemaman, Terengganu, 2013), representing 1,012 persons within a total of 13 residential areas. With respect to environmental sanitation, all of the households surveyed enjoyed adequate and safe drinking water sources, while their garbage disposal practices were also satisfactory. The sanitation status was generally good with 99.5% possessed hygienic toilets.</p> <p>With respect to health profile of the community surveyed, the prevalence rates for chronic diseases like hypertension, asthma, tuberculosis and diabetes mellitus were the most significant percentage of occurrence but still below than the national prevalence rates. However, the prevalence rates for tuberculosis were higher than the national prevalence by 0.13%.</p> <p>Morbidity statistics from the Kemaman District do not show any peculiarity with respect to respiratory, waterborne, vectorborne, zoonotic and skin diseases. However, foodborne diseases may be a concern in the District since prevalence rates for dysentery, food poisoning, and leptospirosis in the district were higher than that of the nation.</p>

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PROJECT PRINCIPAL ACTIVITIES

34. This section highlights particular activities during the pre-construction, construction and operational phase of the Project which may have impacts on the existing environment and its resources.
35. The pre-construction phase would include preliminary studies for the preparation of Project design. This comprise of site reconnaissance, feasibility studies, soil investigation, land surveying, baseline environmental sampling; all of which have very minimal impact to the site.
36. Activities in construction phase are mainly construction of the building particularly the civil & structural, mechanical and electrical works to accommodate the Project as the Project site had been brought to the required platform by the Eastern Steel.
37. During the operation phase, the major focus is at the PFR kiln where the limestone will be converted into burnt lime. The main activities that will be carried out during the operation of the PFR kiln will be transportation of limestone (lorry and conveyor belt), washing of the limestone, burnt lime storing, bag house filter operation and also a regular maintenance of the equipment.
38. The potential impacts of these activities which may be significant or insignificant are mainly touched on the air, water, noise, traffic, occupational safety and health, and also scheduled waste.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Sensitive Receptors

39. The sensitive receptors identified mostly located at the southern part of the Project area which are as follow:
 - Residents of Taman Rakyat Bestari (1.6 km south of the Project site) and residents of Taman Bukit Kuang Sejahtera (about 2.3 km southeast of the Project site).
 - Teluk Kalung Bypass and Federal Route 3 road users (adjacent east of the Project site)
 - Aquatic life and water users of Sg Cukai (adjacent east of the Project site)

The locations of the sensitive receptors are shown in **Figure ES-2**.

Air Quality

40. The main emission during the construction period is from fugitive dust and trace amount of CO, CO₂, NO₂, SO₂ and dark smoke from construction vehicle combustion sources.

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41. Overall, the impact of the fugitive dust during construction is expected to be short term and will only create a local nuisance problem as the dust particles will be settled down near to the source and confined within PASB site, where control methods such as construction of hoardings, watering, covering, etc. shall be implemented to further reduce and minimise the fugitive dust emission from the construction site.
42. The assessment of air quality impact during normal and abnormal operations is carried out using AMS/EPA Regulatory Model (AERMOD), which uses steady state Gaussian equation that combines source emission, meteorological information, terrain, and dispersion coefficients to predict the maximum average incremental concentration (MAIC) of pollutants within the study impact zone.
43. The overall findings showed that the predicted MAIC for all air pollutants modelled under normal operation comply with the air quality standards recommended by the DOE. The impact zone for most of the gaseous pollutants is within 2.7-4.0 km from the Project site which is concentrated at Bukit Takar at the west, Bukit Pelanduk and Bukit Setongkol at the northeast and Bukit Jirat and Bukit Kuang at the southeast.
44. SO₂ and NO₂ levels may be expected to approach the ambient limit depending on specific atmospheric conditions such as under prolonged periods of extreme calm conditions with minimal dispersion and additional contributions from other sources. Abnormal operations will contribute to high concentrations of dust and gaseous pollutants, however it is expected unlikely and to be short term in nature if occurred.
45. The combustion of lean gas and chemical reaction in the lime kiln will generate GHG such as carbon dioxide (CO₂). The estimated quantities of the GHG were then converted to the Carbon Dioxide Equivalent (CO_{2e}). It was estimated that the CO_{2e} is about 0.63 mil MT/year based on maximum production of the plant.
46. Proposed mitigation measures such as baghouse filter installation, effective emergency response plan with a built-in alarm and shutdown system of the critical operations, good housekeeping and planting more trees shall be carried out to minimise the generation of main pollutants which are dust and fume.

Water Quality

47. Potential sources of water pollution during the construction phase are due to surface runoff. Other possible sources may include leaks and spills of oil or other fluids from construction machineries and vehicles operating at the site (if occur).
48. Runoff will be directed to the detention pond located at the southwest corner of the Project site, which effluent will be discharged into a stream that later flow into Sg. Ruang and Sg. Cukai before subsequently emptying into the sea. The maximum capacity of the detention pond is about 293.6 m³.

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49. In order to minimise the risk of leaks and spills of oil and other fluids from construction machineries and vehicles, it is proposed that no major repair and maintenance are allowed on-site.
50. Potential sources of water pollution during the operation phase are due to increase in surface runoff, sewage discharge and washwater from limestone washing.
51. In order to manage the additional runoff, all surface runoff from the Project area will be channelled into a detention pond. Discharge from the detention pond will be regulated into the receiving stream in accordance to the capacity of the stream. The maximum capacity of the detention pond is about 293.6 m³ with maximum water level at 3.67 m. During normal operations, the detention pond is expected to contain about 136 m³ of captured runoff.
52. Besides that, the maintenance of the individual septic tank (IST) is important in ensuring no unwanted pollution occurs from the Project area and it is recommended that a pH meter is installed before the discharge outlet of the detention pond to monitor the pH of the effluent.

Noise Pollution

53. Noise sources during the construction phase are mainly from construction machineries and vehicles such as dozers, backhoes, end loaders, etc.. The noise levels arising from operation of these construction machineries and vehicles will be confined and localised within the Project site.
54. Noise sources during operational phase will be from various sources such as from the processing area, auxiliary equipment area, during raw material handling as well as from the vehicles movement within the site.
55. The operational noise along the Project boundary for both Phases are predicted to slightly exceeding the respective permissible limit for industrial land use for new development which is 70 dB(A) daytime and 60 dB(A) night-time for designated industrial zones.
56. The nearest sensitive receptor, Taman Rakyat Bestari is expected to receive noise level less than 55 dB(A) which is lower than the recommended value of 65 dB(A) during day time and expected to be more significant to the onsite workers.
57. In order to prevent occupational hearing loss effectively under many different work situations and conditions for on-site workers, a comprehensive program must be employed incorporating noise control measures like substitution, engineering control, administrative control and personal protective equipment (PPE).

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Quantitative Risk Assessment

58. The main hazards of concern have been identified to be due to fire & explosion caused by the major equipment failure which is diesel oil storage tank failure and lean gas pipeline failure.
59. From the result of risk assessment obtained, it shows that the Lime Kiln Plant facilities meets the risk acceptability criterion for industrial (1×10^{-5} fatalities/person/year) as well as for nearby residential areas (1×10^{-6} fatalities/person/year). The operation of gases pipeline and diesel storage for plant operation will not pose any significant impact to the nearest residential area as the iso-risk contours are confined to the industrial estate.
60. Good housekeeping and regular maintenance will need to be carried out, as both procedures are preventive measures from accident to occur. In addition, by having good staff training and careful control and maintenance of equipment and other flammable materials, the risk as assessed could be greatly reduced.

Health Hazard and Risk

61. Screening exercise in accordance to the Guidelines of Health Impact Assessment (HIA) in Environmental Impact Assessment (DOE, 2009) was carried out to determine whether a full HIA is needed for the Project.
62. The screening results confirm that there is no necessity to undertake the HIA as there is no significant risk for health impact. Ground level concentrations of pollutants at the sensitive receptors were well below the Malaysian Ambient Air Quality Standard stipulated by DOE and they (air pollutants) do not pose any significant potential for chronic or irreversible diseases i.e. cancer.

Waste Management

63. During construction phase several type of solid wastes will be generated which is construction waste, general refuse and scheduled waste. For this Project, no earthwork will be carried out due to the platform level has been prepared by Eastern Steel earlier. Thus no biomass vegetation is expected to be generated.
64. Construction wastes generated are in the form of debris, cardboard, wood, bricks and blocks, plastics, etc.. These wastes which are derived from construction activities will be segregated to its classes and be reused or recycled if possible. The remaining waste then will be collected by MPK and disposed at Bukit Takar Landfill. The general refuse such as food waste, aluminium cans, waste paper, etc will also be treated in the same way as per construction waste.

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65. For scheduled waste such as waste oils (SW305/306/309), used oil filter (SW 410), paint containers (SW 409), contaminated soil, debris (SW 408), etc., it shall be collected, stored, labelled and managed according to the Environmental Quality (Scheduled Wastes) Regulations, 2005. These wastes will be collected by licensed scheduled waste contractor for recovery or final disposal at DOE prescribed premises.
66. During operation phase, the waste consists primarily of residual process materials and some amount of scheduled wastes. The process waste residues, which include limestone reject, burnt lime reject, dust particle, spent refractory, etc. are mostly to be recycled or reused in the process. Only part of them will be sold if possible. Other wastes which are classified as scheduled waste, including spent hydraulic oil and spent lubricants are to be collected by DOE licensed contractor for disposal or recycle at DOE licensed premises.

Traffic Assessment

67. It is anticipated that during construction phase, maximum of 5 daily trips is estimated for transportation of construction machinery and construction materials into the Project site while during operational phase, it is estimated that a maximum of 15 trips throughout the day for transportation of limestone into the raw material storage area .
68. With just 15 trucks throughout the day, the traffic flow along the Teluk Kalung Bypass roads, as well as the FR 3, is not expected to be significantly affected. Nevertheless, in order to reduce traffic disruption, it is recommended that all the transportation to be carried out during the non-peak traffic flow period.

RESIDUAL IMPACTS

69. The Project has been assessed both for its compliance with regulatory requirements and its impacts to the ambient environment. Measures proposed to control and mitigate pollution from the Project have been established to be able to fulfill regulatory requirements meeting the limits of air emissions and effluent discharge and compliance with the noise guidelines limits for industrial areas. In addition, under normal operational conditions, residual pollutants emitted to the atmosphere or those discharged to watercourse are not expected to adversely affect ambient environmental quality..
70. Among the recommendation for residual impacts is continuous monitoring, good housekeeping and good waste management practices of the Project area. Any unlikely events predicted, should this happen must be reported, controlled and mitigated following the Emergency Response Plan (ERP) that has been developed for the Project.

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ENVIRONMENTAL MANAGEMENT FRAMEWORK

71. The environmental management objectives for the Project are to identify critical issues and plan to minimize their impacts, ensure that the environmental legal requirements are identified and addressed, and monitor the effectiveness of mitigation measures through environmental audits and monitoring programmes.
72. The framework provides the basic mechanism on the organizational set-up, the environmental monitoring system and the emergency response plan (ERP) of the Project and prior to the commencement of the construction work; an Environmental Management Plan (EMP) will be prepared.
73. An Environmental Officer (EO) shall be appointed by the Contractor to oversee the implementation of the mitigation measures and to liaise with relevant agencies pertaining to matters related to the environment. The EO will also liaise with the local community to keep them informed of the progress of the Project and to address their complaints in a timely and appropriate manner.

CONCLUSIONS

74. The findings of the PEIA study concluded that environmental impacts associated with the construction and operation of the proposed Lime Kiln Plant are within the acceptable limit and not likely to have significant long-term residual impacts to the surrounding environment. This is provided that all required environmental management measures are implemented and maintained throughout the operational phase.
75. In conclusion, the findings of the EIA study support the development and operation of the LKP provided the proposed measures identified in this EIA are implemented for the Project.

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Table ES-1 Summary of Potential Significant Impacts, Mitigation Measures and Residual Impacts for the Project

Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
Construction Phase			
<u>Air Quality</u>			
<ul style="list-style-type: none"> a) Minor groundwork activities; b) Vehicles movement; c) Construction activities such as mixing of cement; and d) Exhaust from site vehicles and machinery. 	<ul style="list-style-type: none"> a) Fugitive dust and trace amount of CO, CO₂, NO₂, SO₂ and dark smoke from construction vehicle combustion sources. 	<ul style="list-style-type: none"> a) 3 m hoarding at Project boundary; b) Water browser; c) Good housekeeping; d) Layoff area nearby to the entrance/exit; e) Tarps or plastics can be used as a temporary covering; f) Pave section of roads or lay it with crusher run; g) Imposed speed limit <20 km/hour within the Project site; h) Eliminate unnecessary travel; i) Trees and green shall be planted along the Project site boundary; j) Open burning of construction waste is prohibited; k) Regular maintenance and service of vehicles and construction machineries; and l) Any power generation equipment with rated burning of liquid fuel > 15 kg/hr shall obtained written approval from DOE Terengganu State prior usage. 	No residual impact is anticipated.
<u>Water Quality</u>			
<ul style="list-style-type: none"> a) Removal of vegetation; b) Minor ground works; c) Washings of equipment and other materials; d) Breakdowns and minor on-site repair and maintenance; and 	<ul style="list-style-type: none"> a) Increase in the silt load carried by the runoff during storm event; b) Accidental spills of oil and grease; c) Sullage from washings of equipment; and d) Sewage discharge from the toilet. 	<p><u>Sediment control</u></p> <ul style="list-style-type: none"> a) Installation of detention pond; b) Monthly inspection and maintenance of detention pond c) Silt collected in the pond shall be dredged once it is two-thirds full. <p><u>Oil and used lubricants</u></p> <ul style="list-style-type: none"> a) 150mm layer of sand lined with plastic sheet below for maintenance area; b) Sand contaminated by oil spillage shall be removed and 	No residual impact is anticipated.

EXECUTIVE SUMMARY

Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
e) Site office operation.		<p>disposed as scheduled waste, and replaced by a fresh layer of sand;</p> <p>c) No maintenance of any plant or vehicle shall be carried out near watercourses, including the detention pond;</p> <p>d) Containment bund provision around the diesel skid tank (110% of the largest container);</p> <p>e) Used oils shall be stored in proper drums and kept in the scheduled waste storage yard; and</p> <p>f) The used oils shall be transported by licensed contractors for recycling or disposal.</p> <p><u>Sewage</u></p> <p>a) Mobile toilet is recommended;</p> <p>b) Temporary septic tank;</p> <p>c) Regular collection and disposal of the toilet waste shall be carried out by the service provider and the waste collected will be disposed at a treatment facility approved by the local authority or by Indah Water Konsortium; and</p> <p>d) Sullage may be directed to a temporary septic tank facility preferably incorporating a soakaway system or to a facultative pond.</p>	
<p>Noise</p> <p>a) Unloading operation of construction materials;</p> <p>b) Truck movements; and</p> <p>c) Piling works and excavation work.</p>	a) Increase of noise level.	<p>a) High noise generation equipments shall be limited and utilised during the daytime only;</p> <p>b) Personal protective equipment (PPE) for construction workers shall be provided especially for the operators who are working within few meters of the noisy equipment. The duration of time exposure for workers working with noisy machineries shall also be limited;</p> <p>c) Idle engines shall be turned off if not in use;</p> <p>d) All construction equipments shall be properly maintained; and</p> <p>e) Noise barriers of 3 m hoarding shall be provided.</p>	No residual impact is anticipated.

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Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
<p>Waste Management</p> <p>a) Construction of LKP facilities.</p>	<p>a) Construction waste generation;</p> <p>b) General refuse generation; and</p> <p>c) Scheduled waste generation.</p>	<p><u>Construction wastes</u></p> <p>a) Construction waste shall be stockpiled at the designated area prior to disposal;</p> <p>b) Construction waste shall be segregated to its classes for their proper disposal; and</p> <p>c) Recyclables may be recovered and sold to recyclers while non-recyclable materials shall be disposed at the nearest landfill area which has been identified to be the Bukit Takar Landfill.</p> <p><u>General refuse</u></p> <p>a) Project proponent shall provide an adequate provision of waste bins at strategic locations where it shall be easily accessible by the appointed contractor to collect the wastes;</p> <p>b) The wastes that can be recycled shall be collected and recycled;</p> <p>c) Frequent monitoring and maintenance for the waste storage area within the Project site;</p> <p>d) The wastes shall be sent to Bukit Takar Landfill; and</p> <p>e) Open burning is strictly prohibited within the Project site.</p> <p><u>Scheduled waste</u></p> <p>a) Scheduled waste generated shall be collected, stored, labelled;</p> <p>b) These wastes shall be collected by licensed contractors approved by DOE for recovery or final disposal at Kualiti Alam; and</p> <p>c) Temporary scheduled waste storage yard is recommended to be constructed and it can be converted into a permanent storage yard during the plant operations.</p>	<p>No residual impact is anticipated.</p>

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Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
Operation Phase			
Air Quality			
a) Air pollution control system.	a) Dust and fume.	a) Continuous improvement on the effectiveness of the dust collector system; b) The air pollution control system shall be monitored in accordance to DOE's Technical Guidance; c) The baghouse filter shall be operated by competent person as required by DOE; d) Employment of road cleaning for removal of accumulated dust; e) An effective emergency response plan with an built-in alarm and shutdown system of the critical operations should be adopted.; f) Good housekeeping has to be practiced; g) Planting more trees the Project site boundary near to raw material storage area; and h) Speed limit of 20-30 km/hr to be imposed to vehicles in the Project site especially in processing area.	Residual impact is minimal provided the mitigation measures proposed are implemented.
Water Quality			
a) Sewage from the individual septic tank (IST) operation; and b) Wash water from limestone washing.	a) Surface runoff; b) Discharge of effluent from IST; and c) TSS concentration and pH may be affected.	<u>Sediment control</u> a) Sediment trap will be installed at the inlet to the detention pond; b) Monthly monitoring of the detention pond; and c) Sediment collected in the pond must be dredged and disposed off. <u>Sewage</u> a) If the BOD concentration would be higher than allowed, further treatment must be carried out before discharging into the detention pond; and b) Quarterly monitoring and regular desludging of the IST is carried out.	Residual impact is minimal provided the mitigation measures proposed are implemented.

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Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
		<p><u>Other pollutants</u></p> <p>a) pH meter is recommended to be installed before the discharge outlet of the detention pond.</p>	
<p>Noise</p> <p>a) Charging of the limestone into the kiln;</p> <p>b) Noise from auxiliary equipment area;</p> <p>c) Raw material handling; and</p> <p>d) Vehicles movement.</p>	<p>a) Physiological effects, hearing loss and psychological effects to the onsite workers.</p>	<p><u>Substitution</u></p> <p>a) Choose machineries that are equipped with acoustic housing, silencers or sound insulations during plant equipment selection.</p> <p><u>Engineering control</u></p> <p>a) The speed of rotating and moving parts shall be reduced (without affecting the process efficiency).</p> <p><u>Administrative control</u></p> <p>a) Quiet lunch and rest areas with low background noise levels shall be provided;</p> <p>b) Train and inform operators of effects of exposure to noise on health, methods of prevention, proper use of personal hearing protectors, maintenance, etc;</p> <p>c) Display warning signs in noisy areas (kiln processing area) to limit access; and</p> <p>d) Proper training should also be provided to workers in handling the equipment. Standard Operating Procedure (SOP) should be established and adhered to.</p> <p><u>Personal Protective Equipment (PPE)</u></p> <p>a) Use necessary personal protective equipment (PPE) for the operators who are working within few meters of the noisy equipment.</p>	<p>Residual impact is minimal provided the mitigation measures proposed are implemented</p>

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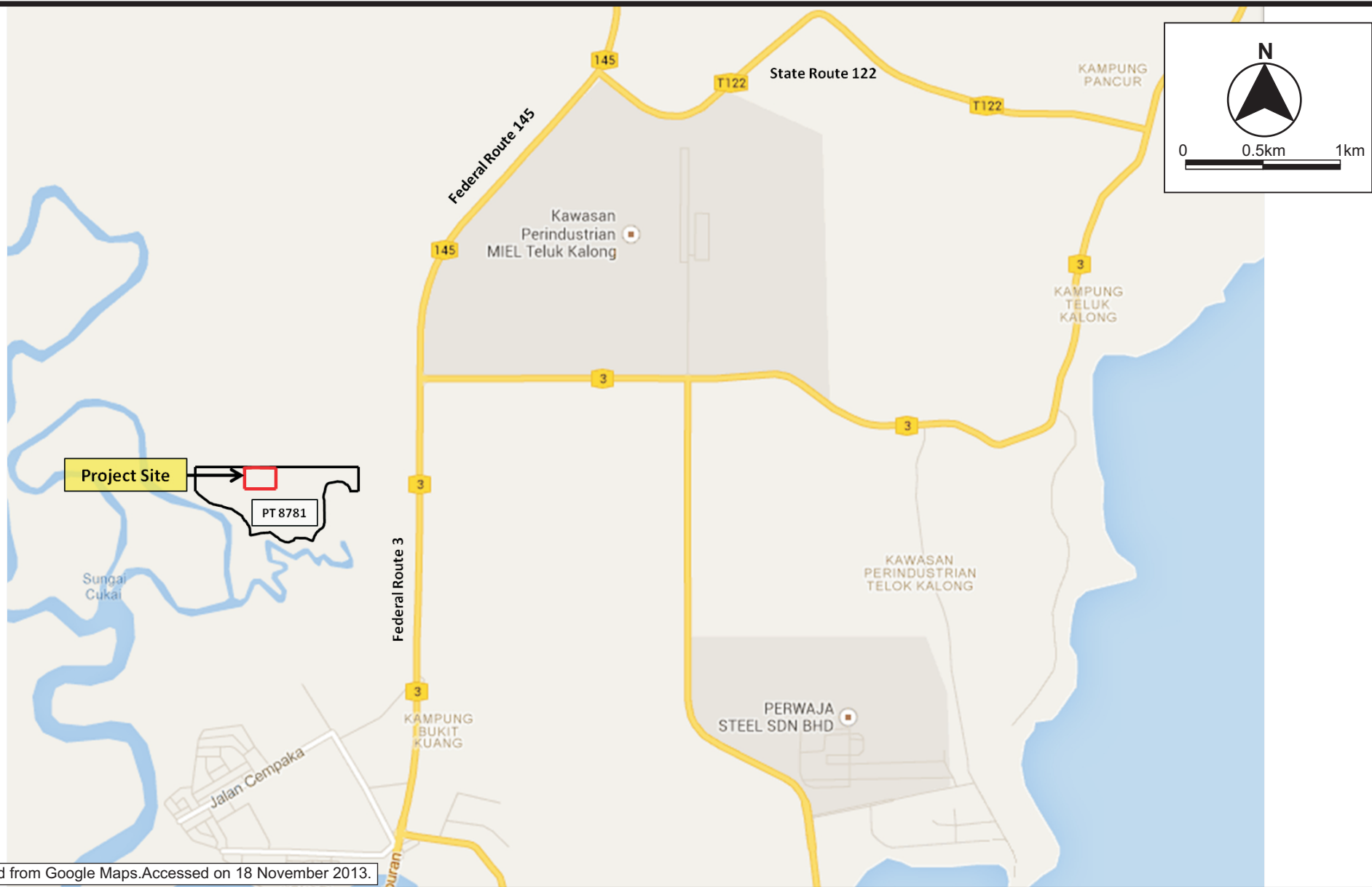
Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
		<u>Monitoring programme</u> a) It is proposed to have a long term monitoring station at the boundary of Project site near to the lime kiln processing area; b) Strict implementation of hearing protection devices, yearly audiometric testing and record keeping, improvement to noisy environment and management of exposure dose to workers are required; and c) Periodic noise exposure monitoring on the workers.	
<u>Quantitative Risk Assessment</u> a) Operation of LKP facilities.	a) Accidental release of lean gas; and b) Accidental release of diesel.	<u>Safety rules and regulations</u> a) Suitable fire fighting protection system shall be designed and installed in the vicinity of the Plant area; b) Ensure the proper Personal Protection Equipment (PPE) is supplied and make easily accessible within the Plant area; c) Apply the Log out Take out (LOTO) procedure when maintenance works in progress for instrument and electrical appliances; d) Regularly inspect and maintain all related piping (including connections, flanges, etc.) of gases transportation and diesel tanks in the plant; e) Routine emergency drill shall be carried out time to time; f) Periodic “walk through” inspection shall be carried out daily for detection of any gas or diesel release/leakage; g) Provide appropriate safety signage within Plant vicinity area; h) “No smoking” must be strictly enforced at all time within the Project Site; i) All heat generating machines and equipments (heat sources) shall be placed away from the pipeline’s right of way. Provide heat insulator as outer cover for all heat sources; j) All pipeline design must be strictly complied with appropriate design standards; and	Residual impact is minimal provided recommended mitigation measures are implemented.

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Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
		<p>k) No activities such as illegal open burning, excavation works, tree planting, parking of heavy vehicle shall be allowed within pipeline right of way or within highly risky area of explosion or fire to occur.</p> <p><u>Good engineering practices</u></p> <p>a) Sufficient safety equipment should be provided and maintained;</p> <p>b) Effective fire alarm and fire fighting system shall be inspected and maintained regularly;</p> <p>c) Provide training to personnel when necessary;</p> <p>d) To prepare a Emergency Response Plan (ERP) that include emergency response towards the neighbouring facilities upon implementation of the Project;</p> <p>e) Enforce a speed limit of 20 km/hr within Plant area, especially near the gas pipelines area and diesel storage for heavy vehicles; and</p> <p>f) Place sufficient and well-placed hazard signboards at strategic locations within Project Site.</p>	
<p><u>Waste Management</u></p> <p>a) Operation of PFR kiln;</p> <p>b) Operation of air pollution control system;</p> <p>c) Maintenance of operating equipment, motors and machinery; and</p> <p>d) Lab and office operation.</p>	<p>a) Residual process material generation;</p> <p>b) Scheduled waste generation; and</p> <p>c) General waste generation.</p>	<p><u>Residual process material</u></p> <p>a) Limestone fines after the screening process will be conveyed and stockpiled at an open area next to washing unit area and will be mixed with other material and managed as back filling material in Project site;</p> <p>b) Particles which are mostly of a size <3 mm which generated from the bag house filter will be transferred to the 300 MT product storage silo and will be sold as product; and</p> <p>c) Spent refractory after maintenance will be temporary store in the Project site prior selling it to lining contractor for recycling.</p>	<p>Residual impact is minimal provided the mitigation measures proposed are implemented</p>

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Activity	Potential Significant Impact	Mitigation Measures	Residual Impact
		<u>Scheduled waste</u> a) Clean up kits and proper PPE for spent hydraulic and lubricants spillage cleaning (<i>if any</i>) shall be provided at appropriate locations around the main processing areas; b) Scheduled wastes are to be stored in a scheduled waste storage facility; and c) Scheduled waste in either liquid or solid form shall be collected in 200 L drums and shall be clearly labeled for identification and warning purposes while prior to collection by licensed recyclers approved by the DOE.	
<u>Traffic Assessment</u> a) Transportation of limestone into the raw material storage area; and b) Transportation of burnt lime.	a) Not expected to cause traffic disruption.	a) All the transportation is recommended to be carried out during the non-peak traffic flow period; and b) It shall be imposed to the drivers to fully abide the speed limit along the public road.	Residual impact is minimal provided the mitigation measures proposed are implemented
<u>Abandonment</u>			
<u>Abandonment</u> a) Abandonment of LKP facilities.	a) Potential safety hazard from the structures; b) Leakage and leaching of contaminants from the presence of chemicals and waste; and c) The collection and ponding of water in the water bearing structures.	a) Removal and proper disposal of all types of wastes; b) Maintain fencing of the site with sufficient warning signs; c) Dismantle all unsafe structures and recover machinery; d) Shut down any source of ignition or switches; e) Ensure site is free from any standing waters or water ponding; and f) Erect necessary signboards for the site.	Residual impacts can occur if abandonment of the LKP materializes.



Source : Modified from Google Maps. Accessed on 18 November 2013.



Figure ES-1

Location Plan of the Project Site

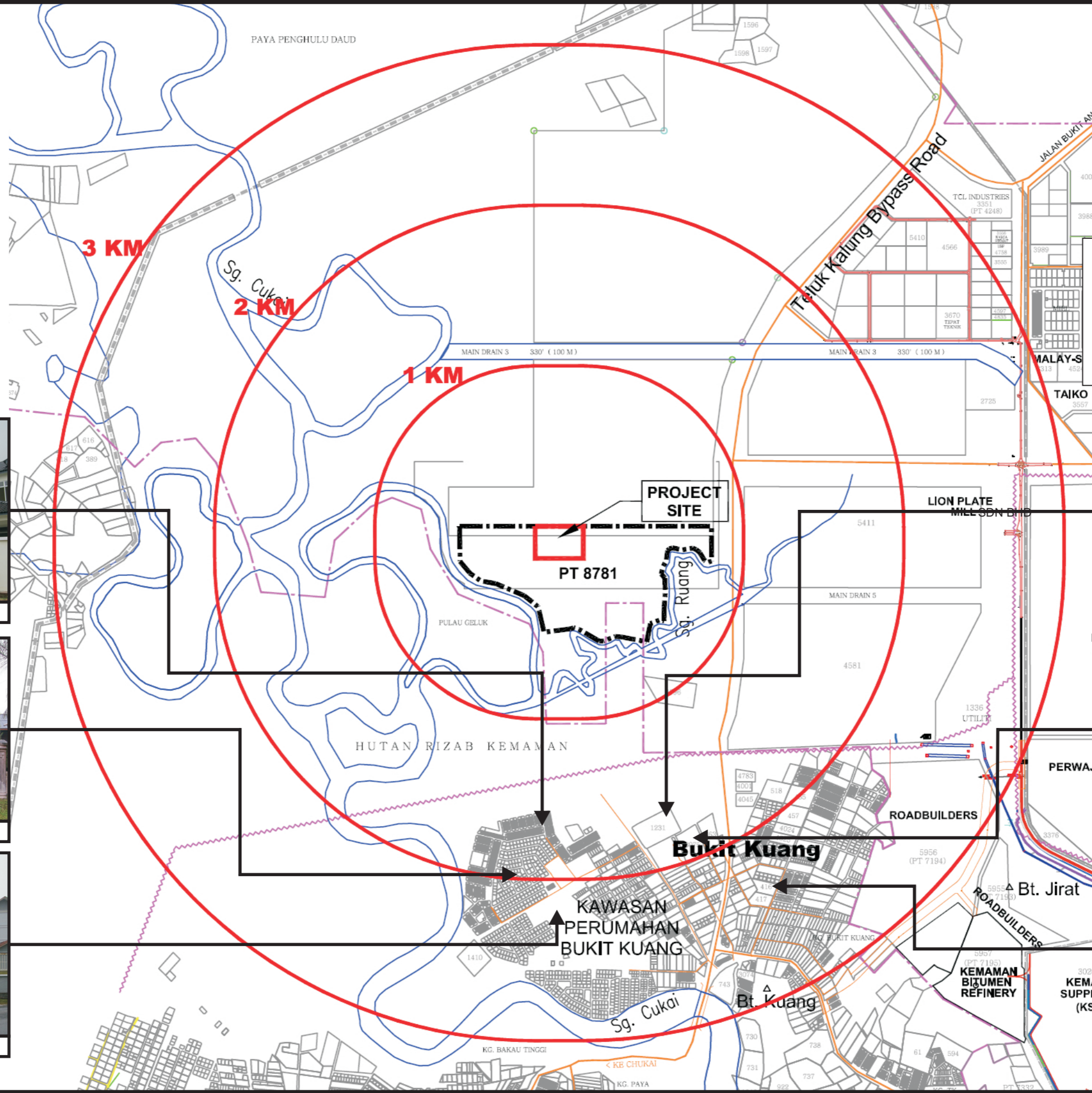
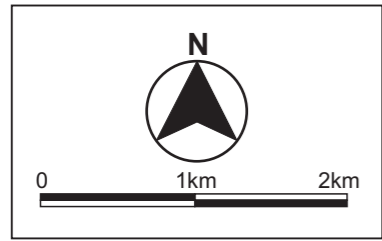


Figure ES-2

Location of Sensitive Receptors