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## EXECUTIVE SUMMARY

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### 1.0 INTRODUCTION

Tanjong Agas Supply Base & Marine Services Sdn. Bhd. have taken the initiative to set up one such facility named as “Tanjong Agas Oil & Gas and Maritime Industrial Park”, i.e. the Proposed Project, to cater for the needs of the oil and gas industries in their quest to explore, develop and produce crude oil and raw natural gas in the waters of Southeast Asia. Apart from serving the upstream oil and gas industries, the Proposed Project would be able to cater some downstream activities such as refineries, finished petroleum products blending and storage, liquefied natural gas/liquefied petroleum gas storage and re-gas plant, and other heavy industries.

### 2.0 LEGAL REQUIREMENT

The Proposed Project in Pahang is a prescribed activity as stipulated in the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 made under Section 34A of the Environmental Quality Act 1974. The prescribed activity as in the EIA Order relevant to the Proposed Project is:

- Schedule 6 (d): Conversion of mangrove swamps for industrial, housing or agricultural use covering an area of 50 hectares or more.
- Schedule 9 (b): Industrial estate development for medium and heavy industries covering an area of 50 hectares or more.
- Schedule 11 (c): Sand dredging involving an area of 50 hectares more.

### 3.0 STATEMENT OF NEED

The Tanjong Agas Supply Base & Marine Services Sdn. Bhd can see the increasing demand of petroleum so that continued exploration for new sources of oil and gas, especially off-shore, will be necessary to meet future demands for both petroleum and natural gas. Also, the need for oil and gas industrial hub in Asia Pacific Region, the project proponent intends to take advantage of the increasing demand for petroleum products in Asia-Pacific region in general and in China in particular by offering the platform for oil & gas player to invest in the business and Tg Agas will become a hub for this connection.

With the increased exploration activities in the coming years, there is a need for facilities that can provide maritime services in the form of fabrication as well as repair of off-shore structures, such as exploration rigs, production platforms and off-shore living quarters.

#### 4.0 SITE SELECTION

The state of Pahang offers the following advantages (and hence has been selected for project implementation):

- ***It enjoys the most comfortable span outside the world's busiest shipping route.***  
Located just off the busiest shipping route in the world, the site offers comfortable span from the route. This proximity will facilitate the unloading and loading of oil and gas products.
- ***It is endowed with existing natural passage way and draft for extra large vessels.***

The transportation of crude oil and finished petroleum products require the utilization of large, and increasingly larger vessels. Such vessels need wide passageway, sufficient draft and large turning area for mooring purposes. The proposed site is suited for the operation of oil and gas facilities because it meets such requirements.

#### 5.0 PROJECT DESCRIPTION

##### 5.1 Project Location

The Proposed Project is at Mukim Pekan in the District of Pekan, Pahang. Previously, Sg. Miang Permanent Mangrove Forest Reserve (Hutan Simpan Kekal Paya Laut Sg. Miang) is within the Proposed Project area. The total area of greenfield land that will be converted is about 1,710.06 hectares (4,225.66 acres). **Figure ES 5.1** shows the location of the Proposed Project. The site is situated about 50 km from Kuantan and 10 km from Pekan. The coordinates of two corners of the Proposed Project are  $\pm N3^{\circ} 27'$ ,  $E103^{\circ} 25'$  and  $\pm N3^{\circ} 30'$ ,  $E103^{\circ} 29'$ .

##### 5.2 Project Components

The project proponent will be constructing the infrastructure within the Proposed Project site such as dual-carriageway roads, drainage, electricity and water supply, telecommunication facilities, and sewage treatment plant. Investors who intend to set up their operation within the Proposed Project will be required to do their own land clearing and site preparation works on the allotted plot of land. If there is a need for jetties for ships to load or unload materials and products, the investors themselves have to construct such structures.

The types of industry that are expected to be located in the Proposed Project are:

- Shipyard
- Major fabrication yard
- Intergrated waste management plant

- Oil & gas storage terminal
- Supply base
- Marine base (facilities)
- Warehouses and non-hazardous factories

Within the proposed industrial park, there will be areas to locate commercial and office buildings to cater for the needs of the industrial activities.

The project proponent will carry out dredging activities to deepen the sea fronting the Proposed Project. The depth will be determined by requirements of investors, depending on the size of ships that enter the dockyard or come along side the jetty heads for berthing (depth varying from 12 m to 20 m). The dredged material are mostly sand that initially will be used as fill materials to raise the level of the low lying areas for the construction of the dual-carriageway roads within the Proposed Project site. The dredged sand can also be used by investors who will be setting up their operation in the Proposed Project site to raise the level of their allotted plots to a height suitable for their operations.

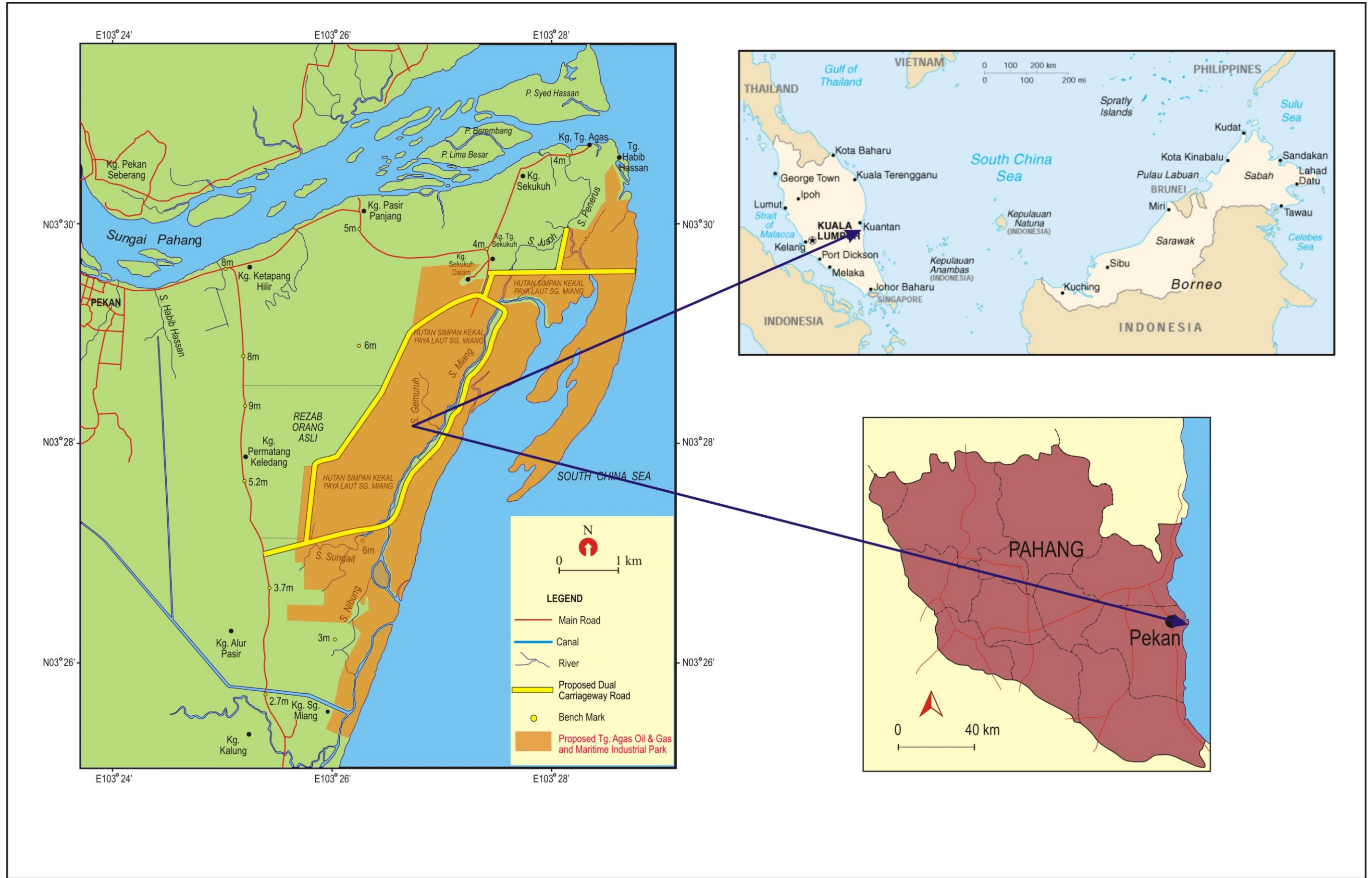


Figure ES 5.1: Maps Showing the Location of Proposed Project

## **6.0 EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES**

### **6.1 Topography & Landuse**

The topography at the vicinity of the Proposed Project is generally flat and low-lying with the highest point at nine meters above sea level. The lowland causes the area to be seasonally flooded especially during the peak monsoon season. The study area is drained by one main river, i.e. Sg. Miang and its tributaries. Sg. Miang, has two river mouths, the main river mouth being located at the north-eastern part of the Proposed Project. The area is swampy, dominated with mangrove and nipah groves especially along the coastal line from Tg. Agas to the southern part of Sg. Miang. Inland vegetation comprises shrubs and sundry non-cultivation flora mixed with wetland vegetation.

Settlement area within the study area around the site of the Proposed Project involves traditional and fishing villages, Orang Asli settlement and modern terrace houses. The main connection from Pekan to the proposed project area is Federal Route 3 and State Road C100 from the junction of Kg. Ketapang Hilir to Kg. Tg. Agas. The surrounding area where the Proposed Project is to be implemented has been designated by the State Government of Pahang to be developed as the proposed Tg. Agas Oil & Gas and Maritime Industrial Park (O&GMIP).

In terms of land use pattern, the landscape of the area will change from a natural habitat of swampy mangrove forest to a built environment of buildings and equipment, typical for an industrial area. The impact is that Hutan Simpan Kekal Paya Laut Sg. Miang would be lost permanently. The presence of an old Muslim cemetery found close to the mouth of Sg. Sungait would be a misfit to the overall development of the area. The existence of paved surfaces and build up areas would also increase surface run-off during rainfall.

The project proponent should preserve and protect other surrounding swampy lands which are not directly planned for development of the industrial park. Relocation of a cemetery should be made over and after a meeting or a series of meetings with the relevant parties. To ensure a balance hydrological system, project proponent should improve the existing drainage system of the affected residential areas and construct temporary bunds along the existing rivers. In addition, anticipated increased runoff can be channeled off the site by properly dimensioned drainage channels. There will also be positive impacts in terms of needed economic development for the area in particular and the country in general.

### **6.2 Geology and Soil**

The Proposed Project is located within part of the Sg. Pahang delta. The site is composed of unconsolidated layers of sand, silt and clay, exceeding to over 60 m in thickness and having relatively low bearing capacity.

For the Proposed Project development, soil erosion can result from site clearing and related activities. This can be mitigated by proper sediment control measures such as silt traps and sedimentation pond. Periodic maintenance of the sediment trapping structures would ensure their effectiveness.

### **6.3 Climate**

The climate of the Proposed Project site can generally be characterized as humid warm weather conditions throughout the year, with uniform temperatures, high humidity and rainfall. Humidity and temperature show very little variations over the year and it is difficult to divide the year into distinct wet and dry seasons.

### **6.4 Air Quality**

The results of air quality monitoring at the vicinity of the Proposed Project show that the air quality is within acceptable limits as outlined in the Recommended Malaysian Environmental Air Quality Guidelines (RMAQG).

Any strong wind will increase the suspended dust and can affect the visibility in the nearby areas. Mud from the wheels of the lorries can also increase the dust level along the access roads and the public roads, forming dust clouds during dry weather periods, which can affect the safety of the road users.

Any existing trees that can act as dust screens should be retained. Water trough should be constructed at the exits of the construction site for washing tyres of construction vehicles to prevent mud from being carried onto the public roads. Lorries should not be over loaded and must be properly covered to avoid spillage. Any dirt or mud carried to the main roads should be immediately cleared as required under Section 47 of Street, Drainage and Building Act 1974 Act 133.

### **6.5 Noise Level**

The existing ambient noise levels at the noise monitoring stations vary between 53.6-59.7 dBA during day-time and 42.1-48.9 dBA during night-time. Such noise levels were above the level specified for low density residential areas and noise sensitive areas as stipulated in Annex A Schedule 1 of the Planning Guidelines for Environmental Noise Limits and Control, published by DOE Malaysia.

To prevent the adverse impact of noise pollution to the sensitive receptors (nearby residents) due to increase in the overall noise levels resulting from construction activities, noisy construction activities should be restricted to between 07:00 and 20:00 hours only. All vehicles should also be checked for proper installation of engine silencer to reduce the emitted noise level. Effort must be made to inform the affected residents of project progress and investigate if there is any complaint.

## 6.6 Hydrology and Drainage

The rivers identified for the DEIA study are the Sg. Pak Leh and Sg Pasir Besar which flows to downstream of Sg. Pahang between Kg. Sekukuh and Kg. Tg. Agas. The other two small streams are Sg. Buaya and Sg. Che Abas, which are located between Kg. Ketapang Hilir and Kg. Pasir Panjang. Others are Sg. Penerus and Sg. Jusoh which flows directed to the sea, and Sg. Gemuruh, Sg. Sungait as well as Sg. Nibung which are tributaries of Sg. Miang. Sg. Miang, being the biggest and longest river (6.48 km) within the Proposed Project area, is unique, such that it has three outlets. One outlet is near Kg. Sekukuh Dalam, to the north of the Proposed Project site, which is the original estuary of Sg. Miang. The second and third outlet is near the southern part of the Proposed Project. The third outlet, about 300 m to the south of the second outlet has become the new estuary for Sg. Miang where waters from the inland basin drains to the South China Sea. The basin measures about 6.0 km x 2.5 km wide. This part of Sg. Miang originates in the Paya Hulu Pancur Forest and is one connected to an irrigation system controlled at the South bund.

## 6.7 River Water Quality

Analysis of water samples collected at five sampling stations at the vicinity of the Proposed Project indicate that the water quality can be categorized between Class III and IV based on Dissolved Oxygen, Class V based on Biological Oxygen Demand, between Class II and IV based on Total Suspended Solids, and between Class IV and V based on Ammoniacal Nitrogen.

Main impacts on river water quality during the construction stage are mainly associated with increase in Total Suspended Solids due to land clearance (biomass and vegetation removal) and earthworks. Oil spillage could occur during maintenance work and refuelling of the engines could be transported by surface run-off into water bodies.

All site clearing activities should be undertaken at least 50 m away from the stream and river banks during dry season. The biomass should be transported out and be disposed at a legally approved waste disposal site. Retention ponds and barriers (silt fence & silt traps) are recommended to be installed to minimize this problem. A proper workshop with oil traps for maintenance, repair and refuelling of machines and vehicles services has to be setup to ensure all vehicles are in good condition.

## 6.8 Marine Water Quality

The results of marine water quality monitoring at the coastal area of the Proposed Project show that the marine water quality is within acceptable limits as outlined in the Marine Water Quality Criteria and Standards (MWQCS).

From the hydraulic analysis, dispersion of suspended sediments for dredging of the harbour shows that the maximum extent that the suspended sediments would travel is approximately 1.5km southwards and 1km along the sand spit with a concentration of below 50mg/l. Within the harbour area, the concentration of suspended sediments ranges between 50-200mg/l. While dispersion of suspended sediments for dredging of the channel, shows that the maximum extent that the suspended sediments would travel is approximately 5km northwards and 3km southwards with a concentration of below 50mg/l.

For dredging works of the harbour, it is recommended that silt protector curtain to be used. The outflow from the dredging shall be limited to 50 g/m<sup>3</sup>. Through regular monitoring, if the suspended sediment concentration values exceed the stipulated limit, the Project Proponent shall immediately reduce the rate of dumping/dredging activity accordingly. The project proponent should carry out regular monitoring and evaluation of the adjacent shoreline and outlets after the proposed project implementation. Maintenance dredging is recommended and the material from this channel should be placed in the surf zone along the southern coast to allow the material to continue replenishing the southern coastline.

## 6.9 Land Traffic

Results of 16-hour traffic counts at two monitoring stations located in the vicinity of the Proposed Project indicate that the Level of Service (LOS) is good. This means that there is good traffic flows without congestion during peak periods.

During the construction period, there will an increase of vehicles, especially transportation lorries and trailers entering and exiting the construction site of the Proposed Project at the junctions with the main public roads (Federal Route 3 and State Road C100).

Signage to indicate that slow moving heavy vehicles are travelling on the public roads near the junctions to the constructions site should be constructed. The signage need to be approved and endorsed by the local authority and the Public Work Department (JKR) (i.e. Arahan Teknik (Jalan) 2C/85, Manual on Traffic Control Devices - Temporary Signs and Work Zones Control, published by Cawangan Jalan, Jabatan Kerja Raya, Malaysia). In addition, flagmen with proper personal protective equipment and clothing should be stationed at the junctions of the project site with the main public roads to warn users of approaching heavy vehicles.

## 6.10 Marine Traffic and Navigational Safety

The proposed project lies along the coast between Tanjung Agas in the north to approximately the position of Sungai Miang in the south. The length of the coastline is about 10 nautical miles (18.5 kilometres). The number of fishing boats is estimated to be approximately 402 vessels of all types, a few pleasure craft and no commercial marine traffic transits or uses the navigable water in the study area.



During dredging activity, there is possibility of marine traffic congestion and safety within the lagoon.

A restricted area will need to be established within the lagoon during dredging and all work areas should be clearly marked by day and by night with lighted marker buoys. Vessel operators must adhere strictly to all local and international Rules and Regulations.

### 6.11 Mangrove Flora

Mangrove flora survey at the study area recorded a total of 48 species within 41 genera and 32 families. Among the most noteworthy species are *Bruguiera sexangula* and *B. hainesii*. The relatively most important species based on the importance value index was *Bruguiera parvifolia* (Lenggadai) whilst, the least important species was *B. hainesi* (Berus mata buaya). The estimated total aboveground biomass for five tree species in the study plot was 305 t/ha, which indicated that the mangrove forest had a high productivity.

Potential impact during the construction phase associated with permanent loss of mangrove and vegetation cover within the Proposed Project site. Land clearing activity right to the edge of rivers are expected to loosen the riverbank causing erosion and slumping.

Planting of shrubs and trees along the unpaved areas would enhance the landscape and also helps to prevent erosion. The 50 m buffer on both sides of the rivers should not be cleared to prevent erosion and slumping.

### 6.12 Terrestrial Fauna

Faunal surveys carried out in areas at the vicinity of the Proposed Project recorded 13 species of mammals in the inland forest site and 6 species in the mangrove forest site. The most frequently caught mammal species using the mist nets was the short-nosed fruit bat (*Cynopterus brachyotis*). A total of 32 species of birds was recorded in the study area, all of them being forest edge/generalist species except one is Near Threatened according to the IUCN conservation status, i.e. the Red-throated Sunbird *Anthreptes rhodolaema*.

Potential impacts include habitat loss and disturbance to the wildlife when due to land use change resulting in increase of noise levels from operation of machineries and vehicular movement. The loss of fauna habitat to make way for the Proposed Project is permanent and represents a trade-off for which there is no mitigation. Land clearing should be done from the shore towards inland to allow the displaced fauna species to migrate to their new habitats. Project Proponent to organize sessions with PERHILITAN to capture the displaced fauna to be transported to their new suitable habitats.

### 6.13 Marine Ecology

A total of 37 phytoplankton species with Bacillariophyta formed the most dominant taxa and 1,871 macrobenthos individuals have been sampled and identified along the coastal area adjacent to the proposed project. The fish community was abundant with trash fishes that consist of non-commercial and juveniles of commercially important species. Range of the catch rate during the survey was between 26.3 – 61.2 kg/hr and the average catch rate was 43.8 kg/hr. At least 50% from the total catch was trash fishes and the remaining 30% was categorized as commercial fishes. There are about 1,300 active fishermen in Pekan with 676 operating fishing vessel from 10 fish landing bases (Tg. Selangor, Kuala Pahang, Kg. Marhum, Pulau Jawa, Pasir Panjang, Tg. Agas, Sungai Miang, Tg. Batu, Nenasi and Merchong). Tg. Agas ranked number three after Kuala Pahang and Nenasi in terms of number of active fishermen (157 individuals) and the registered fishing gear used (129 vessels). Drift net is the main fishing gear used by the local fishermen followed by fish trap or bubu, and long-line.

There will be a total loss of the macrobenthos organisms directly at the dredged sites while in the surrounding areas, changes in macrobenthos species composition and abundance might occur. The increased suspended solid might have some impact on feeding activity of filter feeding macro-invertebrates as their feeding apparatus might be clogged. Increase in turbidity will cause reduction in light availability for photosynthesis activity of the phytoplankton. Sedimentations can affect fish embryos as oxygen will not be able to pass through the membrane of the egg, introducing contaminants, and preventing excretion of wastes. Turbidity also could reduce the reaction distance of visually foraging fish toward their prey.

The suspended sediment plumes (turbidity plumes) should be minimized by putting silt screens or curtains around the dredger and a monitoring program should be implemented throughout the course of the dredging activity to ensure its effectiveness.

### 6.14 Freshwater Ecology

A total of 19 families of macroinvertebrates are identified with Arthropod as the most abundant. The fish inventory shows that Cyprinidae as the most dominant family and has the highest richness and composition. Four phyla of phytoplankton were recorded which comprises of 777 individuals with Bacillariophyta as the most dominant phylum. These results show that Sg. Miang is dominated by freshwater and brackish communities and depend on the water tide schedules to determine their roaming area.

Siltation and sedimentation are expected to occur during the land clearing activity could cause serious changes to the river habitat and harm the aquatic communities. Indiscriminate machinery services and operation could cause contamination to water system and harm aquatic communities.

A buffer zone for river protection should be provided at least 50 m from the river bank which shall not be disturbed with the vegetation within the buffer zone maintained to protect the

river bank from being eroded. Slope protection of the bare and unstable slope must be implemented. All vehicles must be regularly inspected to avoid any leakage and a garage with oil trap for vehicle servicing and maintenance must be provided and all procedures should be managed and disposed according to the EQ(SW)R, 2005.

### 6.15 Socioeconomy

With one side of its periphery fronting the sea, the project site is surrounded on the landward side by a vast stretch of wetlands punctuated by pockets of settlements mainly smallish fishing villages. The total population within the Mukim Pekan is estimated about 23,652 people with the total number of households was 4,986 giving an average of 4.7 persons per household. The population of mukim Pekan is mainly Malay dominated. The Bumiputra comprised 88.1 percent (77.2 percent Malay and 10.9 percent Orang Asli) of the total population of the study area, the Chinese and Indian being 2 and 1 percent respectively and the Cambodians made up the remaining 8.9 percent. There are five fish landing jetties operating in the study area comprising Tg Agas, Sg. Miang, Pasir Panjang, Kuala Pahang and Kg Marhom. The total number of licensed fishermen using these jetties is 791 persons. From public dialogue, it summarized that the locals were very concerned about the fate of their fishing activities especially the limit of their fishing ground. In the survey, there seemed to be a consensus agreement among the locals that the Proposed Project would bring advantages of all the kinds, such as employment opportunities to the household members and the locals, improvement in basic amenities and increased in property value, standard of living, business opportunities and opportunity for house ownership.

The requirement of several hundred workers during construction will boost local labour market or employment especially when locals are deployed. The local should be encouraged and given priority in filling up the manpower requirement. Potential increase in population size would bring about increased demand in basic goods and services. Commerce in the area would be boosted and the locals should capitalize this opportunity. Nevertheless, potential negative impacts during construction would be related to health and safety, noise pollution and tranquility, air pollution and social stability due to the multi-ethnic and cultural background of the workers. Therefore, observing stringent work ethics, working hours and cultural tolerance would help mitigate the impacts.

## 7.0 ECONOMIC VALUATION OF ENVIRONMENTAL IMPACTS

The construction and operation of the proposed industrial park is expected to positively contribute towards regional and national economy by further enhancing existing economic activities through substantial investment and value adding operations. However, project implementation will also give rise to negative environmental impacts that cannot be completely mitigated thus justifying the need to quantify the degradation in services obtainable from the disturbed natural environment. In evaluating the impact of the proposed project on

environmental services, this study adopts the impact pathway approach (IPA) where the physical environmental impacts are linked to an economic valuation process.

Three environmental impacts have been identified to be significant enough to be considered for evaluation. Potential impacts in the forms of loss of mangrove area, the removal of seabed habitat for macrobenthos and the loss of fishing ground for fishermen are evaluated in this study. After discounting at the rate of 4%, the project is expected to bring about a present value of environmental cost amounting to (-RM40.914) million over a 50-year period. The corresponding values are equal to (-RM61.832) million and (-RM84.110) million when 6% and 8% rates of discount are used respectively.

## 8.0 RESIDUAL IMPACTS AND ABANDONMENT

Some impacts cannot be mitigated completely, as not all adverse impacts that arise from the proposed project can be fully alleviated. There would be permanent loss of Forest Reserve of about 1,710.06 hectares (4,225.66 acres) due to land clearing for the development of the proposed project.

The proposed project will have physical structures such as building and storage tanks protruding from the flat ground when the area is fully occupied with development by the investors.

The livelihood of some fishermen will be affected due to the loss of some fishing grounds as a result of the operation of the harbour that renders this area as a security zone.

On the other hand, the operation of the industrial park also provides opportunities for jobs and business to local populations.

## 9.0 CONCLUSION

With good design and responsible implementation and management by the Project Proponent, most of these impacts can be reasonably minimised with appropriate mitigation and control measures as proposed in this report. The proposed monitoring programmes to be carried out will ensure that criteria and standards of environmental quality are observed and abided by the project proponent throughout the project's life. It is important that this project be carried out in full compliance with all the conditions set by DOE and the relevant regulatory agencies.

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## RINGKASAN EKSEKUTIF

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### 1.0 PENGENALAN

Tanjung Agas Supply Base & Marine Services Sdn. Bhd. Telah mengambil inisiatif untuk membina satu kemudahan yang dinamakan “Tanjung Agas Oil & Gas and Maritime Industrial Park” iaitu Project Cadangan, untuk memenuhi keperluan industri minyak dan gas dalam mencari, membangun dan menghasilkan minyak mentah dan gas asli di perairan Asia Tenggara. Selain daripada memenuhi kehendak industri hulu minyak dan gas, Projek Cadangan juga boleh memenuhi keperluan aktiviti hiliran seperti loji, pencampuran dan penyimpanan produk petroleum, penyimpanan dan loji regasifikasi gas asli dicecairkan/gas petroleum dicecairkan dan industri berat yang lain.

### 2.0 KEPERLUAN UNDANG-UNDANG

Projek yang dicadangkan ini merangkumi komponen di bawah aktiviti yang ditetapkan seperti tertakluk di dalam Perintah Kualiti Alam Sekeliling (Aktiviti yang Ditetapkan) (Penilaian Impak Alam Sekitar) 1987 (seterusnya dirujuk sebagai Perintah EIA) yang dibuat di bawah Seksyen 34A Akta Kualiti Alam Sekeliling 1974 (Akta 127). Aktiviti yang ditetapkan seperti di dalam Perintah EIA yang berkaitan dengan cadangan projek adalah:

- Jadual 6 (d): Penukaran paya bakau untuk penggunaan industri, perumahan atau pertanian meliputi kawasan sebanyak 50 hektar atau lebih.
- Jadual 9 (b): Pembangunan estet industri bagi industri sederhana dan berat meliputi kawasan sebanyak 50 hektar atau lebih.
- Jadual 11 (c): Pengorekan pasir meliputi kawasan sebanyak 50 hektar atau lebih.

### 3.0 PENYATAAN KEPERLUAN

Tanjung Agas Supply Base & Marine Services Sdn. Bhd dapat melihat permintaan petroleum tinggi yang akan menyebabkan eksplorasi sumber-sumber baru bagi minyak dan gas, terutama di pesisiran luar pantai diperlukan untuk memenuhi permintaan masa hadapan bagi petroleum dan gas asli. Tambahan terdapat permintaan hub industri minyak dan gas di Kawasan Asia Pasifik, penggerak projek bercadang untuk mengambil peluang permintaan produk petroleum yang meningkat di kawasan Asia Pasifik amnya dan di China khususnya dengan menawarkan platform kepada pelabur minyak dan gas untuk melabur dan Tg Agas akan menjadi hub kepada hubungan ini.

Dengan peningkatan aktiviti eksplorasi di tahun akan datang, terdapat keperluan fasiliti yang dapat menyediakan servis maritim dalam bentuk fabrikasi dan juga pembaikan struktur-struktur pesisir luar pantai seperti rig eksplorasi, platform penghasilan dan kuarters kediaman pesisir luar pantai.

#### 4.0 PEMILIHAN KAWASAN

Negeri Pahang menawarkan kelebihan seperti berikut (seterusnya dipilih untuk implementasi projek):

- ***Kawasan paling sesuai di luar laluan perkapalan tersibuk dunia.***  
Terletak luar daripada laluan perkapalan tersibuk dunia, kawasan ini menawarkan keadaan yang sesuai daripada laluan ini. Jarak ini akan membantu pemindahan produk minyak dan gas.
- ***Terdapat laluan dan kedalaman semulajadi sediada bagi kapal-kapal besar.***  
Pengangkutan minyak mentah dan produk akhir petroleum memerlukan penggunaan kapal besar. Kapal-kapal ini memerlukan laluan yang lebar, kedalaman mencukupi dan kawasan pusingan yang besar bagi tujuan pelabuhan. Tapak cadangan sesuai untuk pengoperasian kemudahan minyak dan gas kerana ia memenuhi keperluan tersebut.

#### 5.0 KETERANGAN PROJEK

##### 5.1 Lokasi Projek

Tapak cadangan terletak di Mukim Pekan, Daerah Pekan. Sebelum ini, Hutan Simpan Kekal Paya Laut Sg. Miang terletak di dalam kawasan Projek Cadangan. Jumlah kawasan tanah lapangan hijau yang akan ditukarkan adalah 1,710.06 hektar (4,225.66 ekar). **Rajah RE 5.1** menunjukkan lokasi Projek Cadangan. Tapak cadangan berada kira-kira 50 km dari Bandar Kuantan dan lebih kurang 10 km dari Bandar Pekan. Koordinat bagi dua penjuru Projek Cadangan adalah  $\pm N3^{\circ} 27'$ ,  $E103^{\circ} 25'$  dan  $\pm N3^{\circ} 30'$ ,  $E103^{\circ} 29'$ .

##### 5.2 Komponen Projek

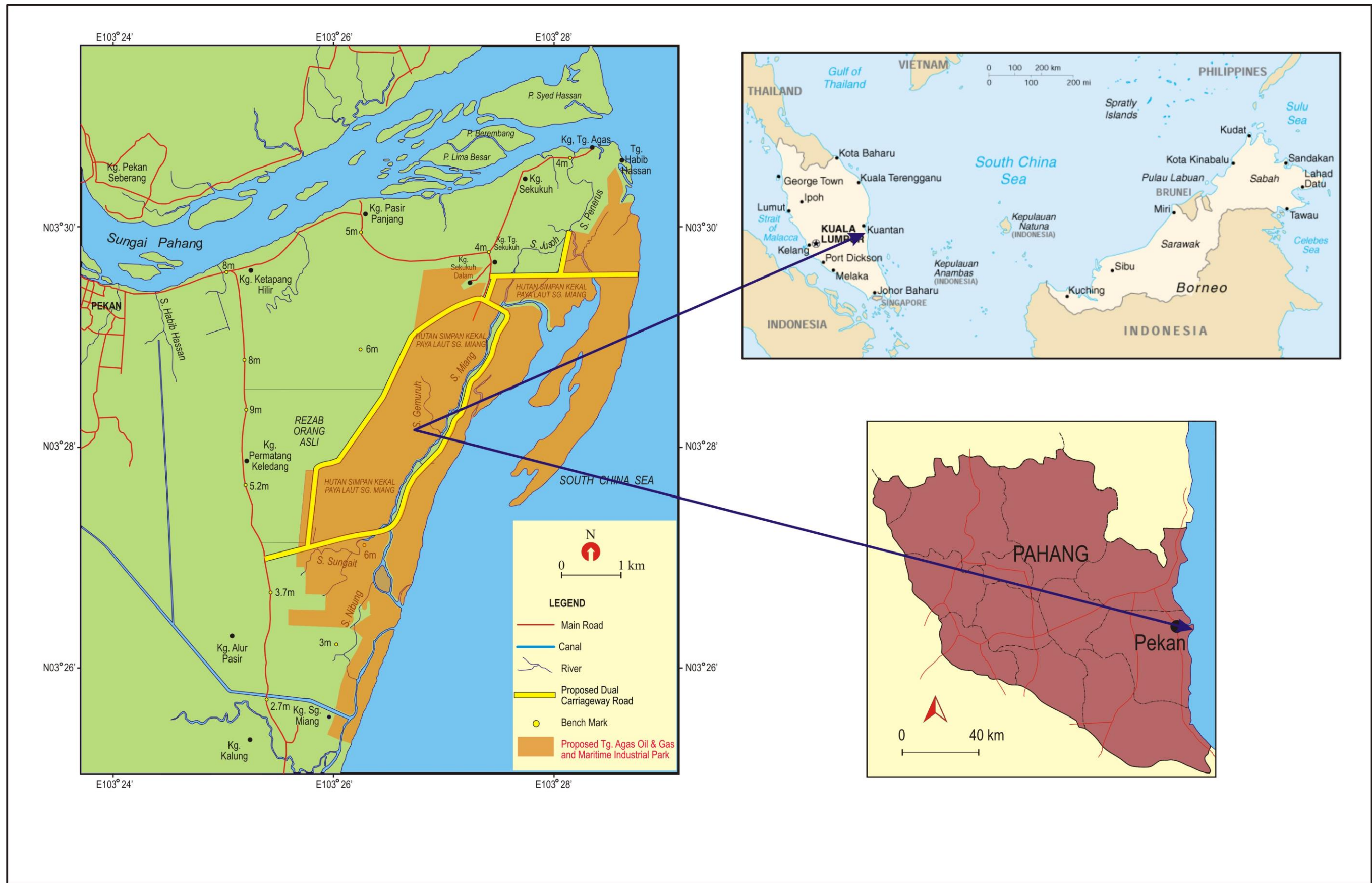
Penggerak projek akan membina infrastruktur di tapak Projek Cadangan seperti jalan pengangkutan berkembar, peparitan, bekalan elektrik dan air, kemudahan telekomunikasi dan loji perawatan kumbahan. Pelabur yang bercadang untuk menjalankan operasi mereka di kawasan Projek Cadangan perlu menjalankan kerja-kerja pembersihan tanah dan penyediaan kawasan sendiri di atas plot tanah yang diberikan. Jika terdapat keperluan jeti bagi kapal-kapal memindahkan bahan dan produk, pelabur perlu membina struktur tersebut.

Jenis-jenis industri yang dijangkakan di Projek Cadangan adalah:

- Limbungan
- Kawasan fabrikasi major
- Loji pengurusan sisa diintegrasikan
- Terminal penyimpanan minyak dan gas
- Pengkalan bekalan
- Pengkalan marin (kemudahan)
- Gudang dan kilang-kilang tidak bahaya

Di dalam kawasan perindustrian yang dicadangkan, terdapat kawasan yang disediakan untuk bangunan-bangunan komersil dan pejabat bagi memenuhi keperluan aktiviti-aktiviti perindustrian.

Penggerak projek akan menjalankan aktiviti pengorekan bagi mendalamkan kawasan pantai berhadapan Projek Cadangan. Kedalaman akan ditentukan oleh keperluan pelabur, bergantung kepada saiz kapal yang memasuki kawasan limbungan atau bersebelahan dengan kepala jeti bagi tujuan berlabuh (kedalaman berbeza daripada 12 m ke 20 m). Bahan-bahan yang dikorek kebanyakan adalah pasir dan akan digunakan sebagai bahan pengisi bagi meningkatkan paras kawasan rendah bagi pembinaan jalan-jalan pengangkutan berkembar di dalam tapak Projek Cadangan. Pasir yang dikorek juga boleh digunakan oleh pelabur yang akan membina operasi mereka di tapak Projek Cadangan bagi meningkatkan plot yang diberikan ke ketinggian yang sesuai dengan pengoperasian.



Rajah RE 5.1: Peta menunjukkan Lokasi Projek Cadangan



## 6.0 PERSEKITARAN SEDIADA, IMPAK DAN LANGKAH-LANGKAH TEBATAN

### 6.1 Topografi dan Guna Tanah

Secara umum, tapak cadangan mempunyai topografi tanah lembab yang mendatar dengan ketinggian maksimum hanya sembilan meter dari paras laut. Tanah rendah ini berisiko mengalami banjir terutama ketika musim puncak monsun. Terdapat sebatang sungai utama yang mengairi sekitar kawasan projek iaitu Sg. Miang dan beberapa batang anak sungai yang lain. Sg. Miang mempunyai dua muara sungai, di mana muara sungai utama terletak di sebelah timur laut tapak projek. Kawasan sekitar Tapak Cadangan Projek berpaya, dan ditumbuhi bakau serta nipah yang dominan di sepanjang garis pantai dari Tg. Agas hingga ke Sg. Miang. Bahagian pedalaman dilitupi dengan belukar dan semak-samun serta pelbagai tanaman renek bercampur dengan vegetasi paya.

Kawasan petempatan yang terdapat dalam lingkungan tapak cadangan projek adalah perkampungan tradisional dan nelayan, petempatan Orang asli dan kawasan perumahan berderet. Laluan utama yang menghubungkan kawasan tapak projek pembangunan dengan Bandar Pekan adalah Laluan Persekutuan 3, dan Jalan Negeri C100 dari persimpangan Kg. Ketapang Hilir ke Kg. Tg. Agas. Kerajaan Negeri Pahang telah mengkhaskan sekitar kawasan cadangan projek ini sebagai kawasan pembangunan Kawasan Perindustrian Minyak, Gas dan Maritim Tg. Agas.

Dari aspek pola guna tanah, lanskap kawasan projek akan berubah dari habitat semulajadi yang berpaya bakau ke pembangunan yang terdiri daripada bangunan dan peralatan, senario biasa bagi kawasan perindustrian.

Impak utama dari pembangunan ini adalah pemusnahan kekal Hutan Simpan Paya Laut Sg. Miang. Kehadiran perkuburan Islam lam berdekatan dengan Sg. Sungait akan menyebabkan ketidaksesuaian kepada pembangunan keseluruhan kawasan tersebut. Kewujudan permukaan yang diratakan dan kawasan yang dibangunkan akan meningkatkan peningkatan larian permukaan ketika hujan.

Penggerak projek harus memelihara dan melindungi kawasan paya lain yang tidak dirancang secara langsung bagi pembangunan kawasan perindustrian. Pemindahan kubur harus dilakukan selepas beberapa mesyuarat bersama pihak-pihak yang berkenaan. Bagi memastikan sistem hidrologi yang seimbang, penggerak projek harus meningkatkan sistem saluran kawasan penempatan yang terjejas dan membina bund sementara di sepanjang sungai-sungai sediadanya. Tambahan, peningkatan larian air yang dijangkakan boleh disalurkan keluar daripada tapak dengan membina saluran yang bersesuaian. Projek Cadangan ini turut meninggalkan impak yang positif terutama dari segi pembangunan ekonomi di kawasan ini umumnya.

## 6.2 Geologi dan Tanah

Tapak Cadangan merupakan sebahagian daripada delta Sg. Pahang. Tapak cadangan terdiri daripada lapisan pasir, lodak dan lempung tak terkonsolidat, dengan ketebalan melebihi 60 meter dan kekuatan menampung beban yang rendah.

Hasil dari pembangunan projek ini kebarangkalian hakisan tanah boleh berlaku akibat dari aktiviti pembersihan tapak dan aktiviti berkaitan. Impak sekitaran ini dapat ditebatkan dengan langkah kawalan mendapan yang sesuai seperti perangkap kelodak dan kolam pemendapan. Penyelenggaraan berkala struktur perangkap mendapan bagi memastikan keberkesannya.

## 6.3 Iklim

Iklim di tapak Projek Cadangan boleh dikategorikan sebagai cuaca panas dan lembap sepanjang tahun dengan suhu sekata, kelembapan dan hujan tinggi. Kelembapan dan suhu menunjukkan variasi yang sangat sedikit sepanjang tahun dan pembahagian tahun kepada musim kering dan basah adalah sukar.

## 6.4 Kualiti Udara

Hasil dari keputusan pemantauan kualiti udara di sekitar kawasan Projek Cadangan menunjukkan bahawa kualiti udara berada di paras kebolehterimaan seperti yang digariskan dalam Garispanduan Kualiti Udara Alam Sekitar Malaysia (RMAQG).

Apabila angin bertiup kencang, kepekatan habuk terampai akan turut meningkat dan menjejaskan kejelasan pandangan di sekitar kawasan projek. Lumpur dari tayar-tayar lori juga menambahkan aras habuk di sepanjang jalan masuk dan jalan awam, membentuk gumpalan habuk di musim kemarau di mana turut menjejaskan keselamatan pengguna jalan raya.

Pokok-pokok sedia ada boleh menjadi penghalang habuk dan harus dkekalkan. Takungan air untuk tujuan pembasuhan tayar-tayar kenderaan perlu disediakan di tempat keluar dari tapak projek supaya dapat mencegah lumpur daripada mengotori jalan awam. Lori-lori hendaklah dipastikan tidak membawa muatan berlebihan dan muatannya perlu ditutup rapi untuk mencegah tumpahan dan keciciran yang mengotori permukaan jalan. Sebarang lumpur dan kotoran yang terbawa ke jalan utama hendaklah dicuci dengan segera seperti yang diperuntukkan di bawah Seksyen 47 Akta Jalan, Perparitan dan Bangunan 1974 Akta 133.

## 6.5 Paras Kebisingan

Paras hingar sedia ada di stesen pemantauan ujian kebisingan adalah berbeza –beza iaitu di antara 53.6-59.7 dBA di waktu siang dan 42.1-48.9 dBA pada waktu malam. Paras hingar ini melebihi paras spesifikasi kawasan penempatan berpenduduk rendah dan kawasan sensitif hingar seperti yang dinyatakan dalam Annex A Jadual 1 Garis Panduan Perancangan bagi Kawalan dan Had Hingar Persekitaran, dikeluarkan oleh JAS Malaysia.

Bagi mengatasi impak pencemaran bunyi terhadap penduduk sekitar, maka aktiviti pembinaan haruslah dihadkan masa aktiviti dari pukul 07:00 pagi hingga 08:00 malam setiap hari. Ke semua kenderaan harus diperiksa bagi pemasangan penyenyap enjin yang sesuai bagi mengurangkan paras hingar yang dikeluarkan. Usaha harus dilakukan bagi memberitahu penduduk terjejas kemajuan projek dan menyiasat jika terdapat sebarang aduan.

## 6.6 Hidrologi dan Saliran

Sungai-sungai yang dikenalpasti bagi kajian DEIA adalah Sg. Pak Leh dan Sg. Pasir Besar yang mengalir ke hiliran Sg. Pahang di antara Kg. Sekukuh dan Kg. Tg. Agas. Dua sungai kecil yang lain adlaah Sg. Buaya dan Sg. Che Abas yang terletak di antara Kg. Ketapang Hilir dan Kg. Pasir Panjang. Selain itu, Sg. Penerus dan Sg. Jusoh yang mengalir terus ke laut dan Sg. Gemuruh, Sg. Sungait serta Sg. Nibung merupakan anak sungai Sg. Miang. Sg. Miang yang merupakan sungai terbesar dan terpanjang (6.48km) di dalam kawasan Projek Cadangan adalah unik dengan mempunyai tiga kawasan pelepasan. Pelepasan pertama berdekatan dengan Kg. Sekukuh Dalam, ke utara tapak Projek Cadangan yang merupakan estuari asal Sg. Miang. Pelepasan kedua dan ketiga berdekatan dengan kawasan selatan Projek Cadangan. Pelepasan ketiga, lebih kurang 300 m ke selatan daripada pelepasan kedua telah menjadi estuari baru Sg. Miang di mana air daripada tadahan daratan keluar ke Laut China Selatan. Kawasan tadahan berukuran 6.0 km x 2.5 km lebar. Kawasan Sg. ini berasal daripada Hutan Paya Hulu Pancur dan dihubungkan ke sistem pengairan di ban Selatan.

## 6.7 Kualiti Air Sungai

Analisa bagi sampel air diperolehi dari lima stesen persampelan di sekitar perairan Projek Cadangan menunjukkan bahawa kualiti air boleh dikelaskan pada Kelas III dan IV berdasarkan Oksigen Terlarut, Kelas V berdasarkan Keperluan Oksigen Biologikal, di antara Kelas II dan IV bagi Jumlah Pepejal Terampai dan di antara Kelas IV dan V berdasarkan Ammoniakal-Nitrogen.

Impak utama terhadap kualiti air sungai semasa fasa pembinaan melibatkan peningkatan Jumlah Pepejal Terampai yang berpunca daripada aktiviti pembersihan tanah (pengeluaran biomas dan vegetasi) serta kerja-kerja tanah. Tumpahan minyak boleh berlaku ketika kerja-kerja penyelenggaraan dan pengisian semula minyak enjin dan boleh diangkut oleh larian permukaan ke badan-badan air.

Ke semua aktiviti pembersihan tapak perlu dijalankan sekurang-kurangnya 50 m jauh daripada sebarang sungai dan tebing sungai ketika musim kering. Biomas perlu diangkut keluar dan dilupuskan secara sah di tapak pelupusan sisa yang diluluskan. Kolam penahanan dan halangan (pagar dan perangkap kelodak) disyorkan dipasang bagi mengurangkan masalah ini. Bengkel yang sempurna dan dipasang perangkap minyak perlu dibina bagi penyelenggaraan, pembaikan dan pengisian semula mesin dan servis kenderaan bagi memastikan ke semua kenderaan berada dalam keadaan baik.

## 6.8 Kualiti Air Laut

Keputusan pemantauan kualiti air laut di kawasan pantai Projek Cadangan menunjukkan kualiti air laut berada di bawah paras yang dibenarkan seperti yang digariskan dalam Kriteria dan Piawai Kualiti Air Laut (MWQCS).

Daripada analisis hidraulik, penyebaran sedimen terampai bagi pengorekan pelabuhan menunjukkan tahap maksimum sedimen terampai bergerak adalah lebih kurang 1.5km ke selatan dan 1km di sepanjang beting pasir dengan kepekatan di bawah 50mg/l. Di dalam kawasan pelabuhan, kepekatan sedimen terampai berada di antara 50-200 mg/l. Penyebaran sedimen terampai ketika pengorekan saluran menunjukkan tahap maksimum sedimen terampai bergerak adalah lebih kurang 5km ke utara dan 3km ke selatan dengan kepekatan di bawah 50mg/l.

Bagi kerja-kerja pengorekan pelabuhan, disyorkan pelindung langsir kelodak digunakan. Takat pelepasan pengorekan harus dihadkan kepada 50g/m<sup>3</sup>. Melalui pemantauan berkala, jika kepekatan sedimen terampai melebihi had yang digariskan, penggerak projek harus mengurangkan kadar aktiviti pembuangan/pengorekan serta merta. Penggerak projek harus menjalankan pemantauan kerap dan menilai garis pantai dan saluran pelepasan berdekatan selepas projek dijalankan. Pengorekan penyelenggaraan disyorkan dan bahan daripada saluran ini harus diletakkan di zon ombak di sepanjang pesisiran selatan bagi membolehkan bahan pengorekan menambah secara berterusan garis pantai di bahagian selatan.

## 6.9 Trafik Darat

Keputusan bancian trafik 16 jam yang telah dilakukan di dua buah stesen berhampiran dengan kawasan Projek Cadangan menunjukkan Paras Servis (LOS) adalah baik. Ini bermaksud terdapat aliran trafik yang baik tanpa sebarang kesesakan ketika waktu puncak.

Semasa fasa pembinaan, akan terdapat peningkatan kenderaan, terutama lori pengangkut dan treler keluar dan masuk tapak pembinaan Projek Cadangan di simpang-simpang yang berhubung dengan jalan awam utama (Jalan Persekutuan 3 dan Jalan Negeri C100).

Papan tanda menunjukkan pergerakan lambat kenderaan berat sedang melalui jalan awam berhampiran dengan simpang ke tapak pembinaan perlu didirikan. Ke semua papan tanda yang didirikan di sepanjang jalan perlu merujuk kepada Arahan Teknik (Jalan) 2C/85 *Manual on Traffic Control Devices-Temporary Signs and Work Zones Control* yang diterbitkan oleh Cawangan Jalan, Jabatan Kerja Raya, Malaysia. Selain itu, pemegang bendera lengkap dengan peralatan dan pakaian keselamatan diri harus ditempatkan di simpang tapak projek yang berhubung dengan jalan awam bagi memberi amaran kepada pengguna jalan akan kenderaan berat yang menghampiri.

## 6.10 Trafik Marin dan Keselamatan Navigasi

Projek Cadangan terletak di sepanjang pesisiran pantai di antara Tg. Agas di utara ke kawasan Sg. Miang di selatan. Panjang pesisiran pantai adalah lebih kurang 10 batu nautika (18.5 kilometer). Bilangan bot-bot nelayan dianggarkan sebanyak 402 buah dari ke semua jenis bot, beberapa bot pelancongan dan tiada trafik marin komersil yang singgah atau menggunakan perairan yang boleh dinavigasi di kawasan kajian.

Ketika aktiviti pengorekan, terdapat kemungkinan masalah kesesakan dan keselamatan marin trafik di kawasan lagun.

Kawasan terhad perlu diwujudkan di kawasan lagun ketika pengorekan dan ke semua kawasan kerja harus ditanda dengan jelas siang dan malam dengan menggunakan boya penanda bercahaya.

## 6.11 Flora Bakau

Survei flora bakau merekodkan sejumlah 48 spesies dalam 41 genera dan 32 famili. Spesies yang perlu diberi perhatian ialah *Bruguiera sexangula* and *B. hainesii*. Spesies yang paling penting secara relatif berdasarkan indeks nilai kepentingan ialah *Bruguiera parvifolia* (Lenggadai) dan yang kurang penting ialah *B. hainesii* (Berus mata buaya). Biojisim atas tanah untuk lima spesies di dalam plot kajian dianggarkan sebanyak 305 t/ha menunjukkan hutan bakau ini mempunyai produktiviti yang tinggi.

Impak yang dijangkakan semasa fasa pembinaan adalah kehilangan kekal bakau dan vegetasi pelindung di kawasan tapak Projek Cadangan. Pembersihan tanah bersebelahan sungai dijangkakan akan menggagalkan struktur tebing sungai menyebabkan hakisan dan pendedapan.

Penanaman pokok dan pokok-pokok renem di sepanjang kawasan yang diratakan akan meningkatkan lanskap dan juga mengelakkan hakisan. Zon penampan 50 m di kedua-dua belah sungai tidak boleh dibersihkan bagi mengelakkan hakisan dan pendedapan.

## 6.12 Fauna Terrestrial

Tinjauan telah dijalankan di kawasan Projek Cadangan merekodkan sejumlah 13 spesies haiwan Mamalia di kawasan hutan sekunder dan 6 spesies di kawasan hutan bakau. Spesies Mamalia yang kerap ditangkap ialah Cecadu pisang (*Cynopterus brachyotis*). Sejumlah 32 spesies burung pula telah direkodkan di kedua-dua kawasan kajian. Kesemua spesies ialah spesies kawasan pinggir hutan/umum kecuali satu yang Hampir Terancam menurut status konservasi IUCN iaitu Red-throated Sunbird *Anthreptes rhodolaema*.

Potensi kesan impak terhadap hidupan liar termasuk kehilangan habitat dan gangguan apabila melibatkan isu seperti perubahan status tanah yang akan meningkatkan tahap bising dari

operasi dan pergerakan jentera. Kehilangan habitat fauna dikenalpasti adalah kekal dan tiada langkah tebatan yang dicadangkan. Pembersihan tanah harus dijalankan daripada pantai ke daratan bagi membenarkan spesies fauna yang terkesan berhijrah ke habitat yang baru. Penggerak projek mengadakan sesi bersama PERHILITAN bagi menangkap fauna yang terkesan untuk dipindahkan ke habitat baru yang bersesuaian.

### 6.13 Ekologi Marin

Sejumlah 37 spesies fitoplankton dengan Bacillariophyta merupakan taxa dominan dan 1,871 individu makrobentos telah disampel dan dikenalpasti di sepanjang kawasan pantai berhampiran Projek Cadangan. Komuniti ikan adalah sangat banyak dengan ikan-ikan tidak bernilai komersil dan juga anak-anak ikan spesies berkepentingan komersil. Julat kadar penangkapan ketika survei adalah di antara 26.3 – 61.2 kg/jam dan purata kadar penangkapan adalah 43.8kg/jam. Sekurang-kurangnya 50% daripada jumlah penangkapan adalah ikan-ikan tiada nilai komersil dan selebihnya 30% dikategorikan sebagai ikan-ikan bernilai komersil. Terdapat 1,300 nelayan aktif di Pekan dan 676 bot perikanan beroperasi daripada 10 pusat pengumpulan ikan (Tg. Selangor, Kuala Pahang, Kg. Marhum, Pulau Jawa, Pasir Panjang, Tg. Agas, Sungai Miang, Tg. Batu, Nenasi dan Merchong). Tg. Agas berada di tempat ketiga selepas Kuala Pahang dan Nenasi dari segi bilangan nelayan aktif (157 nelayan) dan peralatan penangkapan ikan berlesen yang digunakan (129 bot). Pukat hanyut merupakan peralatan penangkapan ikan utama yang digunakan oleh nelayan tempatan diikuti oleh perangkap ikan atau bubu dan tali panjang.

Akan terdapat kehilangan organisma makrobentos di tapak pengorekan dan di persekitaran kawasan mungkin berlaku perubahan dalam komposisi dan kebanyakan spesies makrobentos. Peningkatan pepejal terampai akan memberi impak kepada aktiviti pemakanan makro-invertebrat pemakanan bertapis kerana organ-organ pemakanan mereka akan tersumbat. Peningkatan kekesruhan akan menyebabkan pengurangan kesediaan cahaya bagi aktiviti fotosintesis fitoplankton. Pemendapan boleh memberi kesan kepada embrio ikan apabila oksigen tidak dapat melepasi membran telur, mengenalkan bahan-bahan pencemar dan mengelakkan pembuangan sisa. Kekeruhan juga boleh mengurangkan jarak reaksi ikan mencari makanan secara visual terhadap mangsanya.

Plum mendakan terampai (plum kekeruhan) harus diminimalkan dengan memasang penghadang atau langsir kelodak di sekeliling pengorek dan program pemantauan harus dijalankan sepanjang aktiviti pengorekan bagi memastikan keberkesanannya.

### 6.14 Ekologi Air Tawar

Sejumlah 19 keluarga makroinvertebrat telah dikenalpasti dengan bilangan Arthropod yang paling tinggi. Inventori ikan menunjukkan Cyprinidae adalah keluarga paling dominan dan mempunyai kekayaan dan komposisi paling tinggi. Empat filum fitoplankton telah direkodkan yang terdiri daripada 777 individu dengan Bacillariophyta sebagai filum paling

dominan. Keputusan ini menunjukkan Sg. Miang didominasi oleh komuniti air tawar dan payau dan bergantung kepada jadual air pasang surut bagi menentukan kawasan pergerakan.

Kekeruhan dan pemendapan dijangkakan berlaku ketika aktiviti pembersihan tanah dan menyebabkan perubahan serius kepada habitat sungai dan mengancam komuniti akuatik. Penyelenggaraan dan pengoperasian jentera yang dikawal akan menyebabkan pencemaran kepada sistem sungai seterusnya mengancam komuniti akuatik.

Zon penampan bagi perlindungan sungai harus disediakan sekurang-kurangnya 50 m daripada tebing sungai dan tidak boleh diganggu serta vegetasi di kawasan zon penampan dikekalkan bagi melindungi tebing sungai terhakis. Perlindungan cerun bagi cerun lapang dan tidak stabil harus dijalankan. Ke semua kenderaan perlu diperiksa selalu bagi mengelakkan sebarang kebocoran dan garaj yang mempunyai perangkap minyak bagi menyelenggara perlu disediakan serta ke semua prosidur harus diurus dan dibuang berdasarkan EQ(SW)R, 2005.

### 6.15 Sosio Ekonomi

Dengan satu daripada sempadan tapak projek menghadap ke laut, di sebelah daratnya pula disempadani tanah paya yang luas dan tompokan petempatan bersaiz kecil terutamanya perkampungan nelayan. Jumlah populasi di Mukim Pekan dianggarkan sebanyak 23,652 orang dan jumlah bilangan isirumah adalah 4,986 dengan purata ahli isirumahnya seramai 4.7 orang. Sebahagian besar penduduk daerah Pekan terdiri daripada penduduk Melayu. Jumlah populasi di kawasan kajian menunjukkan Bumiputera adalah sebanyak 88.1 peratus (77.2 peratus Melayu dan 10.9 peratus Orang Asli), Cina dan India 2 dan 1 peratus masing-masing dan Kemboja sebanyak 8.9 peratus. Terdapat lima jeti pengumpulan ikan beroperasi di kawasan kajian iaitu Tg Agas, Sg. Miang, Pasir Panjang, Kuala Pahang dan Kg Marhom. Jumlah bilangan nelayan berlesen menggunakan jeti-jeti tersebut 791 orang. Daripada dialog awam, kesimpulan dapat dibuat di mana penduduk tempatan sangat bimbang mengenai nasib aktiviti penangkapan ikan mereka terutama had kawasan penangkapan ikan. Hasil daripada survey, didapati terdapat satu persetujuan bersama di antara penduduk tempatan di mana Projek Cadangan akan memberi pelbagai kebaikan seperti peluang pekerjaan kepada ahli isirumah dan penduduk tempatan, penambahbaikan kemudahan-kemudahan asas dan peningkatan nilai hartanah, taraf hidup, peluang perniagaan dan peluang memiliki rumah.

Keperluan beberapa ratus pekerja ketika pembinaan akan meningkatkan pasaran atau pengambilan tenaga buruh tempatan terutama apabila penduduk tempatan diambil bekerja. Penduduk tempatan sepatutnya digalakkan dan diberi keutamaan bagi memenuhi keperluan tenaga kerja projek ini. Peningkatan potensi saiz penduduk akan mencetuskan peningkatan permintaan ke atas barangan dan perkhidmatan asas. Keadaan ini akan juga menggalakkan perniagaan di kawasan ini dan penduduk tempatan seharusnya merebut peluang tersebut. Walau bagaimanapun, impak negatif semasa pembinaan dijangka lebih menjurus kepada kesihatan dan keselamatan, pencemaran bunyi dan gangguan, pencemaran udara dan kestabilan sosial disebabkan kepelbagaian latarbelakang pekerja yang terdiri daripada pelbagai etnik dan budaya. Oleh itu, memberi perhatian yang lebih kepada etika kerja selamat, waktu

bekerja yang sesuai dan sisipan toleransi budaya dijangka mampu menangani impak berkenaan.

## 7.0 PENILAIAN EKONOMI KESAN ALAM SEKITAR

Pembinaan dan operasi kawasan perindustrian yang dicadangkan dijangka akan menyumbang kepada ekonomi negeri melalui peningkatan pelaburan pengoperasiaan yang mempunyai nilai tambah. Namun projek yang akan dilaksanakan akan membawa beberapa kesan negatif kepada alam sekitar yang tidak dapat ditebat sepenuhnya. Ini memerlukan kepada penilaian kepada penurunan perkhidmatan yang diperolehi dari alam sekitar. Kajian ini menggunakan kaedah laluan impak di mana kesan fizikal alam sekitar akan dikaitkan secara langsung kepada penilaian ekonomi.

Tiga impak alam sekitar telah dikenalpasti di peringkat awal untuk dinilai. Impak dalam bentuk kehilangan kawasan bakau, penyingkiran habitat dasar laut makrobentos dan kehilangan kawasan penangkapan ikan oleh nelayan dinilai di dalam kajian ini. Selepas mendiskaun pada kadar 4%, projek ini dijangka mengakibatkan kos alam sekitar berjumlah (-RM40.914) juta dalam jangkamasa 50 tahun. Nilai (-RM61.832) juta dan (-RM84.110) juta diperolehi jika kadar diskaun 6% and 8% digunakan.

## 8.0 IMPAK BAKI DAN PENINGGALAN

Sesetengah impak tidak boleh ditebat sepenuhnya kerana tidak ke semua impak negatif disebabkan oleh Projek Cadangan dapat dielakkan sepenuhnya. Akan terdapat kehilangan berkekalan Hutan Simpan sebanyak 1,710.06 hektar (4,225.66 ekar) disebabkan oleh pembersihan tanah bagi pembangunan Projek Cadangan.

Projek Cadangan akan mempunyai struktur fizikal seperti bangunan dan tangki penyimpanan yang menonjol dari permukaan tanah rata apabila kawasan tersebut diisi sepenuhnya dengan pembangunan yang akan dijalankan oleh pelabur.

Mata pencarian sesetengah nelayan akan terjejas akibat pengurangan kawasan menangkap ikan akibat daripada pengoperasian pelabuhan yang menyebabkan kawasan ini dijadikan zon keselamatan.

Akan tetapi, pengoperasian kawasan perindustrian juga akan menyediakan peluang pekerjaan dan perniagaan kepada penduduk tempatan.



## 9.0 KESIMPULAN

Projek ini boleh dilaksanakan kerana dengan reka bentuk yang baik serta pelaksanaan dan pengurusan yang bertanggungjawab oleh Pemaju Projek, kebanyakan impak boleh dikurangkan dengan langkah tebatan dan langkah kawalan seperti yang dicadangkan di dalam laporan ini. Cadangan program pemantauan yang akan dijalankan akan memastikan kriteria dan standard kualiti alam sekitar dipantau dan dipatuhi oleh Pemaju Projek sepanjang hayat projek ini. Adalah penting bagi projek ini dijalankan dengan mematuhi sepenuhnya segala syarat yang ditetapkan oleh Jabatan Alam Sekitar serta agensi-agensi lain.