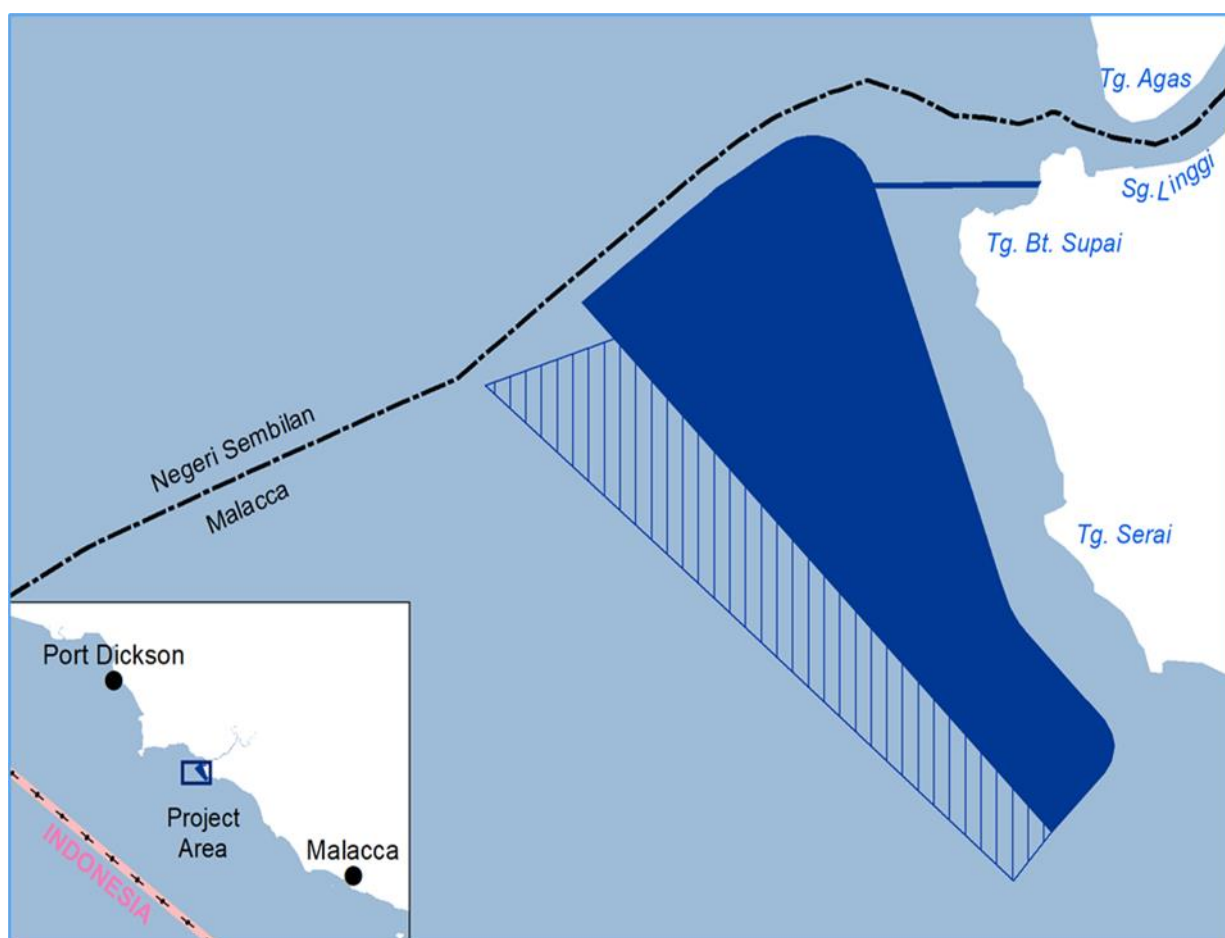


Environmental Impact Assessment Report

Volume I of IV

Linggi Base Sdn. Bhd

Proposed Reclamation and Dredging for the Development of Pelabuhan Kuala Sg. Linggi at Perairan Muara Sungai Linggi, Alor Gajah, Melaka



February 2021

This report has been prepared under the DHI Business Management System certified by Bureau Veritas to comply with ISO 9001 (Quality Management)

ISO 9001
Management System Certification
BUREAU VERITAS
Certification Denmark A/S



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RINGKASAN EKSEKUTIF

PENILAIAN KESAN KEPADA ALAM SEKITAR JADUAL KEDUA

PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA



Ringkasan Projek

- Projek terletak di pinggir utara Negeri Melaka, berdekatan dengan muara Sg. Linggi.
- Tapak Projek terletak di Had Pelabuhan Kuala Sg. Linggi di mana pemindah minyak dan gas dari kapal ke kapal dilakukan.
- Projek terdiri daripada penambakan, pengorekan induk, pembinaan jambatan akses dan pembaikan semula pantai.

Keperluan Projek

Memperluaskan aktiviti dan meningkatkan kapasiti Pelabuhan Kuala Linggi yang sedia ada bagi memenuhi keperluan perkhidmatan Pelabuhan pada masa hadapan.



Keperluan Undang-Undang

Jadual Pertama

15. Pengorekan
a) Pengorekan induk

Jadual Kedua

7. Penebusgunaan Tanah
a) Penebusgunaan kawasan pantai yang melibatkan kawasan seluas 50 hektar atau lebih
c) Penebusgunaan bagi pulau buatan manusia



PENGERAK PROJEK



LINGGI BASE SDN BHD

JURURUNDING EIA

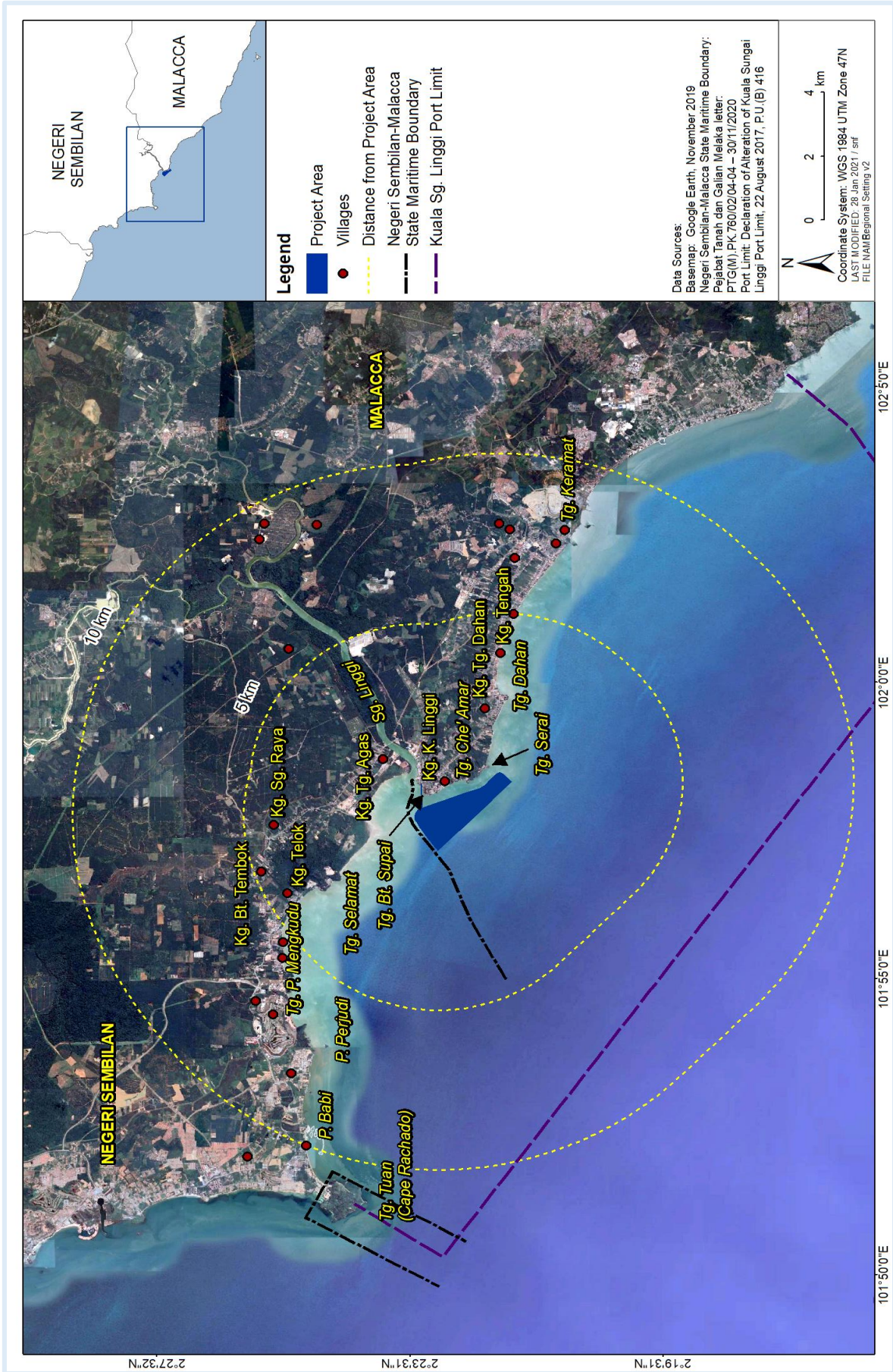


DHI WATER & ENVIRONMENT (M) SDN BHD

RINGKASAN EKSEKUTIF

PENILAIAN KESAN KEPADA ALAM SEKELILING JADUAL KEDUA PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Lokasi Projek



Konsep Projek

- Untuk memenuhi pembangunan Pelabuhan Kuala Sungai Linggi (KSLP) di masa hadapan
- Projek KSLP yang dicadangkan akan terdiri daripada kemudahan seperti terminal penyimpanan minyak dan gas, limbungan kapal, tapak fabrikasi, dermaga kargo am, terminal minyak dan gas, penggunaan tanah pentadbiran dan institusi, termasuk tanah yang dikhaskan untuk Kerajaan (EIA berasingan akan dilakukan untuk komponen-komponen ini).

Komponen Projek



Penebusgunaan Laut

- 620 ekar
- 300 m dari garisan pantai
- 20.2 juta m³ pasir

Jambatan Akses

- 764 m panjang
- Benteng 255 m
- Tiang jejambat 509 m

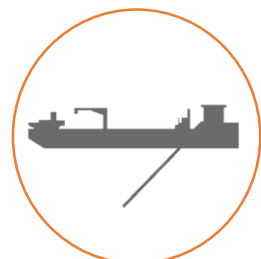


Pengisian Semula Pantai

- Di antara Tg. Che' Amar dan Tg. Bt. Supai
- Penempatan pasir sebanyak 30,000 m³

Pengorekan Induk

- 750,000 m³ bahan pengorekan
- Pengorekan sehingga -13 m CD



Aktiviti-Aktiviti Projek

Pra-Pembinaan

- Tinjauan topografik dan hidrografik
- Penyelidikan geoteknik
- Reka bentuk dan pengoptimuman terperinci
- Kelulusan-kelulusan agensi

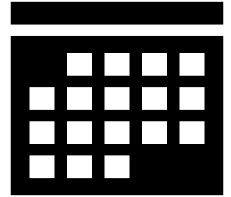
Pembinaan

- Menyiapkan infrastruktur pembinaan
- Penebusgunaan
- Pembinaan jambatan akses
- Pembinaan semula pantai
- Pengorekan induk

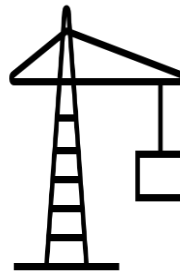
Pasca-Pembinaan

- Kehadiran jejak penebusgunaan dan pengorekan
- Komponen-komponen pembangunan KSLP di atas tanah yang ditebusguna akan dinilai di EIA yang berasingan

**Pelaksanaan
Projek**



- Bermula pada bulan April 2021
- Penyiapan kira-kira 3 tahun kemudian
- Fasa 1 – Penebusgunaan, jambatan akses dan pembinaan semula pantai
- Fasa 2 – Penebusgunaan
- Phase 3 – Penebusgunaan dan pengorekan induk



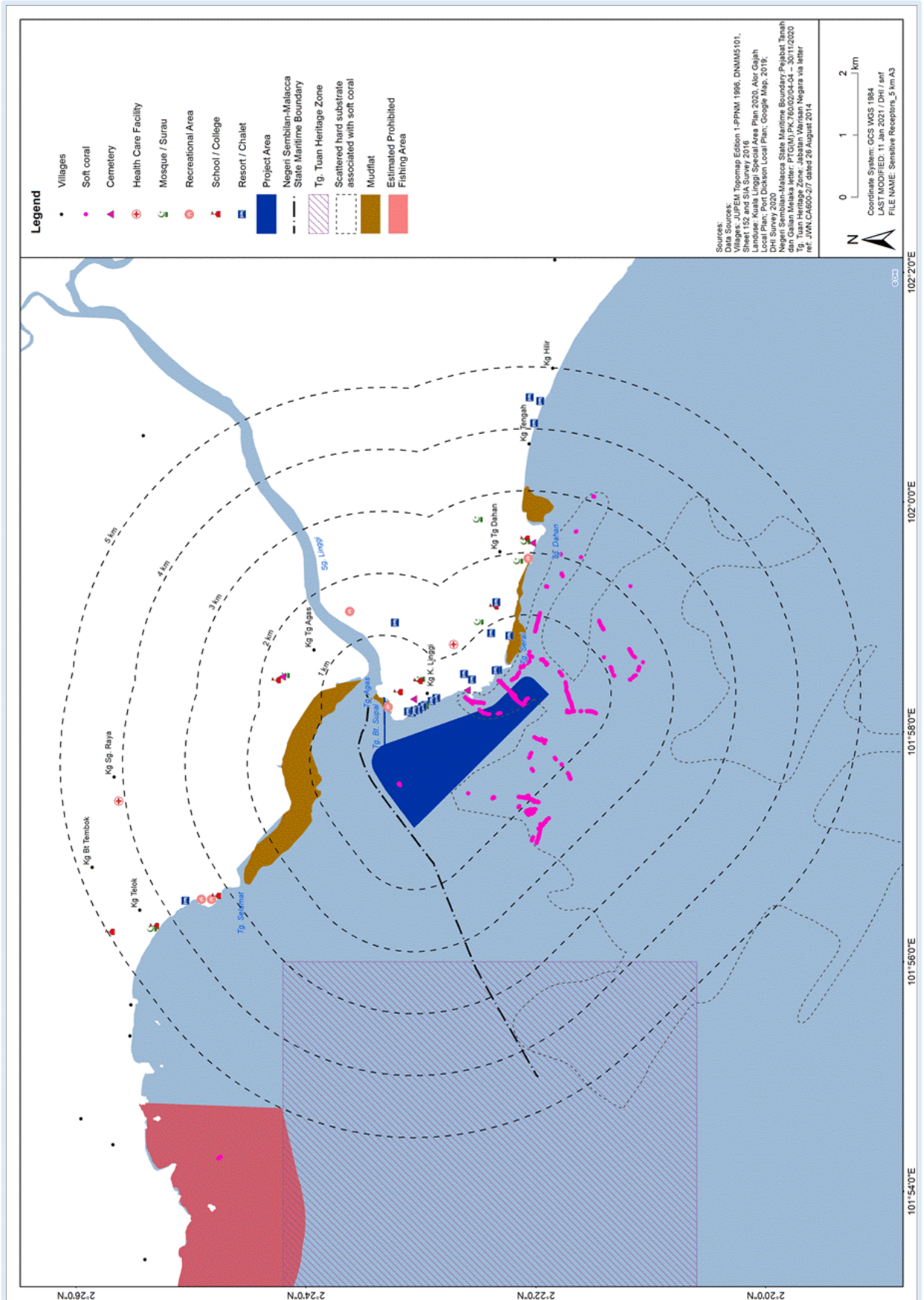
**Pengabaian
Projek**

Bahan buangan dan jentera-jentera pembinaan akan dikeluarkan

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Reseptor-reseptor sensitif dalam lingkungan 5 km dari Projek



Persekitaran Fizikal-kimia Sedia Ada



Meteorologi: Musim hujan adalah dari bulan Mac hingga Mei dan September hingga Disember.

Hydrologi: Kawasan tadahan adalah 1,270 km²



Morfologi Pantai: Terdapat bakau, lapis lindung pantai, pantai berpasir yang terhakis dan singkapan berbatu di persisiran pantai.

Batimetri: Kawasan kajian terletak di kawasan pasang surut berhampiran Sg. Linggi.

Arus: Kelajuan arus air lemah dari Sg. Linggi dengan kelajuan arus min di bawah 0.3 m/s.

Gelombang: Gelombang musim monsun Barat Daya lebih tinggi daripada musim lain.

Paras air: Julat pasang surut (MHWS – MLWS) berada dalam urutan 2 m.



**Keadaan
Hidrografi**



Kualiti Air: Perairan laut mengandungi kepekatan ammonia, aluminium dan koliform najis yang tinggi. Kekeruhan, TSS, ammonia, aluminium dan koliform najis adalah tinggi di perairan muara sungai.

Jika dibandingkan dengan data 2016, fosfat dan nitrat bukan lagi masalah kualiti air. Serakan sedimen dari sungai dapat dilihat mengalir ke kawasan persisiran pantai yang berdekatan.

Enapan Marin: Sebahagian besar enapan terdiri daripada pasir kasar. Jumlah enapan halus adalah lebih tinggi berdekatan dengan muara sungai. Kepekatan arsenik didapati tinggi di beberapa stesen.



Kualiti Udara: Jika dibandingkan dengan data Februari 2016, kepekatan PM₁₀ telah meningkat (purata kenaikan ialah 22 µg/m³) manakala kepekatan PM_{2.5} menurun di salah satu stesen. Walau bagaimanapun, semua berada dalam had MAAQS.

Hingar: Kebanyakan tahap hingar pada waktu siang dan malam meningkat jika dibandingkan dengan data 2016. Tahap kebisingan persekitaran pada waktu siang agak tinggi manakala tahap hingar melebihi had di beberapa tempat. Pada waktu siang, sumber utama hingar adalah bunyi lalu lintas jalan raya manakala pada waktu malam, angin dan hujan.



Persekitaran Biologi Sedia Ada

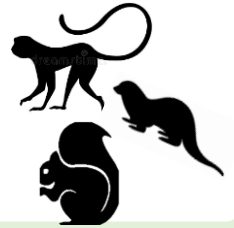


Tumbuh-tumbuhan: Vegetasi atau tumbuh-tumbuhan di sepanjang pesisir pantai di kawasan kajian didominasi oleh hutan bakau atau tumbuhan pesisir pantai. Di bahagian darat pula didominasi oleh kawasan tanaman, terutamanya kelapa sawit. Di kawasan lain di mana terdapatnya tumbuhan, kebanyakannya terdiri daripada kawasan tanah semak (*shrubland*).

Bakau: Pokok bakau boleh didapati di sepanjang Sg. Linggi, di sepanjang pantai dari Tg. Che 'Amar ke Tg. Serai, dari Tg. Mengkudu ke Tg. Agas dan beberapa tompok di Tg. Bt. Supai dan Tg. Dahan. Spesies yang dominan adalah *Rhizophora* spp. dan *Sonneratia* spp. Spesies yang sering diperhatikan adalah termasuk *Avicennia* spp., *Bruguiera* spp. dan nipah. Secara umumnya, kawasan bakau diperhatikan berada dalam keadaan sihat, walaupun terdapat beberapa pokok yang mati kelihatan.



Fauna Darat: Sebilangan besar mamalia yang dilindungi (*totally protected*) dan dilindungi (*protected*) ditemui terutamanya di kawasan hutan bakau Sg. Linggi yang sebahagian kawasannya adalah dilindungi sebagai Hutan Simpan Linggi. Ini tidak termasuk monyet, yang kebanyakannya terdapat di kawasan hutan bakau sepanjang pantai Negeri Sembilan dan Hutan Simpan Pasir Panjang.



Avifauna: Burung-burung di kawasan kajian secara relatifnya mempunyai jumlah dan kepelbagaian spesis yang tinggi. Burung darat yang biasa seperti *Common Myna*, *Peaceful Dove*, *Eurasian Tree Sparrow*, *Asian Glossy Starling* dan *White-throated Kingfisher* sering diperhatikan. Walau bagaimanapun, terdapat bilangan burung pantai (*waders*) yang rendah. *Lesser Adjutant* adalah spesies rentan (*vulnerable*) yang terdapat di kawasan lumpur di sebelah utara muara Sg. Linggi.

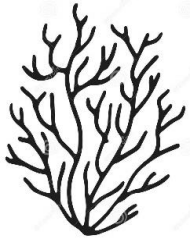
Tuntung Laut: Pada tahun 2001, Sg. Paka, Sg. Setiu dan Sg. Linggi dipercayai adalah satu-satunya tiga sungai di Semenanjung Malaysia yang mempunyai kemungkinan tinggi untuk didiami oleh lebih dari 100 betina *B. Borneoensis* yang membiak. Banci yang dilakukan dari 23 Julai hingga 23 Ogos mencatatkan dua tuntung *B. Borneoensis* bertelur (satu kawasan bertelur di Tg. Dahan dan satu percubaan bertelur yang tidak berjaya di Pantai Cermin pada 12 Ogos 2020).



Buaya: Populasi buaya di sepanjang hiliran Sg. Linggi ialah 12.5 ind./km dan nilai populasi bulanan yang diperbetulkan adalah antara 5 dan 24.9 ind./km (Mei-Dis 2015). Kemunculan anak buaya dan buaya dewasa dengan ukuran <50 cm menunjukkan bahawa terdapatnya kawasan habitat yang sesuai, serta bilangan buaya dewasa yang membiak dan membentuk reservoir penting buaya *C. porosus* di Sg. Linggi. Tinjauan lapangan pada Oktober 2020 di sepanjang Sg. Linggi (~ 5 km) selama satu hari tinjauan pada waktu siang mencatatkan hanya satu buaya remaja.

Existing Biological Environment (cont'd)

Rumput Laut: Rumput laut dijumpai diantasa 18 hingga 60 m dari pesisir pantai di Tg. Bt. Supai dengan keluasan rumput laut sekitar 21 m². Spesis rumput laut yang dijumpai adalah *Enhalus acoroides* (dua tompok lebih besar) dan *Halodule pinifolia* (satu tompok kecil).



Habitat Terumbu Karang: Kawasan di antara Tg. Selamat dan Tg. Dahan mengandungi tompokan-tompokan berbatu/ substrat keras dan batu karang lembut (*Octocorallia*) (keluasana sekitar 3,150 ha). Topokan kecil terumbu batu karang keras juga dijumpai berhampiran Tg. Dahan. Campuran batu karang keras dan lembut dijumpai di Tg. Tuan. Batu karang lembut diklasifikasikan sebagai kualiti 'rendah' dengan peratusan penutupan 1% - 20% manakala batu karang keras diklasifikasikan sebagai 'sederhana' atau 'rendah'. dengan peratusan penutupan 10% - 40%.

Penyu: Di Melaka, penyu yang paling terkenal adalah penyu karah (*Eretmochelys imbricata*). Namun, perairan Melaka juga merupakan kawasan migrasi dan peringkat perkembangan bagi penyu agar (*Chelonia mydas*). Kawasan yang menerima sarang penyu terbanyak di Melaka adalah di Pulau Upeh, Padang Kemunting, Kem Terendak dan Tg. Dahan. Jumlah tahunan yang dilaporkan adalah 468 sarang setiap tahun secara purata sejak tahun 2006.



Megafauna Lain: Ikan lumba-lumba telah dilihat di sekitar kawasan Kuala Sg. Linggi (2014) dan perairan Tg. Tuan (2020). Pada tahun 2009, Ginkgo-toothed whale (*Mesoplodon ginkgodens*), Indo-Pacific humpback dolphins (*Sousa Chinensis*) and Irrawaddy dolphins (*Orcaella brevirostris*) telah dilihat di perairan Melaka dan Negeri Sembilan.

Fitoplankton: Sebahagian besar fitoplankton terdiri daripada Ochrophyta, yang biasa dijumpai di Malaysia; 9 genus berkaitan dengan HAB juga dijumpai (i.e. *Dinophysis* sp., *Ceratium* sp., and *Gymnodinium* sp.), tetapi dalam jumlah yang sangat rendah.



Zooplankton: Sebahagian besar fitoplankton terdiri daripada calanoid, *Bestiolina similis*, *Parvocalanus crassirostris*, dan *Paracalanus* sp.



Makrobenthos: Ketumpatan di lokasi kajian secara umumnya rendah dengan ketumpatan sekitar 112 ind./m² hingga 247 ind./m². Kegiatan antropogenik mungkin salah satu penyebab komuniti benthik berada dalam tekanan.

Fauna Ikan: Sebanyak 248 individu ikan dapat ditangkap semasa persampelan, di mana 118 individu (12 species) ditangkap ketika air pasang-surut anak manakala 130 individu (15 species) ketika air pasang surut perbani. Secara keseluruhan, *Nematalosa nasus* atau Ikan Selang merupakan spesis dominan.



RINGKASAN EKSEKUTIF

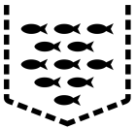
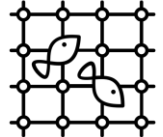
PENILAIAN KESAN KEPADA ALAM SEKELILING JADUAL KEDUA PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Persekitaran Manusia Sedia Ada



Profil Komuniti: 8 penempatan dalam jarak 5 km dari kawasan Projek; kebanyakannya terdiri daripada golongan berpendapatan rendah dan sederhana. Terdapat 4 mukim (Kuala Linggi, Kuala Sungai Baru, Pasir Panjang, Linggi) yang dihuni terutamanya daripada golongan Melayu. Pekerjaan utama adalah pekerja kilang, pekerja am, pekedai, dan nelayan. Dari 326 jumlah isi rumah, 76.4% berasal dari kawasan kampung.

Perikanan: Terdapat 396 nelayan sepenuh masa. Kawasan memancing adalah dari Tg. Panchor (selatan tapak Projek) ke sempadan zon penangkapan ikan yang terlarang di Tg. Tuan. Sebahagian besar kapal nelayan menggunakan pukat hanyut.



Akuakultur: Sg. Linggi adalah Zon Industri Akuakultur (AIZ). Industri akuakultur skala kecil di N. Sembilan memelihara ikan kakap (*seabass*) dan kerang. Tidak ada operasi akuakultur berdaftar di Melaka.

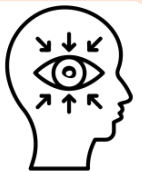
Pelancongan: Kawasan pelancongan adalah kawasan pantai yang berdekatan dengan kawasan Projek hingga ke Tg. Serai. Terdapat 29 chalet / homestay di sepanjang kawasan pantai yang dikenal pasti di dalam kawasan kajian.



Warisan Budaya: Kota Bukit Supai adalah tapak warisan binaan dan artefak yang terletak di seberang tapak Projek (jarak 500 m). Di dalam perairan Kawasan Warisan Negaral Tg. Tuan, terdapat beberapa bangkai kapal yang berasal dari Perang Dunia II.

Persepsi (tahap sokongan): Sebanyak 27.2% responden nelayan bersetuju dengan Projek. Bagi pihak berkepentingan yang lain, kira-kira 50% responden bersetuju.

Persepsi (tahap kesedaran): Majoriti responden (76.1%) mengetahui tentang Projek ini melalui penduduk kampung lain (58.5%) dan media massa (8.9%).



Penglibatan awam: Pihak berkepentingan telah menyetujui pelbagai masalah yang menjadi perhatian terutama bagi nelayan, termasuklah masalah pampasan, kehilangan mata pencarian dan persekitaran untuk ekosistem perikanan.

Trafik Marin: Trafik marin termasuklah kapal-kapal yang menuju ke kawasan operasi STS, *Linggi International Floating Transshipment and Trading Hub* (LIFT-HUB), Pelabuhan Kuala Linggi dan kapal-kapal nelayan. .



Trafik Darat: Kenderaan berat terhad kepada 1.66% daripada jumlah lalu lintas di jalan raya sekunder Jalan Sungai Baru / Kuala Linggi. Di jalan masuk Kg. Kuala Linggi, kenderaan berat terhad kepada 0.66% dari jumlah lalu lintas.

Guna tanah: Tapak projek adalah kawasan badan air yang tidak terganggu. Guna tanah dalam radius 5 km dari tapak Projek merangkumi kawasan pertanian dan perindustrian, kemudahan pelancongan, kawasan penempatan dan kemudahan awam.



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Penilaian Kesan



Kualiti Air

Fasa Pembinaan

- Peningkatan sedimen terampai
- Pelepasan logam berat dari sedimen
- Pelepasan air balast, pembuangan air buangan dari kapal laut, & tumpahan minyak

Fasa Pasca Pembinaan

- Perubahan kualiti air



Morfologi Pantai

Fasa Pembinaan

- Pengelodakan dan sedimen

Fasa Pasca Pembinaan

- Pengurangan/penstabilan hakisan



Kualiti Udara

Fasa Pembinaan

- Penambahan habuk



Hingar

Fasa Pembinaan

- Peningkatan hingar



Hidrolik Pantai

Fasa Pasca Pembinaan

- Perubahan arus dan ombak



Bakau

Fasa Pasca Pembinaan

- Pertambahan sedimen dan perubahan morfologi



Penyu

Fasa Pembinaan & Fasa Pasca Pembinaan

Kesan terhadap kawasan bertelur, peningkatan risiko pertembungan kapal, kesan dari pencahayaan antropogenik, pembuangan sisa pepejal, cecair dan air balast dan manusia

Fasa Pembinaan sahaja

- Kesan dari pengorekan, hingar dan getaran dan tempoat mencari makanan



Tuntung Laut

Fasa Pembinaan

- Kekeruhan, kematian, gangguan cahaya dan bunyi

Fasa Pasca Pembinaan

- Kesan hidraulik kekal dan kehilangan habitat



Ekologi Darat

Fasa Pembinaan

- Hingar dan gangguan visual



Avifauna

Fasa Pembinaan

- Gangguan hingar

Fasa Pasca Pembinaan

- Kehilangan habitat



Terumbu Karang

Fasa Pembinaan & Pasca Pembinaan

- Kehilangan habitat



Megafauna Lain

Fasa Pembinaan

Sedimen terampai, kebisingan dalam air, pertembungan bot dan tumpahan minyak

Fasa Pasca Pembinaan

- Kehilangan tempat mencari makanan



Buaya

Fasa Pembinaan

- Peningkatan bunyi bising, trafik, serakan sedimen
- Risiko pertembungan dengan buaya



Makrobenthos

Fasa Pembinaan

- Kehilangan habitat, pengurangan pencarian makanan dan biotumpukan

Fasa Pasca Pembinaan

- Perubahan habitat

Plankton

Fasa Pembinaan

- Kekeruhan
- Pelepasan logam berat semasa pengorekan

Fasa Pasca Pembinaan

- Perubahan kualiti air



Fauna Ikan

Fasa Pembinaan

- Pengurangan pencarian makanan

Fasa Pasca Pembinaan

- Kehilangan habitat



Rumput Laut

Fasa Pembinaan

- Kehilangan habitat

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Penilaian Kesan (sambungan)



Sosio-ekonomi

Fasa Pembinaan

- Kehilangan pendapatan kepada nelayan tempatan
- Kemasukkan orang luar
- Inflasi
- Peningkatan dalam perniagaan
- Risiko terhadap kesihatan dan keselamatan

- Kenaikan nilai hartanah
- Ancaman terhadap pelancongan, warisan budaya dan arkeologi
- Mengurangkan estetik

Fasa Pasca Pembinaan

- Kehilangan pendapatan kepada nelayan tempatan
- Mengurangkan estetik



Trafik Darat

Fasa Pembinaan

- Peningkatan trafik



Trafik Marin

Fasa Pembinaan

- Peningkatan trafik marin

Fasa Pasca Pembinaan

- Risiko kerana kewujudan penambakan

Langkah Pencegahan

Kualiti Air

Fasa Pembinaan

- Pemasangan ikatan perimeter dan tirai kelodak
- Kawalan anggaran tumpahan melalui pemantauan maklum balas
- Memilih sumber tanah yang mengandungi kandungan halus yang rendah
- Semua kapal beroperasi mengikut MARPOL 73/78 mengenai kumbahan.



Kualiti Udara

Fasa Pembinaan

- Penyemburan jalan masuk secara berkala
- Penimbunan, dll.



Hingar Ambien

Fasa Pembinaan

- Waktu bekerja terhad pada waktu siang
- Semua kenderaan dan mesin diservis dengan baik, dll.



Ekologi Terrestrial

Fasa Pembinaan

- Pengurusan sampah yang sesuai
- Pekerjaan dihadkan dalam kawasan tapak
- Program kesedaran pekerja



Avifauna

Fasa Pembinaan

- Mengurangkan tahap hingar
- Rondaan untuk kecederaan burung secara tidak sengaja
- Penubuhan pasukan tindak balas pengurusan hidupan liar

Habitat Batu Karang

Fasa Pembinaan

- Kawal sedimen yang terampai
- Menetapkan kawasan kerja dan rancangan pengurusan laut
- Tiada kematian di Tg. Tuan

Tuntung

Fasa Pembinaan

- Kerja pembinaan berhampiran pantai akan dilakukan di luar musim kemuncak tuntung bersarang
- Pengimbangan persekitaran - sumbangan dalam penyelidikan tuntung
- Menyumbang kepada strategi pemulihan spesies

RINGKASAN EKSEKUTIF

PENILAIAN KESAN KEPADA ALAM SEKELILING JADUAL KEDUA PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Langkah Pencegahan

Fasa Pembinaan

Penyu

- Pemasangan tirai kelodak
- Penambakan sewaktu keadaan cuaca yang tidak baik harus diberhentikan
- Pemulihan dan/atau peningkatan terumbu karang
- Terumbu tiruan yang direka untuk mengimbangi kehilangan kawasan berbatu
- Hadkan kelajuan kapal
- Pelaksanaan strategi pengurusan pencahayaan, bunyi dan getaran



Fasa Pasca Pembinaan

- Kajian untuk mengatasi jurang pengetahuan dan memahami potensi impak dicadangkan

Buaya

Fasa Pembinaan

- Tidak mengganggu bakau di luar kawasan tapak projek
- Perhati dan rekod kejadian pergerakan buaya di luar Sg. Linggi

Megafauna Lain

Fasa Pembinaan

- Cegah daripada mengganggu megafauna terutama semasa memasang cerucuk
- Mengurangkan risiko pelanggaran kapal – had kelajuan 5 knot dalam jarak 3 km dari kawasan kerja laut
- Kecederaan atau pelanggaran megafauna laut secara tidak sengaja di bawah rancangan tindak balas kecemasan

Sosio-ekonomi

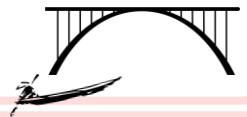
Fasa Pembinaan

- Menyediakan mekanisme aduan
- Penyediaan pusat tempat tinggal untuk semua pekerja pembinaan
- Latihan orientasi pekerja
- Pampasan sementara untuk nelayan yang dikenal pasti
- Mengakses ketinggian jambatan yang mencukupi untuk bot melintas

- Bantu mempromosikan penggunaan chalet tempatan
- Pengisian semula pasir bagi mengekalkan nilai pelancongan

Fasa Pasca Pembinaan

- Pampasan untuk kehilangan kawasan tangkapan ikan



Trafik Darat

Fasa Pembinaan

- Memudahkan peningkatan pergerakan dan kebolehpercayaan masa perjalanan serta keselamatan perjalanan terutama pada waktu puncak
- Pegerakan pekerja binaan di luar waktu puncak

Guna Tanah

Fasa Pasca Pembinaan

- Meneutralisasikan impak terhadap kawasan sensitif penerima

Trafik Marin

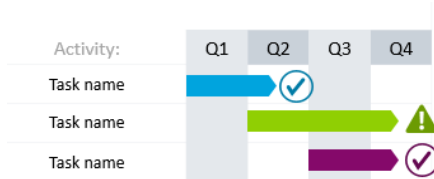
Fasa Pembinaan

- Semua pergerakan kapal di laporkan kepada ketua kapal (shipmasters)
- Pemasangan alat bantuan sementara
- Akur kepada Peraturan, Perundangan dan Garis Panduan bagi memastikan keselamatan Pelabuhan

Fasa Pasca Pembinaan

- Mengeluarkan notis kepada pelaut memaklumkan kewujudan kawasan penambakan
- Maklum Pusat Hidrografi Nasional Malaysia
- Pemasangan lampu navigasi yang mencukupi

Langkah Pencegahan dan Pengurangan Pencemaran



Jadual Fasa

- Jadual Projek pemasangan ikatan perimeter dan tirai kelodak di subplot penambakan Projek.
- Program kaedah jalan kerja kritikal

Jadual Mersyuarat Tapak

- Keutamaan bagi memulakan sebarang aktiviti pembinaan.
- Perbincangan terperinci mengenai skop kerja berkaitan P2M2, dll.



Penstabilan Pintu Masuk & Kawalan Perimeter

- Penanda pembinaan akan dipasang
- Laluan masuk dan keluar ke tapak
- Pelaksanaan P2M2 (seperti kemudahan mencuci, perangkap sedimen dll)
- Kerja penambakan akan dilengkapi dengan penampam untuk mengawal pembuangan sisa dari tapak

Pemeriksaan Tapak

- Periksa bahawa semua P2M2 telah dipasang dan dikendalikan dengan betul.
- Melaksanakan pemantauan prestasi.
- Rekod aktiviti pemeriksaan dalam buku log.
- Rekod pemerhatian utama dan kejadian ketidakpatuhan.



Pelan Pengurusan Sisa Buangan

Pelaksanaan pelan pengurusan sisa buangan secara berkesan untuk memastikan pengurusan pengumpulan, penyimpanan dan pelupusan sisa buangan yang dihasilkan di lokasi semasa fasa pembinaan.

Pelan Tindakan Kecemasan

Pelan Tindakan Kecemasan seperti berikut:

- Pelan Pertembungan Kapal
- Pelan Pencemaran Minyak
- Kecederaan kepada megafauna laut

RINGKASAN EKSEKUTIF

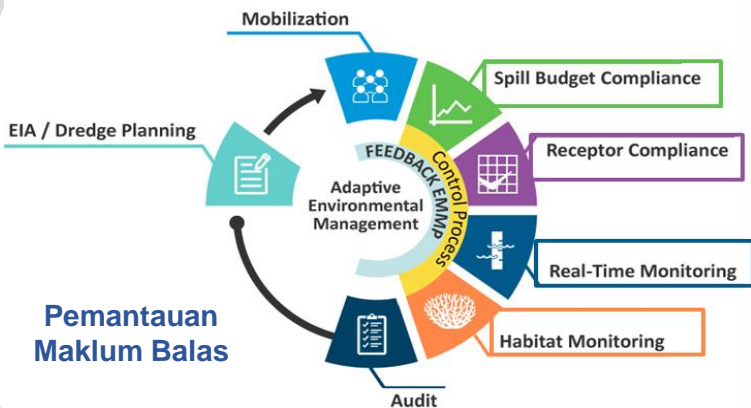
PENILAIAN KESAN KEPADA ALAM SEKELILING JADUAL KEDUA PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Cadangan Program Pemantauan

Pemantauan Prestasi

Standard Prestasi

- Lebihan TSS > 25 mg/L tidak lebih dari 5% masa; ATAU
- Lebihan TSS antara 10 hingga 25 mg/L tidak lebih dari 20% masa; ATAU
- Lebihan TSS antara 5 hingga 10 mg/L di antara 5 dan 50% masa tetapi tidak lebih dari 50% masa.
- Tiada kematian batu karang akibat Projek



- Pra-Pembinaan: menetapkan dasar dan menyesuaikan metodologi bagi pengorekan dan penambakan
- Pembinaan: memasukkan progress kawalan merangkumi komponen seperti pematuhan anggaran tumpahan, pematuhan reseptor, pemantauan waktu sebenar, pemantauan habitat
- Pasca Pembinaan: audit

Pemantauan Pematuhan

Pematuhan Peraturan Alam Sekitar

- Perundangan alam sekitar
- Standard dan garis panduan alam sekitar



Kualiti Air



Hingar



Kualiti Udara



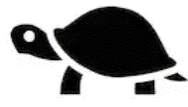
Penyu



Pengisian Semula Pantai



Sosioekonomi



Tuntung

Pemantauan Impak



Kualiti Air: 7 stesen (5 Marin and 2 muara); Kekerapan: Pembinaan – Bulanan; Pasca Pembinaan – 2 kali setahun, sehingga 1 tahun. Parameter: SKAMM

Profil Pantai: 15 transek; Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Setiap 3 bulan; Pasca Pembinaan – 2 kali setahun sehingga 1 tahun. Parameter: profil garis pantai



Pemantauan Impak (sambungan)



Fauna Ikan: 3 stesen. Kekerapan: Pembinaan – Setiap 3 bulan; Pasca Pembinaan – Setiap 3 bulan sehingga 6 bulan. Parameter: Kelimpahan (Abundance)

Penyu:

Bersarang: 8 pantai. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: Isi padu bersarang; Kejayaan bersarang; Kejayaan pengeraman (Incubation success).

Orientasi dan Taburan Anak Penyu : 4 pantai. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: Statistik pelepasan anak penyu; Taburan anak penyu.

Penjejakan Satelit: 5 penyu. Kekerapan: Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: Kesan tapak penyu selepas bersarang pada musim bersarang.

Pencahayaan: 4 lokasi. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Setiap 3 bulan sehingga 2 tahun. Parameter: Tahap cahaya persekitaran pada waktu malam.



Tuntung:

Bersarang: 5 stesen. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: Kawasan dan Taburan Bersarang.

Saiz Klac (Clutch Size): 5 stesen. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: Menentukan saiz klac telur tuntung.

Tanda dan Tangkap Semula: 5 stesen. Kekerapan: Pra-Pembinaan – Sekali; Pembinaan – Tahunan; Pasca Pembinaan – Tahunan sehingga 2 tahun. Parameter: kekerapan bersarang, tempoh antara bersarang, saiz populasi.



Habitat Batu Karang: 2 stesen. Pra-Pembinaan – Sekali; Pembinaan – Setiap 3 bulan; Pasca Pembinaan – Setiap 3 bulan sehingga 1 tahun. Parameter: Peratusan litupan dan spesies karang hidup, penyakit karang, dan kejadian pelunturan karang.



Kualiti Udara: 4 stesen. Kekerapan: Pembinaan – Setiap 3 bulan. Parameter: PM10 dan PM2.5

Hingar: 4 stesen. Kekerapan: Pra-Pembinaan – Sekali; Construction – Setiap 3 bulan. Parameter: Leq, Lmax, L90, L10



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA



Project Brief

- Project located off the northern shoreline of the State of Malacca, situated in proximity to the river mouth of Sg. Linggi
- Project footprint lies within the existing Kuala Sg. Linggi Port Limit where ship-to-ship (STS) liquid and gas cargo transfer occurs
- Project consists of reclamation, capital dredging, construction of access bridge and beach nourishment.

Statement of Need

Expansion of the existing Kuala Linggi Port activities to increase its capacity to meet future needs for seaport services.



Legal Requirement

First Schedule

15. Dredging
a) Capital dredging

Second Schedule

7. Land Reclamation
a) Coastal reclamation involving an area of 50 hectares or more
c) Reclamation for man-made island



PROJECT PROPONENT



LINGGI BASE SDN BHD

EIA CONSULTANT

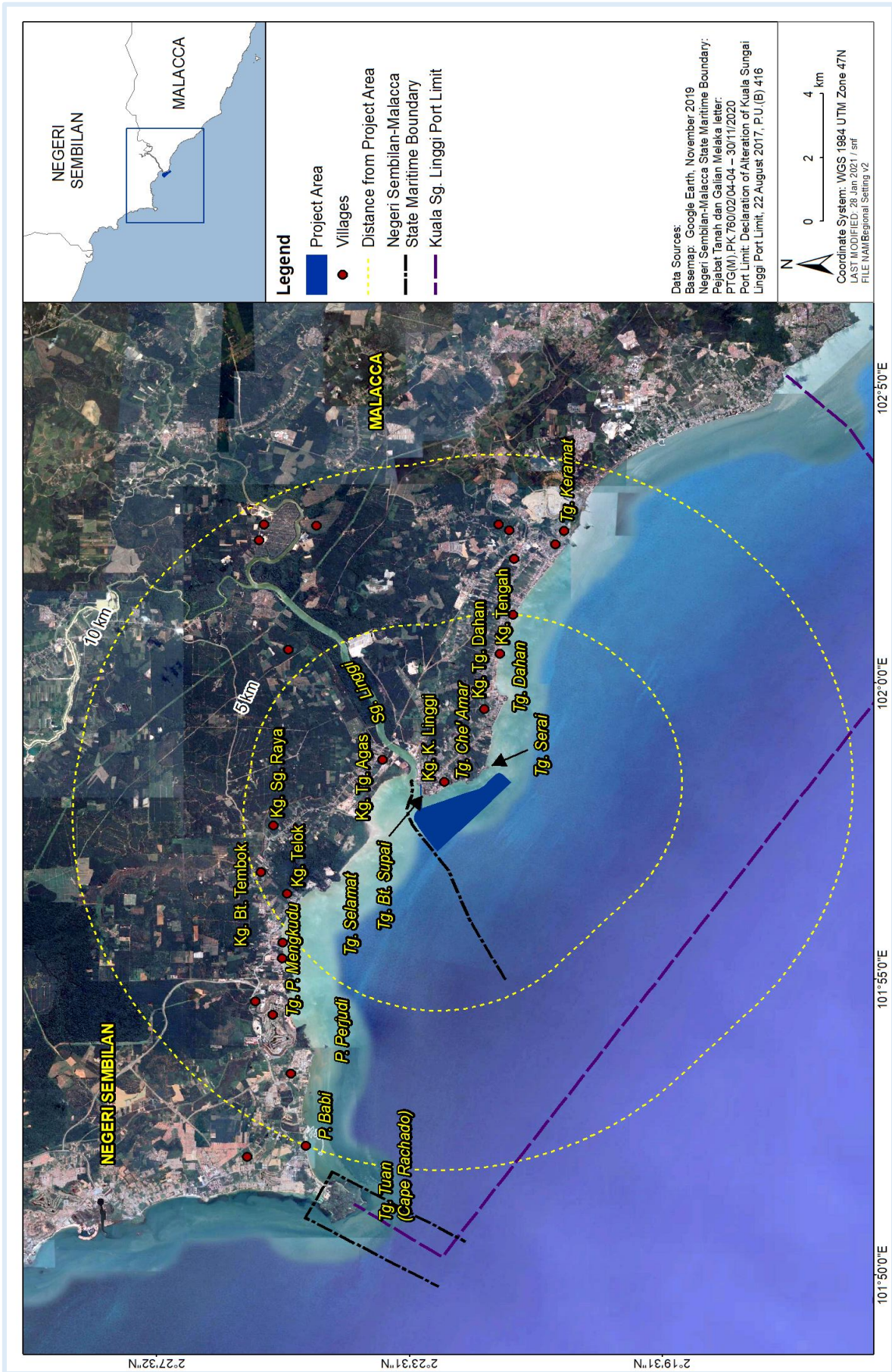


DHI WATER & ENVIRONMENT (M) SDN BHD

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Project Location



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Project Concept

- To cater for the development of the Kuala Sungai Linggi Port (KSLP) at a later stage
- The proposed KSLP will consists facilities such as an oil and gas storage terminal, a shipyard, fabrication yard, general cargo wharf, oil and gas terminal, administrative and institutional land uses, including land reserved for the Government (separate EIAs will be conducted for these components).

Project Component



Marine Reclamation

- 620 acres
- 300 m from shoreline
- 20.2 million m³ of sand

Access Bridge

- 764 m length
- Embankment 255 m
- Pile 509 m

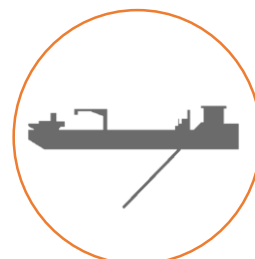


Beach Nourishment

- Between Tg. Che' Amar and Tg. Bt. Supai
- Placement of 30,000 m³ of sand

Capital Dredging

- 750,000 m³ dredged materials
- Dredge level of -13 m CD



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Project Activities

Pre-Construction

- Topographic and hydrographic survey
- Geotechnical investigation
- Detailed design and optimisation
- Agency approvals

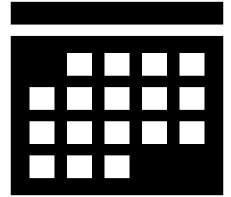
Construction

- Setting up construction infrastructure
- Reclamation
- Construction of access bridge
- Beach nourishment
- Capital dredging

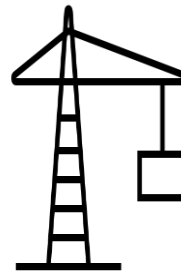
Post – Construction

- Presence of the reclamation and dredge footprint
- KSLP development components on the reclaimed land will be assessed under separate EIA(s)

Project Implementation



- Commence in April 2021
- Completion approximately 3 years later
- Phase 1 – Reclamation, access bridge and beach nourishment
- Phase 2 – Reclamation
- Phase 3 – Reclamation and capital dredging



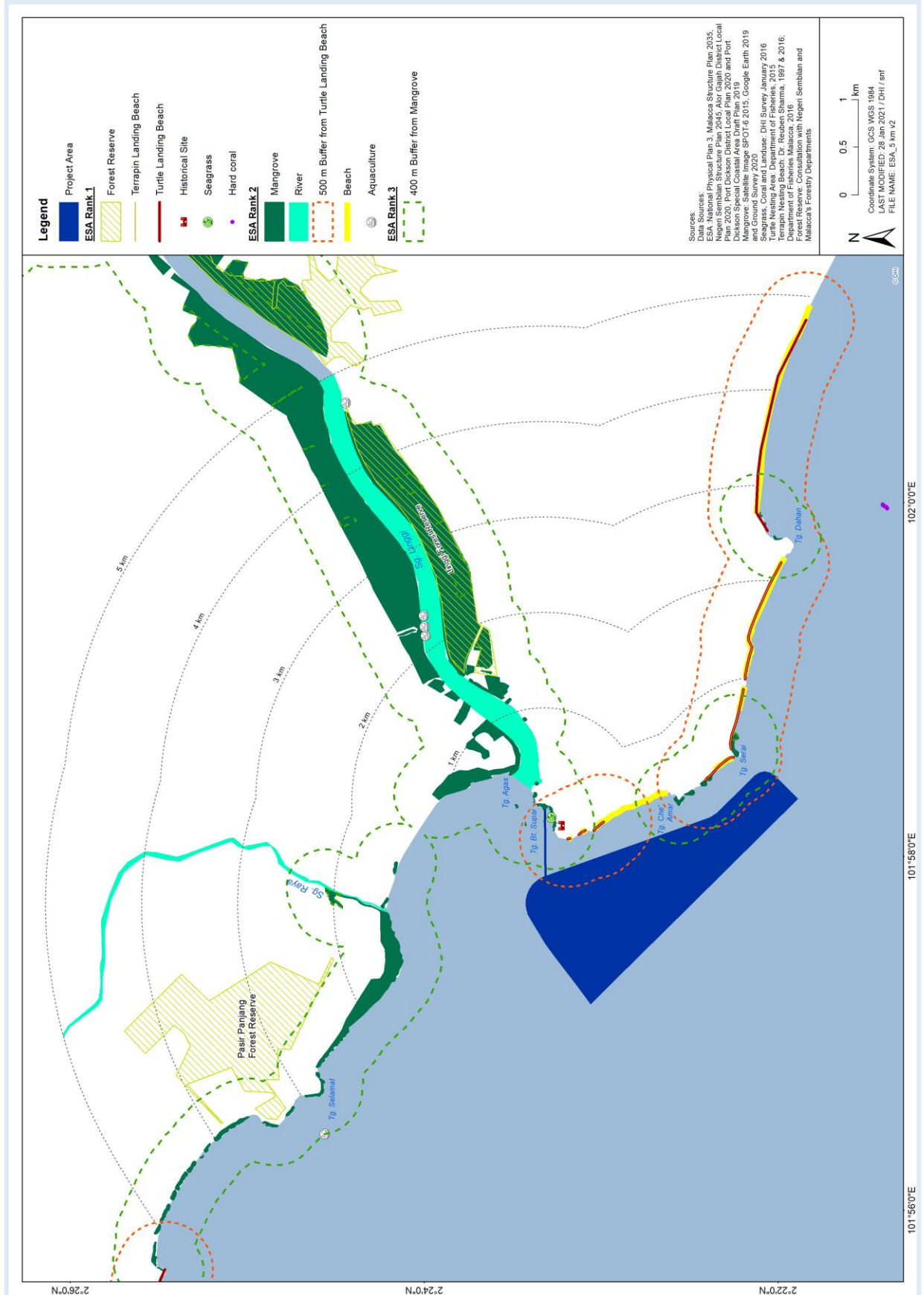
Project Abandonment

Construction waste materials and machinery will be removed

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

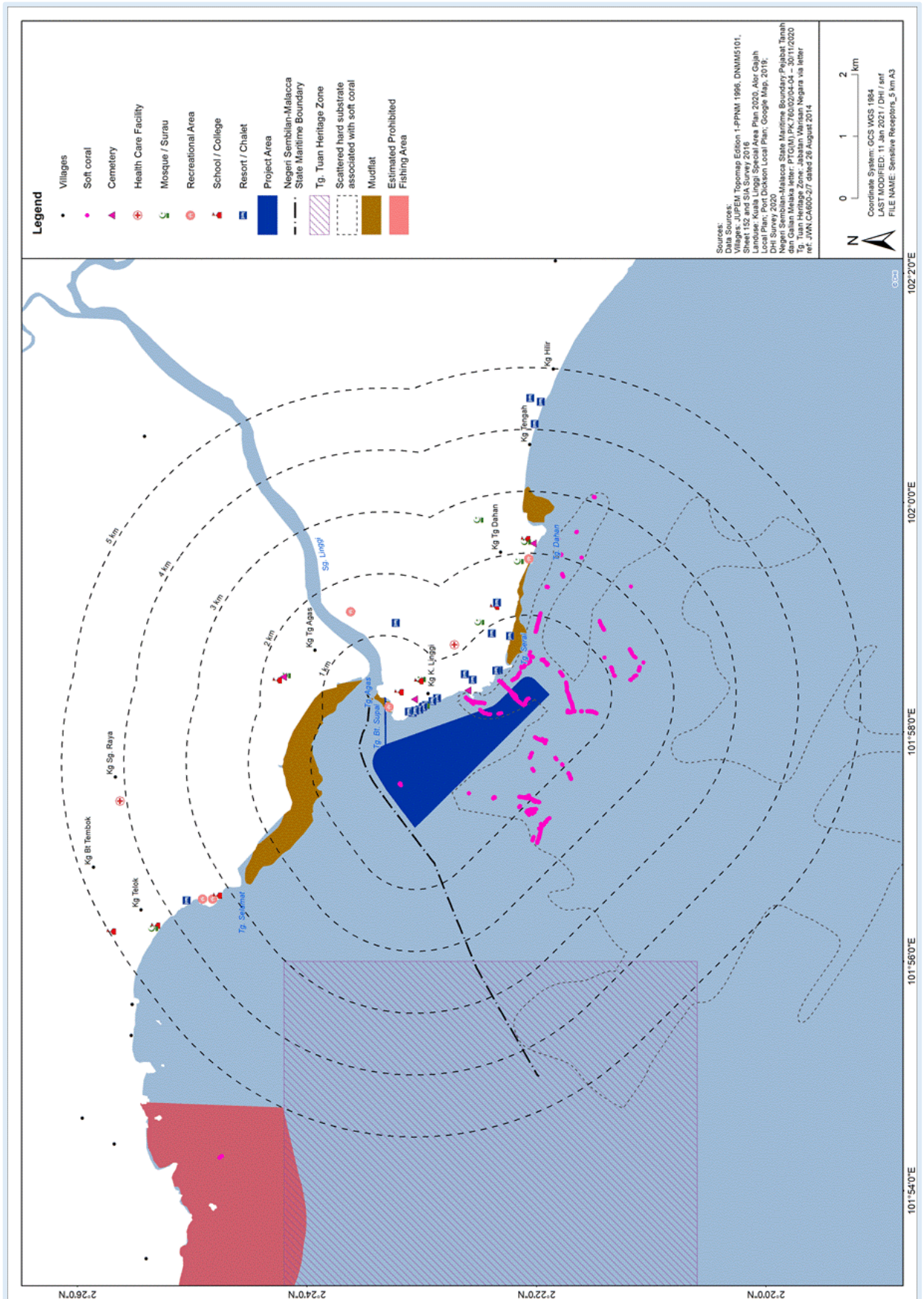
Environmentally Sensitive Areas (ESA) within 5 km from Project



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Sensitive Receptors within 5 km from Project



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Existing Physical-Chemical Environment



Meteorology: Wet seasons are Mar to May and Sept to Dec.

Hydrology: Catchment area is 1,270 km²



Coastal Morphology: Shoreline is lined with mangrove, revetment, eroded sandy beaches and rocky outcrops.

Bathymetric: Study area is located in the shallow tidal flat fronting Sg. Linggi.

Current: Weak current speed off Sg. Linggi with mean current speed below 0.3 m/s.

Waves: The SW monsoon waves are significantly higher than those occurring during other seasons.

Water level: The standard tidal range (MHWS – MLWS) is in the order of 2 m..



Hydrographic Condition



Water quality: Marine waters were high in unionised ammonia, aluminium, and faecal coliform. Estuarine waters has high turbidity, TSS, unionised ammonia, aluminium and faecal coliforms.

When compared to the 2016 data, phosphate and nitrate are no longer water quality issues.

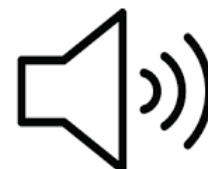
Riverine plume can visibly seen flowing to nearby coastal area.

Marine Sediment: Sediments are predominantly coarse. Higher amount of fines close to the river mouth. Arsenic was found to be elevated at a few stations.



Air quality: Compared to the previous survey in February 2016, it is noted that PM₁₀ concentration has increased at all stations (average increase of 22 µg/m³) while PM_{2.5} concentrations are slightly lower at one station. Nevertheless, all are within the MAAQS limit.

Noise: Daytime and night time noise level mostly increased when compared to 2016 data. Ambient noise levels during daytime were generally high whereas night time ambient noise level exceeded the limit at two stations. The predominant source at all stations was road traffic noise during daytime and wind and rain during night- time.



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Existing Biological Environment

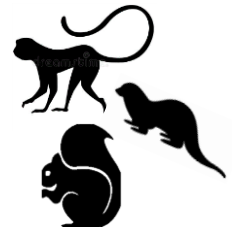


Terrestrial vegetation: Vegetation along the coastline within the study area is predominantly mangroves or mixed beach vegetation. Further inland, it is dominated by plantation areas, particularly palm oil. In other areas, where trees were observed, the physiognomic type is mostly shrubland or sparse shrubland.

Mangrove: Mangrove were mainly observed along Sg. Linggi, along shoreline from Tg. Che' Amar to Tg. Serai and from Tg. Mengkudu to Tg. Agas and patches at Tg. Bt. Supai and Tg. Dahan. Dominant species within are *Rhizophora* spp. and *Sonneratia* spp. Frequently observed species include *Avicennia* spp., *Bruguiera* spp. and nipah. Generally, mangroves appeared healthy, although occasional dead trees were also seen.



Terrestrial fauna: Most of the totally protected and protected mammals were found mainly within the Sg. Linggi mangrove forest which half of the area is protected under Linggi Forest Reserve gazettement. Except for long-tailed macaque which was mainly found along the shoreline of Negeri Sembilan within the mangroves and Pasir Panjang forest reserve.



Avifauna: Birds in the study area are relatively high in abundance and species richness. Common land-birds such as Common Myna, Peaceful Dove, Eurasian Tree Sparrow, Asian Glossy Starling and White-throated Kingfisher were frequently observed. However, there are low number of waders. Lesser Adjutant are the vulnerable species recorded on the mudflats at the northern side of Sg. Linggi rivermouth.

Painted Terrapins: In 2001, Sg. Paka, Sg. Setiu and Sg. Linggi were believed to be the only three rivers in Peninsular Malaysia with a high possibility of inhabiting more than 100 breeding females of *B. borneoensis*. A census conducted from 23rd July to 23rd August recorded 2 sightings of *B. borneoensis* nesting event (one successful nest at Tg. Dahan and one 'u-turn' at Pantai Cermin on 12th August 2020).



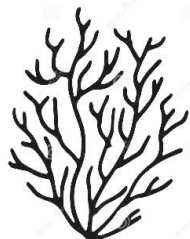
Crocodiles: Population density along the downstream stretch of Sg. Linggi was 12.5 ind./km and values of monthly corrected densities were between 5 and 24.9 ind./km (May-Dec 2015). The emergence of hatchlings and crocodiles of a size <50 cm indicates the existence of substantial areas of suitable habitat, as well as numbers of breeding adults, forming an important reservoir population of *C. porosus* in Sg. Linggi. Field survey in October 2020 along Sg. Linggi (~ 5 km) of one survey day during daytime recorded one juvenile crocodile.

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Existing Biological Environment (cont'd)

Seagrass: Seagrass patches are located between 18 m and 60 m from the beach at Tg. Bt. Supai embayment with a combined estimated area of 21 m². Seagrass species present are *Enhalus acoroides* (two larger patches) and *Halodule pinifolia* (small patch).



Coral Habitat: The area surveyed between Tg. Selamat and Tg. Dahan contained a patchy distribution (scattered and sparse approximately 3,150 ha) of rocky/hard substrate with associated soft coral (Octocorallia). A small patch of hard coral was also observed near to Tg. Dahan. At Tg. Tuan, a mixture of hard and soft corals was observed. The soft coral was primarily classified as 'poor' quality with 1% to 20% percentage cover while the hard coral was classified as either 'fair' or 'poor' quality with 10% to 40% percentage cover.

Sea Turtle: In Malacca, the most well-known sea turtle is the hawksbill sea turtle (*Eretmochelys imbricata*). However, Malacca waters are also home to migratory and developmental stage green turtles (*Chelonia mydas*). Sites that receive the most nests in Malacca are Pulau Upeh, Padang Kemunting, Kem Terendak and Tg Dahan. Reported annual nest counts have averaged 468 nests per year since 2006.



Other Megafauna: Based on available literature, dolphins have been spotted around Kuala Sg. Linggi (2014) and Tg. Tuan waters (2020). In 2009, Ginkgo-toothed whale (*Mesoplodon ginkgodens*), Indo-Pacific humpback dolphins (*Sousa Chinensis*) and Irrawaddy dolphins (*Orcaella brevirostris*) was sighted in the waters of Malacca and Negeri Sembilan.

Phytoplankton: Community was dominated by Ochrophyta, which is common in Malaysia; nine genus related to HAB were found (i.e. *Dinophysis* sp., *Ceratium* sp., and *Gymnodinium* sp.), but occurred in extremely low numbers.



Zooplankton: Community dominated by calanoid, *Bestiolina similis*, *Parvocalanus crassirostris*, and *Paracalanus* sp.



Macrobenthos: The density at the study sites are generally low which ranged between 112 ind./m² to 247 ind./m². Anthropogenic activities (i.e. maritime activities) may cause the benthic community is under pressure.

Fish Fauna: A total of 248 individuals of fish fauna were caught throughout the sampling, where 118 individuals (12 species) were caught during neap tide and 130 individuals (15 species) during spring tide. Overall, *Nematalosa nasus* or locally known as Ikan Selangut was the dominant species.



EXECUTIVE SUMMARY

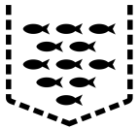
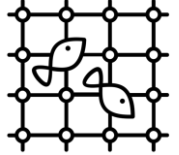
SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Existing Human Environment



Community Profile: 8 settlements within 5 km of the Project area; mostly comprised of lower income and middle literacy groups. There are 4 mukims (Kuala Linggi, Kuala Sungai Baru, Pasir Panjang, Linggi). Predominantly Malay. Main occupations are factory workers, general workers, shopkeepers, and fishermen. Out of 326 households, 76.4% are originally from the villages.

Fisheries: There are 396 full time fishermen. Fishing grounds are from Tg. Panchor (south of Project site) to the boundary of the prohibited fishing zone in Tg. Tuan. Majority of fishing vessel are using gill/drift nets.



Aquaculture: Sg. Linggi is an Aquaculture Industry Zone (AIZ). Small scale aquaculture industry in N. Sembilan rearing seabass and mussels. There is no registered aquaculture operation in Malacca.

Tourism: The sandy beaches adjacent to the Project area down to Tg. Serai. 29 chalets/homestays, located along the coastal areas identified within the study area.



Cultural Heritage: Kota Bukit Supai is a built and artefact heritage site located on the mainland across the Project site (500 m distance). Within the waters of Tg. Tuan National Heritage Area are several shipwrecks dating from World War II.

Perception (level of support): About 27.2% of the fishermen respondents agree with the Project. For other stakeholders', about 50% of respondents agree with the Project.

Perception (awareness): The majority of the respondents (76.1%) are aware of the Project through other villagers (58.5%) and mass media (8.9%).



Public engagement: Stakeholders have highlighted various issues of concerns especially for fishermen including compensation issues, loss of livelihood and environmental s to fisheries ecosystem.

Marine Traffic: Vessels going to the STS Transfer Operations, Linggi International Floating Transhipment and Trading Hub (LIFT-HUB), Kuala Linggi Port and fishing boats.



Land Traffic: Heavy good vehicle is limited to 1.66% of total traffic at the secondary distributor road access Jalan Sungai Baru/Kuala Linggi. At access road to Kg. Kuala Linggi, heavy good vehicle is limited to 0.66% of total traffic.

Land Use: Project site itself is an undisturbed water body. Land use 5 km radius of the Project site comprises agricultural and industrial areas, tourism facilities, human settlement areas and public facilities.



EXECUTIVE SUMMARY

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Impact Assessment



Water Quality

Construction Phase

- Increase in suspended sediment
- Release of heavy metals from sediment
- Release of ballast water, wastewater discharge from marine vessel, & oil spill

Post Construction Phase

- Changes in water quality



Coastal Morphology

Construction Phase

- Siltation and sediment transport

Post Construction Phase

- Reduction or stabilization of existing erosion



Air Quality

Construction Phase

- Increase airborne dust



Ambient Noise

Construction Phase

- Increase noise emission



Coastal Hydraulic

Post Construction Phase

- Change in current and waves



Mangrove

Post Construction Phase

- Increase sedimentation or morphological impact



Sea Turtle

Construction & Post Construction Phase

- Impact to nesting site, from anthropogenic lighting and human interaction
- Increase risk in vessel strike
- Discharge of solid, liquid and ballast waste



Painted Terrapin

Construction Phase

- Turbidity, mortality, light and noise

Post Construction Phase

- Permanent hydraulic impact and habitat loss



Terrestrial Ecology

Construction Phase

- Noise and visual disturbance



Avifauna

Construction Phase

- Noise disturbance

Post Construction Phase

- Loss in habitat



Coral Habitat

Construction & Post Construction Phase

- Loss of habitat



Other Megafauna

Construction Phase

- Suspended sediment
- Underwater noise
- Boat strike
- Oil spill

Post Construction Phase

- Loss of foraging habitat



Crocodile

Construction Phase

- Increase noise, traffic, sediment plume
- Risk of crocodile encounter



Macrobenthos

Construction Phase

- Loss of habitat
- Reduction in foraging
- Bioaccumulation

Post Construction Phase

- Change in habitat

Plankton



Construction Phase

- Turbidity
- Release of heavy metal during dredging

Post Construction Phase

- Change in water quality



Fish Fauna

Construction Phase

- Reduction in foraging

Post Construction Phase

- Loss of habitat



Seagrass

Construction Phase

- Loss of habitat

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Impact Assessment (cont'd)



Socio-Economics

Construction Phase

- Lost of income to local fishermen
- In-migration
- Inflation
- Increase in business
- Risk to health and safety
- Value of property increase

- Threat to tourism, cultural heritage and archeology
- Reduce aesthetic

Post Construction Phase

- Lost of income to local fishermen
- Reduce aesthetics



Land Traffic

Construction Phase

- Increase in land traffic



Marine Traffic

Construction Phase

- Increase in marine traffic

Post Construction Phase

- Risk due to the presence of reclamation

Mitigation Measures

Water Quality

Construction Phase

- Perimeter bunding & silt curtain installation
- Control spill budget through feedback monitoring
- Select source with low content of fines
- All vessels operate as per MARPOL 73/78 regarding sewage.



Air Quality

Construction Phase

- Regular spraying of access road
- Hoarding, etc.



Ambient Noise

Construction Phase

- Working hours limited to daytime
- All vehicles and machinery properly services, etc.



Terrestrial Ecology

Construction Phase

- Appropriate waste management
- Works to be confined to site
- Workers awareness programme



Avifauna

Construction Phase

- Reduce level of noise
- Patrol for accidental injury to bird
- Setup of wildlife management response team



Coral Habitat

Construction Phase

- Control suspended sediment
- Establish marine working area and management plan
- No mortality to corals at Tg. Tuan

Painted Terrapin

Construction Phase

- Nearshore construction works to be performed outside peak terrapin nesting season
- Environmental offset – contribution to terrapin research
- Contribute to species conservation strategies

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Mitigation Measures

Sea Turtle

Construction Phase

- Installation of bubble curtain
- Reclamation under unfavourable weather condition should be halted
- Coral reef restoration and/or enhancement
- Designed artificial reefs to compensate for loss of rocky outcrops
- Restrict vessel speed
- Implementation of lighting, noise and vibration management strategies



Post Construction Phase

- Studies to address knowledge gaps and understand potential impacts are proposed

Crocodile

Construction Phase

- Mangrove beyond project footprint to not be disturbed
- Observe and record incidences of movement of crocodile outside Sg. Linggi

Other Megafauna

Construction Phase

- Prevent from startling megafauna especially during piling
- Reduce risk of boat strikes – speed limit of 5 knots within 3 km of marine working area
- Accidental injury or strike of marine megafauna covered under emergency response plan

Socio-economic

Construction Phase

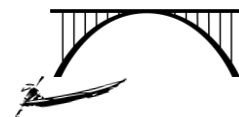
- Setup of Grievance Mechanism
- Central living quarters for all construction workers will be provided
- Worker's orientation training
- Temporary compensation for identified fishermen
- Access bridge height sufficient to allow boats to

pass through

- Help promote the use of local chalets
- Beach nourishment to retain their touristic value

Post Construction Phase

- Compensation for lost fishing ground



Land Traffic

Construction Phase

- Facilitating increased mobility and improved travel time reliability and safety especially during peak hours
- Mobilisation of construction workers outside of peak hours

Landuse

Post Construction Phase

- Neutralize impacts to ESA buffer encroachment to the receptors

Marine Traffic

Construction Phase

- All vessel movements under compulsory pilotage and SOP to shipmasters is required
- Installation of temporary aids
- Closely follow Rules, Regulation and Guidelines to ensure port safety

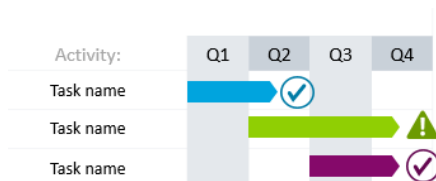
Post Construction Phase

- Issue notice to mariners informing presence of reclamation area
- Inform National Hydrographic Centre Malaysia
- Installation of adequate navigation lights

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Pollution Prevention and Mitigation Measures (P2M2s)



Schedule of Phasing

- Project schedule on bunding and silt curtain installation in reclamation subplots.
- Critical path method work program

Schedule Site Meeting

- Prior to start of any construction activity.
- Discuss in detail all relevant scope of work that have relevance to P2M2s, etc.



Stabilized Construction Entrance & Perimeter Control

- Construction markers to be installed
- Entrance and exits roads to site
- Implement P2M2 (i.e. washing facility, sediment trap, etc)
- Reclamation work to be equipped with hoarding to control discharges from the site.

Site Inspection

- Check that all P2M2s have been properly installed and maintained.
- Conduct performance monitoring.
- Record inspection activities in logbook.
- Record major observation and incidents of non-compliance.



Waste Management Plan

Implementation of waste management plan to ensure effective management of the collection, storage and disposal of waste materials generated on-site during construction.

Emergency Response Plan

Emergency Response Plan shall address at least the following:

- Marine collision
- Oil Pollution Emergency Plan
- Figure on vessel(s)
- Injury / harm to marine megafauna

EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Proposed Monitoring Programme

Performance Monitoring

Performance Standard

- Excess TSS > 25 mg/L for no more than 5% of the time; OR
- Excess TSS of 10 to 25 mg/L for no more than 20% of the time; OR
- Excess TSS of 5 to 10 mg/L between 5 and 50% but no more than 50% of the time.
- No hard coral mortality due to Project.



- Pre-construction: establish baseline and adjust dredging and reclamation methodology
- Construction: enters control progress which includes components i.e. spill budget compliance, receptor compliance, real time monitoring, habitat monitoring
- Post construction: audit

Compliance Monitoring

Compliance to environmental regulations

- Environmental legislation
- Environmental standards and guidelines



Water quality



Noise



Air Quality

Sea turtles



Beach nourishment

Socioeconomics



Painted Terrapins

Impact Monitoring



Water quality: 7 stations (5 Marine and 2 estuary); Frequency: Construction – Monthly; Post construction – Biannual, up to 1 year. Parameter: MMWQCS

Coastal Profile: 15 transects; Frequency: Pre-construction – Once; Construction – Quarterly; Post-construction – Biannual up to 1 year. Parameter: shoreline profile



EXECUTIVE SUMMARY

SECOND SCHEDULE ENVIRONMENTAL IMPACT ASSESSMENT PROPOSED RECLAMATION AND DREDGING FOR THE DEVELOPMENT OF PELABUHAN KUALA SG LINGGI AT PERAIRAN MUARA SUNGAI LINGGI, ALOR GAJAH, MELAKA

Impact Monitoring (cont'd)



Fish Fauna: 3 stations. Frequency: Construction – Quarterly; Post Construction – Quarterly up to 6 months. Parameter: Abundance

Sea Turtle:

Nesting: 8 beaches. Frequency: Pre-construction – Once; Construction – Annually; Post-construction – Annually up to 2 years. Parameter: Nesting volume; Nesting success; Incubation success.

Hatchling Orientation and Dispersal: 4 beaches. Frequency: Pre-construction – Once; Construction – Annually; Post-construction – Annually up to 2 years. Parameter: Hatchlings departing statistics; Hatchling dispersal.

Satellite Tracking: 5 turtles. Frequency: Construction – Annually; Post-construction – Annually up to 2 years. Parameter: Tracks of post-nesting turtles during season.

Lighting: 4 locations. Frequency: Pre-construction – Once; Construction – Quarterly; Post-construction – Quarterly up to 2 years. Parameter: Ambient light levels at night.



Painted Terrapins:

Nesting: 5 stations. Frequency: Pre-construction – Once; Construction – Annually; Post-construction – Annually up to 2 years. Parameter: Nesting distribution and site.

Clutch size: 5 stations. Frequency: Pre-construction – Once; Construction – Annually; Post-construction – Annually up to 2 years. Parameter: Terrapin eggs to determine clutch size.

Mark and recapture: 5 stations. Frequency: Pre-construction – Once; Construction – Annually; Post-construction – Annually up to 2 years. Parameter: nesting frequency, interesting interval, population size.



Coral Habitat: 2 stations. Pre-construction – Once; Construction – Quarterly; Post-construction – Quarterly up to 1 year. Parameter: percentage of live coral cover and species, coral diseases, and incidences of coral bleaching.



Air quality: 4 stations. Frequency: Construction – Quarterly. Parameter: PM10 and PM2.5

Noise: 4 stations. Frequency: Pre-construction – Once; Construction – Quarterly. Parameter: Leq, Lmax, L90, L10

