MANAGEMENT UNIT (MU) (LOCATION)	MANAGEMENT OBJECTIVES	MANAGEMENT STRATEGIES	ISSUE/IMPORTANCE/REASON	RESPECTIVE \RESPONSIBLE AGENCIES
MU01	Coastal Bund • Ensure sufficient mangrove cover	• Annual monitoring of mangrove cover from satellite image should be carried out. • Width of mangrove cover less than 150m means the bunds will have to be raised to prevent overtopping. • Width of mangrove cover less than 50m means protection works must be constructed on the bunds. • Mangrove loss can be overcome by constructing escarpment protection such as the type constructed along the coastline of Sabak Bernam, Selangor.	• Mangrove cover fronting the bund is important in preventing bunds from overtopping and damage from wave action.	• JPS
	• To keep record and update the bund levels. • To maintain safe bund levels and making sure that the bunds are in good condition. • Ease for bund improvement/repair.	• All bund levels must be above 2.91m LSD. Carry out annual monitoring of bund levels and top up bunds where necessary. o Monthly monitoring of the bunds. o Biannually bund level measurements • Carry out immediate improvement/repair on damaged and insufficient bund levels. • Check for mud lobster burrows. Where mud lobster burrows are allowing sea water to seep through the bund, the seepage must be plugged quickly.	• Insufficient information on the bund levels, for reaches that have coastal bunds. • Seawater overtopping the bunds during HAT and storm surge. • Bund damage due to storm surge, human activity and mud crabs.	

		• Monitor coastline movement annually using satellite imagery. • Where aquaculture ponds are located seawards of the bund, the seaward line of the ponds must be adequate protection against erosion and bund breach. Proper revetment must be constructed.	• Settlement of bund due to heavy vehicles.	
	Setback • Necessary deviations to allow for existing infrastructures and predicted movement of shorelines.	• Setback have been determined based on the coastal features and important infrastructure. Generally, the DID guidance of landward of the tree line 400m for mangroves and 60m landward of the Highest Astronomical Tide contour for sandy beaches is followed. However, deviations were necessary to allow for existing infrastructures such as roads and bunds where the authorities will be required to maintain the line. In such cases, the setback is placed landward of the infrastructure (see Appendix Bund Mangrove Cover and Setback). • The DSS should be used to determine the setback required for future developments.	• Allow for movement of the shoreline.	
	River mouths • Maintain river mouth for navigation to important fishing landing site	• The channel should be dredged to at least -0.5m below MSL to allow access for small sampans and fishing boats that are using the jetties. Dredging should be done every 5 years or when required (see Appendix Outlets Require Maintenance).	• Insufficient depth	
	Tidal Gates • Improve the flushing capacity and the function of the tidal gates	• One example of maintaining boat access is what is adopted at Sungai Pulai, Sabak	• Navigation – difficulty for the fisherman boats to	

		Bernam, where the fishing community maintain the channel by plying their boats along the channel to create propeller wash that agitates the mud and prevent consolidation. • Breakwaters at the outlets can be constructed to prevent sediments from entering the channels and create tidal prism that will aid in flushing during ebb flows.	manoeuvre in and out where places with tidal gates. • Insufficient flushing capacity leads to sedimentation in front of the tidal gates.	
	Sea Level Rise • Maintain and improve the usability and performance of the tidal gates • To make sure that developments along the coastal area are constructed away from flood prone areas. • Developments along the shoreline must take into account Sea Level Rise.	• Existing drainage systems will require improvement or adaptation. • Pumps maybe required to assist in evacuation of flood water. • Bund levels will have to be increased. • Determine practical setbacks along the coastal area. • To include the sea level rise value (aside from wind setup, storm surge and wave runup) in the calculation of the platform/finish level of a design.	• Tidal gate usability and performance • Coastal flooding	

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MU01	Marine Capture Fisheries • To ensure high standards of fish quality, enhanced food safety and nutritional value through provision of better fisheries infrastructures and facilities.	• Upgrade the fisheries infrastructure at respective fish landing points (Sg, Chennam, Sg Kota, Kuala Bagan Tiang, Sg Labu Bawah, Sg Betul Bawah, Tg Piandang, Sg Hujan)	• Lack of fisheries infrastructure at most fish landing points	• Lembaga Kemajuan Ikan Malaysia (LKIM)
	• To improve the navigation of fishing vessels at the affected areas.	• Undertake maintenance dredging with proper planning and mitigation measures	• Siltation problem at Sg. Chenaam, Sg. Kota, Kuala Bagan Tiang, Sg. Labu Bawah, Sg. Betul Bawah have prevented safe passage for fishing vessel during low tides	• JPS • Marine Department • Department of Fisheries
	Aquaculture • To minimize the potential of water quality degradation from aquaculture activities.	• Provision of proper wastewater treatment facilities at aquaculture farms to reduce discharge of untreated water directly into the river.	• Degradation of water quality due to the untreated wastewater discharge from brackishwater pond culture.	• Department of Fisheries

	• To promote sustainable aquaculture practice	• Regular maintenance of the wastewater treatment facilities. • Encourage aquaculture farmers to get myGAP certification		
	• To promote sustainable aquaculture practice.	• Promote programmes related to the restoration and replanting of suitable mangrove species • Prohibition of new development plans within mangrove areas. • Restoration of abandoned farms as an alternative to minimize the development of new aquaculture farms. • Reforestation of abandoned shrimp farms.	• Aquaculture activities or coastal modification contributes to mangrove degradation.	• Department of Forestry • Department of Fisheries • PlaNMalaysia Perak
	• To conserve cockle farming through protection of mudflat areas.	• Mudflats and natural spatfall areas gazetted as fisheries protected area. • Propose Aquaculture Industrial Zone (AIZ) for cockle farming.	• Lack of protection of the cockle farming activities within mudflat areas off Sg. Kota to Sg. Labu Bawah.	• Department of Fisheries
	Recreational Fisheries • To promote good fishing practices in recreational fishing activities	• Strengthen the surveillance and enforcement.	• Unregistered fishing boat for recreational fishing activities can lead to unsustainable fishing and safety issues.	• Malaysian Maritime Enforcement Agency

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MU01	• Promoting High Productivity Modern Agriculture	• Improving landing facilities for marine product and promoting sales as well as downstream industries	• Provide complete infrastructure facilities. • Allows fishermen to land their catch efficiently • Encourage downstream fisheries-related activities that add value to fishery products. • Using artificial reefs to create marine fish breeding regions, particularly for the advantage of coastal fisherman. The reef provides a haven for baby fish as well as a rest stop for larger fish. • Restore and conserve marine habitats that have been degraded by fishing and natural disasters. • Provide fish and other aquatic species with breeding places and nurseries.	• Department of Fisheries Malaysia • Department of Agriculture • Majlis Daerah Kerian
	• Mitigating Flood Risk through Integrated Management	• More holistic and comprehensive river basin management	• The data and information will be collected and frequently updated to aid in the monitoring of the River Basin, which will include factors such as hydrology, environmental cleanliness, and others. • Improving flood control efficiency	• JPS

	• Preserving and Controlling Environmental Quality for Ecological Balance	• Management of Environmental Sensitive Areas (ESAs)	• Natural assets of different properties need to be integrated for development planning and control purposes. • The National Physical Plan 3 and the National Policy on Biological Biodiversity emphasize the conservation of natural resources because natural resources are national heritage assets that must be protected.	• Perak Forestry Department • Majlis Daerah Kerian • Perak State Government

Forest accounted for nearly half of land use in MU01, followed by agriculture. Forest-related issues includes encroachment of economic activities, as well as the issue of ambiguous forest boundaries and the gazettement of the forest reserves. It is also crucial to include strategies on controlling development activities based on ESA to clarify on which land use activities are permitted or prohibited in the ESA. This is due to the presence of an IADA Kerian area in the MU01 area, which is classified as an ESA Level 1 and one of the national food security areas.

The agriculture sector in MU01 can be improved and promoted towards a high productivity modern agriculture by improving the existing infrastructures and facilities, and usage of technologies, to efficiently produce and manufacture the product. In addition, insufficient fisheries infrastructure at most fish landing points and unavailability of a proper wastewater treatment facility for aquaculture activities are also key issues which need to be reviewed and managed

MANAGEMENT UNIT (MU) (LOCATION)	MANAGEMENT OBJECTIVES	MANAGEMENT STRATEGIES	ISSUE/IMPORTANCE/REASON	RESPECTIVE \RESPONSIBLE AGENCIES
MU01	Mangroves • To protect, conserve and rehabilitate the mangrove areas. • To facilitate mangrove regeneration by implementation of appropriate tools and methods.	• Gazettement of mangroves areas as Permanent Forest Reserve at state land mangrove forests. • Rehabilitation, restoration and replanting of suitable mangrove species at the affected areas.	• Mangrove serves various ecological importance such as providing protection and habitat for a wide diversity of aquatic species of different taxonomic groups. • Degradation of mangroves area at some part within Perak coastline due to the coastal erosion.	• Department of Forestry • Land Office • PlaNMalaysia Perak • Department of Fisheries
		• Promote programmes related to the restoration and replanting of suitable mangrove species. • Provision of buffer zone between mangrove and development areas.	• Potential mangrove forest degradation due to coastal and aquaculture developments	
		• Restoration of abandoned farms as an alternative to minimize the development of new aquaculture farms. • Reforestation of abandoned shrimp farms.		

	Mudflat • To protect and conserve the mudflat areas.	• Minimize coastal developments in respect to mudflat areas	• Coastal development within Perak coastline possesses adverse impacts towards adjacent mudflat areas.	• Pejabat Tanah dan Galian (PTG) Perak
		• Mudflats and natural spatfall areas gazetted as fisheries protected area. • Protect the mudflat areas due to its importance as cockle farming area.	• Mudflat areas serve as important grounds for cockle farming.	• Department of Fisheries

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MU01 (Ban Pecah)	• To control the tourism development and activities along the tires of Pantai Ban Pecah	• Enforcement of car-free policy along the tires • Introduction of community-based agrotourism to the surrounding villages • Development of parking area in the villages	• Developing tourism activities around the tires increasing crowd especially as the road along the tires is too small	• JPS • Majlis Daerah Kerian • Tourism Perak • Tourism Malaysia

MANAGEMENT UNIT (MU) (LOCATION)	MANAGEMENT OBJECTIVES	MANAGEMENT STRATEGIES	ISSUE/IMPORTANCE/REASON	RESPECTIVE \RESPONSIBLE AGENCIES
MU01	**Wastewater discharge** • Control of untreated discharge from the agriculture areas such as irrigation canal, and discharge from aquaculture ponds. **Fertilizers and Pesticides** • Control the usage of synthetic fertilizers and chemical pesticides. **Conservation of the Mangrove Forest Areas** • Stop the deforestation of mangrove areas. Enhance mangrove replantation and rehabilitation of decaying mangrove forests. • Rehabilitation of abandoned aquaculture ponds.	• Increase the awareness on the importance of Good Agricultural Practices (GAP). GAP Certification will assist to enhance the traditional practices to be more sustainable. *Pewartaan Kaedah-Kaedah Perikanan (Akuakultur Perikanan Darat*) will also be introduced by the Department of Fisheries. • Provision of Competent Person to operate the effluent treatment systems for the agriculture and aquaculture activities. • Promote the use of environmentally friendly and biodegradable fertilizers and pesticides. Enhance the implementation of biological control for pest control. • New aquaculture and agriculture activities that fall under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015 must submit the EIA report to the Department of Environment for approval. • New aquaculture and agriculture activities that do not fall under the Environmental Quality (Prescribed Activities) (Environmental Impact	• The water quality status shows that most of the water quality index (WQI) parameters at the estuaries exceeded Class E1, hence the moderate and poor WQI. Parameters of concern include nitrate, phosphate and faecal coliform. • This could be largely due to the untreated discharge from the agriculture and aquaculture activities that contains residues from the use of fertilizers and pesticides. • Mangrove forests are being exploited via land conversion or reclamation for the development of agriculture, aquaculture, urbanization and infrastructure. • The conversion of mangrove to other uses affects the habitat that depends on the mangrove	• Department of Environment • Department of Agriculture • Department of Fisheries • Department of Forestry • Local Council

		Assessment) Order 2015 shall submit their development proposal to the Local Authority and conditions on discharge should be imposed on the operators. • Existing aquaculture ponds that are found to cause pollution by discharging untreated wastewater shall be warrant with a stop work order.	ecosystem to survive and in the long run will also affect the biodiversity in the area.	