Technical Assistance Consultant's Report

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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

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The National Port Directions – Volume 1 (Part 4)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

Rotterdam, The Netherlands

For Sri Lanka Ports Authority

Asian Development Bank

Category	Issue	Severity
Equipment	Installation of 3 gantry cranes from UCT at JCT berths I-II	Medium
Equipment	Technical and financial assessment on the feeder cranes at JCT I-II	Medium
Equipment	Scrap/amortisation of old tractors and trailers	Medium
Equipment	Over a period of time, the RTG equipment fleet need to be upgraded when additional investment for new RTGs and/or replacement of RTGs is required	Medium
Operations	Truck flow direction should be changed back into a one-directional flow	High
Logistics	Expansion of the gate complex for import/export containers	High
Systems	Upgrade of the Terminal Operating System (TOS) to N4 version	High
Grain & Animal Feed Activities		
Infrastructure	Quay wall PVQ is deteriorated	Low
Infrastructure	CD -9.0m water depth is insufficient for large bulk carriers	High
Infrastructure	CGE Animal Feed quay warehouse is deteriorated (abandoned)	Medium
Equipment	Grain operations carried out with 2 suction cranes with substandard performance (240t/hr)	Low
Equipment	Animal feed operations carried out with an inefficient belt system to a newly developed warehouse (240 t/hr)	Low
Berth	Berth occupancy is too high, causing delays.	Medium
Cement		
Infrastructure	CD -11.0m water depth is insufficient for large bulk carriers	Low
Infrastructure	200m quay is insufficient for large bulk carriers	Low
Equipment	Discharge rate is substandard	Low
Berth	Berth occupancy is too high causing delays.	Medium
Fertilisers		
Equipment	Mobile equipment lacks efficiency	Low
Liquid Bulk		
Infrastructure	Maximum vessel LOA is insufficient to accommodate large liquid bulk vessels at Dolphin jetty	Medium
Infrastructure	Pipelines to refinery are outdated	Medium
Infrastructure	A connection between Kollonnawa tank farm and Muthurajawela tank farm should be created in future	Medium
Infrastructure	Sapugaskanda oil refinery outdated; needs to be revamped or demolished and newly built at more suitable location	High
Infrastructure	A LNG handling capacity for the envisioned Kerawalapitiya power plant should be planned for	High
Infrastructure	In case dolphin jetty is removed due to north port development new refined product jetties should be catered for	Medium
Warehousing Logistics		
Logistics	Inefficient use of gate infrastructure, due to a substantial number of manual handlings and lack of automation.	High

Category	Issue	Severity
Logistics	The complete logistic chain need to adapt a 24-hour operational scheme to better distribute truck arrivals	High
Infrastructure	Transit sheds are used as warehouses but are not adequately equipped to handle the MCC and LCL cargoes. Additionally, layout / spacing of the transit sheds is not suited for the current operations.	High
Operations	Operations are carried out through manual documentation.	Medium
Equipment	Equipment is outdated and in poor state.	Medium
Systems	There is a lack of an efficient automated warehousing system.	Medium
Environment		
Organisation	The organisation has no department which coordinates, monitors and controls environmental issues	High
Emission Measurements	SLPA has no emission measurement system installed, hence the actual emissions cannot be measured	High
Health and Safety	Occupational Health & Workers safety is very important but, safety guidelines are not adequately implemented, monitored and enforced. At the terminals no specific hats, jackets and shoes are being used. Several terminals can be regarded as unsafe as movement of personnel and heavy traffic often coincide.	High
Port equipment	The majority of SLPA equipment is diesel based. Hence the emissions from the organisation is subject to improvement.	High
IT systems on revenue stream		
General	Manual processes and paper based approvals cause high administration and time consumption	High
TOS	The TOS of JCT (Navis Sparcs 3.10 and Navis Express) are outdated and do not support modern yard utilisation, real time yard planning and web based applications, GPS and modern gate applications	High
TOS	TOS system to provide a dashboard management system with relevant management information (productivity and performances)	High
TOS	Ability to upload files and amend records within the permitted timeframe	High
TOS	System should be able for to bill activities directly on handlings and storage and share the invoice lines with the finance system.	High
TOS	Babplie files often have errors leading to communication, corrections by shipping agents	High
TOS/ harbourmaster	Berth planning system to be shared between container terminals and harbourmaster and linked to scheduling system of vessels on calendar planning	High
Gate automation	JCT has no gate automation, once TOS system is updated OCR gate systems become feasible (OCR and automated truck driver passes).	High
Damage control	Equipment Interchange Reports (EIR) are made manually. These reports lack photo's. Accident reports and claim handling is subject to become more efficient through OCR scanning.	Medium
Harbour master	Tug and pilotage recording and invoicing is subject to manual registration.	High
Harbour master	Ship registry, berth planning, mooring and de-mooring is not integrated with invoice recording. A Harbour Information Management System (HaMIS) is required integrating the ship registry file with actual ship history call records. The ship registry file is to be linked with the international ship file from IHS/Fairplay or Clarksons.	High

Category	Issue	Severity
Harbour master	HaMis system is lacking and planning on tugs and pilots including statistical data should be provided from HaMis to a management web based dashboard. Turnaround times to be integrated into the dashboard with information provided by the TOS systems (productivity & performances)	High
Warehouse	The warehouse LCL system is a manual driven process, no automation available (no barcodes scanning, no receipt alerts, no damage control systems, no track and trace)	High
Single window	There is no single data window for port users. Approvals in the information chain are based on manual procedures and stamped documents. Communication in the process consists of several rounds via phones and even by fax. System should share specific and allowed data between terminal operators and management information systems	High
Single window	Publications on procedures, rules and practices	High
Legal	Contract management system with alerts should be linked with TOS to respond effectively on disputes	Medium
Payment control	Systems to be linked with unrestricted Payment Gateway and Pay online and submit digital receipts.	Medium
IT systems on costs stream		
CRM	A Customer Relation Management system is lacking.	High
Manual document management	The manual document management system should be digitalised to avoid business based on hard copies.	High
Shift planning & rostering	Shift planning and rostering is done on a manual basis whilst services have to offered 24/7 optimisation is required in this respect.	Medium
WIFI networks	WIFI networks are lacking at various locations	High
Cable internet	Cable internet is often not reliable causing file transfer to fail	High
Customs		
IT	Asycuda World is able to handle E-declaration and uses HS classification codes for all commodities	Low
IT	They apply a Single Administrative Document (SAD) comparable to many developed countries	Low
IT	Asycuda World is able to handle electronic payments, yet the business is often still cash based	High
IT	Too limited consignees and shippers use the ability to do electronic declarations.	High
IT	Electronic clearance is not yet integrated in a Customs single window despite using the SAD	High
Gatepass	The Gatepass procedure is a manually intensive procedure which also involves wharf clerks to run around the trucks at main gate (safety issue). The original gatepass, the sealing and the issue of a new gatepass in all is rather a time consuming procedure.	High
Gate efficiency	The Main gate handles about 1 container each two to three minutes.	High
Logistics	High traffic queues of over 5 km are present at several days in the week. Next to manual procedures at the Main gate also the congestion in the city and in front of the inspections yards is causing this queue. Often the queue in front of the inspection area is all the way, from South Port to Grayline II.	High
Logistics	Inspection areas are scattered over several sites, often not easy accessible due to traffic. The scattered locations cause sub-optimal use of resources and planning. Customs is not	High

Category	Issue	Severity
	able to control the truck flow as consignees themselves plan the truck move to the inspection areas.	
Green line	A few shippers and consignees have been appointed to the green line which allows the container to pass directly without standard checks. Unfortunately, only a small part of the full container loads gets the green line label, resulting in many inspections still today.	High
Inspection	The total capacity on inspection is limited to about 1,000 containers per day.	High
Scanning	Customs likes to implement 100% scanning (today about 70%). Scanning would increase the daily capacity of inspecting containers which is today limited to about 1,000 Containers per day. Today the scanning at the port is limited by only two mobile scanning trucks	High
Detention	Customs has own detention areas near the inspection sites. Also, in the port there are warehouses with goods under detention. The issue is here that these goods are not moved our frequently. Sometimes as auction are planned. The storage space in the port occupied by is Customs is for them free of charge. This space is however very valuable for the port and should be cleared if possible.	High

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Colombo:

SP1. **JCT Modernisation Plan –** A modernisation plan must be developed for JCT, to enable the terminal to continue performing container handling operations safely and reliably over the coming years, after which the container activities are to be phased out from the JCT location.

SP2. **Dedicated berth for grains and cement –** The dedicated berth can solve immediate sea side operations bottle necks and the accompanying depth issues.

SP3. **PVQ Upgrade Plan –** To handle bigger vessel dredging works might dredging if possible is needed.

SP4. **Sapugaskanda oil refinery -** Sapugaskanda oil refinery is in poor state and operates near densely populated areas. As such, the oil refinery may need to be revamped and/or relocated.

SP5. **LNG Storage Facility -** An LNG handling and storage facility is to be developed, to serve the envisioned Kerawalapitya LNG power plant and enable LNG bunkering activities in the port. A floating LNG storage vessel with regassification units on board is recommended. Such a solution would reduce the need for LNG related structures ashore. The pipeline connection to the powerplant should take into consideration the future location of North Port.

SP6. **UCT Transformation Plan –** A plan should be developed to guide the transformation of UCT towards a general cargo facility, as it is expected that container activities will be phased out in the short term (2020).

SP7. **An adequate passenger terminal**, with adequate berthing space and a modern passenger building, is to be developed. The preferred location for this development is on the BQ (once the CFS activities have been relocated to the South Harbour). An adequate facility will also enable an efficient passenger arrival process.

SP8. **Port Gate Upgrade Plan**, including an expansion of the current main gate from 3 in-lanes and 3 out-lanes to 5 in-lanes and 5 out-lanes, and a new gate complex that directly connects the South Harbour to the PAEH.

SP9. **BQ Warehousing Relocation Plan –** Current Warehouses on BQ need to be relocated to ensure continuation of operations. Additionally, new equipment needs to be procured and a modern Warehouse Management System needs to be adopted.

SP10. **Mechanical and electric workshops. –** Due to the PAEH project, a number of buildings need to be relocated.

SP11. **The resettlement of underutilised buildings**

SP12. **Widening of the port access road -** Port road should be widened to a 6-lane road. In case the PAEH, which will run above the port road, hampers widening of the port road at a later stage, the widening should be carried out before the PAEH is completed.

SP13. **Port Gate Automation –** Automation of the gate process is an absolute necessity when dealing to achieve port efficiency and alleviation of congestion.

SP14. **PAEH Simulations –** Traffic simulations are required to help shape the design characteristics of the PAEH.

SP15. **PAEH Development -** Development should proceed as planned by RDA, with SLPA input on construction issues, ramp locations, and gates locations.

SP16. **Securing Future Rail Development Path –** A path for optional future rail development towards south port should be secured.

SP17. **Port Community System –** Port Community System to help data exchange and paperless environment in the port.

SP18. **North Port development –** A feasibility study on North Port development is required including the impacts on the Kelani river outlet.

Colombo Port development plan

In this document the information that follows is an abstract from the Port Colombo Development Plan, which can be assessed for more detailed information.
The table below summarizes the capacity requirements for each of the commodity groups, taking into consideration the forecasted demand and planned short-term capacity increases/decreases.

Table 5-2 Capacity Development Requirement Colombo

Commodity	Capacity Development Requirement
Containers	**2025** – By 2025, 883m of additional quay is required. **2030** – By 2030, 1,735m of additional quay is required, including the 883m that is required by 2025. **2050 –** By 2050, 8,075m of additional quay is required, including the 1,735m that is required by 2030
Dry Bulk	**2025 –** In the immediate future, cement operations need a dedicated berth with a depth of 13.5m, to accommodate a design vessel with a draft of 12.5m. **2030 & 2050 –** Stabilisation of demand, no additional capacity needed.
Liquid Bulk	**2025** – LNG handling and storage facilities are required immediately to avoid operational delays of the new gas-fired power plant. Additionally, new refining capacity is required and the old pipelines need to be renewed. **2030** – Possible relocation of the dolphin jetty, in case of North Port construction and operations. **2050 –** No additional capacity requirements.
General Cargo	**2025 –** Development of JCT berth 1 for general cargo. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo. **2050 –** No additional capacity needed.
RoRo	**2025 –** UCT needs to be transformed into a dedicated general cargo and RoRo facility. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo. **2050 –** No additional capacity needed.

In order to meet the future Base Case capacity demand, the following two port layouts have been developed:

- South Port Max – The South Port Max design is based on the SLPA concept of the current South harbour basin development. The "South Port Max" concept incorporates this design with a wave protection on the north side of the port. This wave protection can be expanded to a break water if expansion of the port area is needed. This concept includes the extension of the current south port break water. In contrast to SLPA concepts, the envisaged West Container Terminal I and West Container Terminal II should have a quay length of 1,400 m, in order to enable accommodation of 3 mega vessels simultaneously.
- North Port Large – The North Port Large option creates the necessary space through a design that is based on the original SLPA North Port concept. Besides meeting cargo capacity demand, the development option will offer sufficient space for logistics development near the quay side. As the western breakwater is not extended, the angle of the northern breakwater is adjusted to bring it in line with the western breakwater. An underwater guide pier should direct sedimentation from the river estuary further to the north.

The figures below visualise the two long term development layouts.

Figure 5-2 Colombo Long Term Design - South Port Max

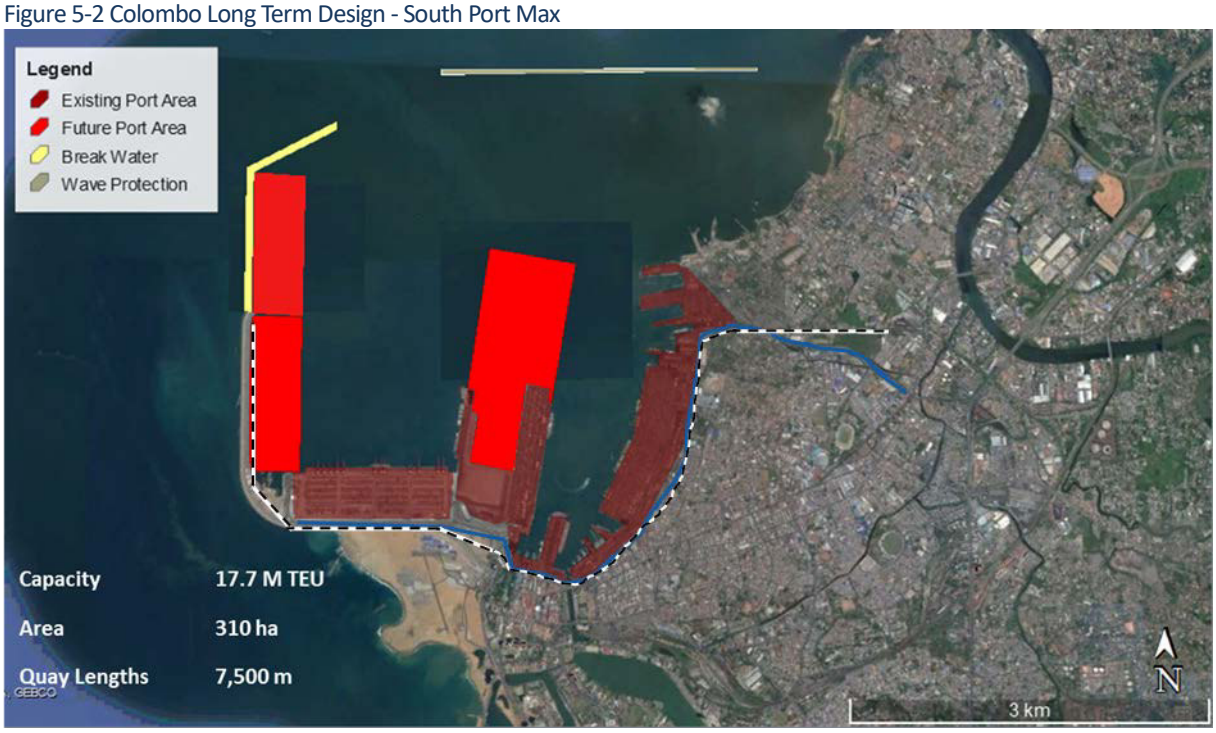
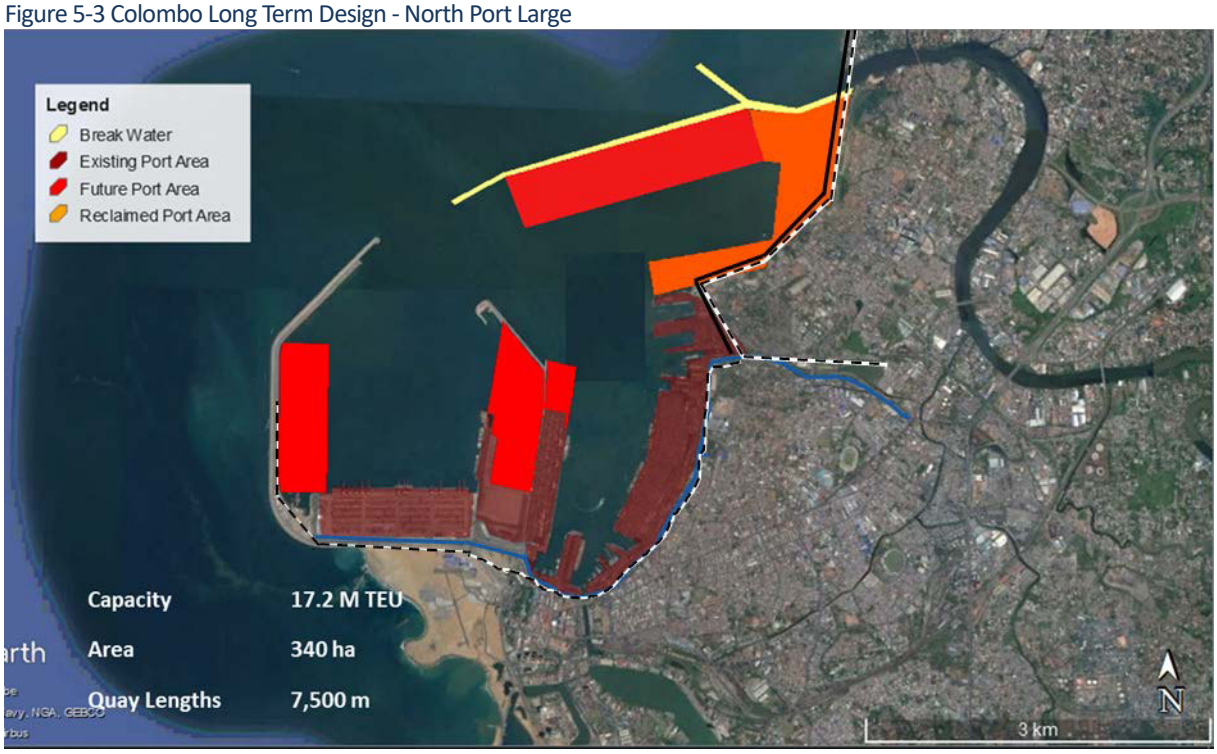


Figure 5-3 Colombo Long Term Design - North Port Large



In order to identify the preferred development option, a multi criteria analysis has been carried out. The table below summarizes the scores of the two development options; based on these scores, the South Port Max design is selected as the preferred long term development plan for Colombo Port.

Category	Score South Port Max	Score North Port Large
Capacity creation	**0.9**	0.6
Development flexibility	**2.2**	0.4
Terminal & port aspects	0.6	**1.4**
Manoeuvrability	**1.3**	0.7
Social & environmental impact	**1.4**	0.6
Final Score (weighted average)	**6.4**	**3.7**

In order to develop the port in line with increasing demand, a phased approach has been adopted towards the final 2050 South Port Max design. Specifically, additional layouts have been prepared for the short term (2025) and the medium term (2030). These two intermediate phases are visualised in the figure below.

Figure 5-4 Colombo South Port Max Phasing - 2025 (Left) and 2030

Potential of North Port development

South Port Max layout is based on the base case scenario in 2050 in the cargo forecast. North Port development is required only when unforeseen developments needs (or high case situation) emerge in the future. North Port development requires comprehensive technical and operational considerations, including vessel manoeuvring, water calmness in the basins, siltation, sand drift, flood- and river flows to determine its alignment (angle with the coast line) and layout. Some potential development options are preliminary assessed; these options are presented in the table below. Each option has its characteristics and of which pro and cons needs to be assessed during detailed studies.

Category	Assessment & Discussion Design		
	Energy Hub Concept	JICA Recommendation	SLPA Concept
			

Category	Assessment & Discussion Design		
Terminal & Ports Aspects	Aims at energy hub (liquid bulk) combined with containers, general cargo, RoRo and logistics	Aims at liquid bulk, containers, multi purpose and logistics through an island development	Aims at containers and liquid bulk with less space for logistics
Special feature	Energy hub can be developed as a standalone island in early phases. Bridge towards the North	Island with bridges towards North and South. Island can be developed with or without expanding south port	Bridge towards the North

5.3 Port of Trincomalee port directions

Trincomalee has development potential due to its key strength of a protected natural bay with deep waters. It is the place of choice for bulk goods servicing the energy and production sector with a focus on the Bay of Bengal.

Trincomalee is a natural deep water port in eastern part of Sri Lanka. It is therefore ultimately well positioned to handle dry bulk cargoes for the country. Especially in connection to the planned corridor development and rail connections the port can emerge as important dry bulk and general cargo port. The establishment of a refinery and power stations would create an additional node in Sri Lankan industrial development.

Several key developments impact the success of the port of Trincomalee, among the most import is the development of the Colombo – Trincomalee corridor to ensure hinterland access to the port. Linked to that is the railway connection to the hinterland to ensure access and distribution of bulk goods to country. For Trincomalee to attract industries of its own, substantial effort should be placed in targeting investors in specific markets.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Trincomalee followed by the main conclusions and recommendations leading to priority projects.

Figure 5-5: Trincomalee Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	112	-	
Transhipment	-	-	-	
Total	-	112	-	-
Dry Bulk ('000 Tons)				
Coal	103	120	0.5%	347
Wheat / Maize / Corn	867	1,709	2.0%	1,161
Cement / Clinker / Gypsum	1,712	3,113	1.8%	2,200

Fertiliser	-	1,536	-	-
Biomass	-	500	-	-
Ilmenite	-	700	-	-
Total	**2,682**	**7,678**	**3.1%**	**3,708**
Liquid Bulk ('000 Tons)				
Crude Oil	-	-	-	-
Refined Oil	238	1,358	5.3%	10,692
LNG	-	-	-	-
Total	**238**	**1,358**	**5.3%**	**10,692**
General Cargo				
Non-containerised General Cargo	-	832	-	-
RoRo ('000 Vehicles)				
RoRo	-	-	-	-
Cruise				
Vessels	No data	21	-	-

Containers

- Trincomalee will attract some container traffic for its captive hinterland.

Dry Bulk

- Substantial dry bulk handling capacity needs to be developed in Trincomalee, to accommodate the growing demand of existing and new dry bulk commodities.
- Trincomalee is the preferred location for a larger bulk facility with deep draft, due to the available space and natural deep waters assuming an efficient transport corridor to the western part of the country.
- In 2050, 75% of the wheat, maize, and corn volumes will be handled at Trincomalee; the remaining volumes will be handled in Colombo (15%) and Hambantota (10%). In order to accommodate the growing demand in grains, additional handling capacity will be required in Trincomalee.
- The Tokyo cement facility in Colombo is nearing maximum capacity, considering the 2016 throughput and the quay side estimated capacity.
- The TTA & Ashroff facility has a limited clinker handling capacity. Initially, new equipment is required to boost capacity; a further expansion of capacity can be achieved by expansion of the Ashroff jetty.
- Biomass is a new dry bulk commodity which may increase to 0.5 million tons per annum. The biomass pellets are stored in silos near the quay and transported through a belt system towards the quay.
- Ilmenite is a mineral of which 0.7 million ton will be exported as dry bulk; handling of this commodity will also require a belt system.
- The berths at the Ashroff quay should also accommodate the fertiliser trade once a fertiliser production facility is constructed.
- The above commodities will require that the Ashroff quay is expanded to facilitate the existing and new trades.

Liquid Bulk

- At the Lanka IOC facility, nearly three quarters of the storage tanks are unused; if these tanks are rehabilitated, total storage capacity can be boosted to approximately 10 million tons per annum. However, a new deep sea quay will be required to accommodate larger vessels.
- Trincomalee will have a larger share of refined oil imports in the future, due to the possible expansion of Lanka IOC facilities in the short term and the available space for long term expansion in Trincomalee.
- If Hambantota is not developed, Trincomalee would be a natural candidate for possible LNG power plants and the accompanying port infrastructure.

General Cargo, RoRo & Cruise

- Trincomalee is a prime destination for general cargo with its deep berth and future connectivity to the west.
- The Ashroff jetty needs to be expanded to accommodate projected growing volumes.
- No RoRo volumes are foreseen for the port of Trincomalee.
- Trincomalee does not have cruise facilities. Today, cruise vessels occasionally moor at the Ashroff quay. In the future, a cruise berth should be planned for, preferably near the city centre.

Other Port Functions

- Trincomalee does not have a marina yet. The location is expected to develop tourism and a marina should be planned for, preferably near the city centre.
- At Trincomalee a naval base exists. Improvements on the naval base are expected during the forecast period.

Observations Capacity & Efficiencies

The table below provides an overview of key issues and constraints that hamper capacity and efficient operations in the port of Trincomalee.

Table 5-3: Trincomalee - Port Issues

Category	Issue	Severity
Mud Cove		
Operations	Quay wall is in a deteriorated state	Low
Operations	Berthing space is constrained	Low
Operations	Slipway is not functional	Low
Operations	Mud cove is not conveniently situated for service jetties, as employees have to travel between Mud cove and Ashroff jetty.	Medium
Connectivity	Low quality access road	Medium
Operations	No Equipment	High
TTA & Ashroff		
Equipment	Belt systems required for new commodities such as Biomass and Ilmenite	High
Operations	There is a sunk barge in front of the TTA facility	Low
Connectivity	TTA quay wall is damaged / in a deteriorated state	Low
Connectivity	TTA quay wall has un-sufficient water depth for service crafts and tug boats	Low
Operations	Coal operations is cumbersome, from quay into container onto rail and truck	High

Category	Issue	Severity
Operations	Gypsum operations is dusty activity as hoppers are not designed for it.	
Operations	No equipment available (everything is with ship's gear) except for hoppers to handle the coal	High
Operations	Causeway to Ashroff Jetty results in inefficient operations	High
Connectivity	Low quality access road including road access to the Ashroff jetty	High
Operations	Ashroff jetty is not capable to receive mini-Capes or Capesize vessels due to length (250m) and depth constraints (-12.5m).	High
Operations	Gate configuration is poor	High
Operations	Limited flat land near the Ashroff jetty for operations and storage	High
Tokyo Cement		
Capacity	Production capacity from 1.8 M tons today to 2.8 M tons.	Low
Operations	The facility is only capable to receive small Handysize cement bulk carriers due to limited water depth but dredging works are underway to increase depths.	Low
Prima Flour		
Operations	The Flour mill is a modern complex with state of the art discharge facilities.	Low
Operations	To widen the access to the flour mill for trucks, land excavation works are under progress	Low
Lanka IOC		
Operations	Deep-water oil jetty necessary to handle increasing demand	High
General		
IT	No computer system for port operations management, ship cargo management and invoicing are manual processes	High
IT	Manual pro-forma invoices are generated, communication mainly by fax.	High
IT	Purchasing & Expense vouchering is manually based	High
IT	Many items are still cash based such as port permits, vehicle permits, handling fees	
IT	Paper Dependent Transaction Recording System (Documents are filled by hand, hard copy based, and require signatures) leading to mistakes, slow decision channels and missing documents.	High
IT	There is no planning system and /or MIS system which tracks; (berth) availability, reservations, space, scheduling of pilots, tugs and to publish information on productivity & performance.	High
Zoning	Encroachment of SLPA Lands	High
Connectivity	Port connection roads are partially unpaved and have limited capacity	High
Connectivity	No rail connection to SLPA facilities yet	High
Zoning	There is no overarching land use plan for the SLPA lands in Trincomalee	High
Navigation	Night time operations are not possible due to missing navigational aids	High

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Trincomalee:

SP1. **Ashroff Jetty Upgrade Phase 1 -** A belt system is needed to reduce inefficiencies of trucking to the Ashroff Jetty and to accommodate future cargoes. Land reclamation, the extension of the quay, new road development, new equipment amongst other should be included in the plans.

SP2. **Navigation Aids** - For night time navigation the ports needs lights, buoys and lighthouses to ensure safety. Maintenance can be outsourced to private parties. SLPA will be remunerated for these costs by increased traffic to the port for which it will receive port dues.

SP3. **Port Access Road Development** - A road connection starting from A15 near Lanka IOC heading North West will make it possible for port traffic to bypass the city traffic to A6.

SP4. **Rehabilitation and Extension of the Rail Connection** to the Ashroff Jetty

SP5. Make **promotional plan** on land and connectivity for newly assigned industrial and logistics.

SP6. **SLPA Land Use Plan** - The Trincomalee Port Zoning Report is a step in identifying the ports future needs to continue to think about which lands are lands need to be uninhabited for port development. A displacement plan, set-up years in advance will ensure a smooth process.

Trincomalee development plan

In this document the information that follows is an abstract from the Trincomalee Port Development, which can be assessed for more detailed information.

5.3.1 Ashroff Jetty

SLPA land plot FVP 17 which currently includes the TTA warehouses is ideally located near the Ashroff Jetty, making it suitable for storage and terminal area. The railway expansion from China Bay station is a necessity in order accommodate dry bulk transport to the Sri Lankan hinterland.

The proposed expansion of the Ashroff Jetty follows twee phases, adding two berths. The proposed shape is different from the SLPA development plans as it follows the natural depth of the water on the eastern side and tries to limit quay construction in shallow waters on the western side.

The following activities can take place at the Ashroff Jetty:

- Coal storage (import);
- Clinker (imports and ship-to-ship transfer);
- Ilmenite & Biomass export processing.

The prime purpose of the Ashroff Jetty should be coal, initially coal destined to the power plant in Puttalam and possibly elsewhere in the country in case of new coal fired power plants. A conveyor belt system to the stock pile is needed, after which coal is loaded on train wagons.

The current hilly road is being replaced by SLPA. Some land reclamation will increase the area available for cargo activities. The current TTA facility is in bad shape and should be replaced. Any office should preferably be centralised in a high rise building to maximise land use as it is prime port development area.

Figure 5-6: Expansion Ashroff, Railway and TTA

A	Phase 1 Ashroff Jetty expansion	F	Possible location coal stock pile
B	Phase 2 Ashroff Jetty expansion	G	SLPA land plot FVP 17
C	100m service jetty for tug boats	H	Rail expansion from China Bay station to Ashroff
D	Land reclamation	I	New road development
E	Service pier (-3m CD)		

5.3.2 Deep-water Oil Jetty

Lanka IOC operates 16 fuel storage tanks for Gasoil, Diesel, IFO and water. It handles the imports and exports through one jetty and is facing marine loading/discharging constraints with high berth occupancy rates.

The company currently sees a steep increase in demand for bunkering fuels for vessels on the east-west trade. Additionally, the refined oils demand which include fuels are set to increase in Sri Lanka with the tank farm in Trincomalee being a prime distribution location. The government designated 10 extra tanks to Lanka IOC, and 10 to a JV set to develop in the future. These tanks are assigned from the 99 storage tanks available. Reportedly, the majority of the storage tanks are in reasonable condition. The current bottlenecks are in the pipelines to connect them.

Due to the water depth constraint at Trincomalee jetty 3 (CD -11.5 m) the facility can handle small tankers up to 45,000 DWT. Larger vessels are currently sailing to Colombo and Trincomalee is then opted as secondary discharge port. A new deep-water jetty could accommodate large mainline vessels of 50,000 to 80,000 DWT. This would enhance the economies of scale and have a positive effect on the purchase price of fuels in the nation.

The Jetty

Characteristics of the new jetty:

- Deep-water jetty of CD -18 m[12];
- Able to handle 80,000 DWT mainline vessels;
- Open jetty construction with service people walking about the jetty;
- Location at the end of prima flour;
- Maybe emergency response vehicles should be able to cross the jetty; then a regular steel construction is not sufficient;
- Pipelines exposed above ground to enable regular environmental checks and maintenance.

Figure 5-7: Deep-water Oil Jetty

5.3.3 Ship Lay-up

The deep-water Trincomalee bay offers enough area for ship lay-up if SLPA deems the business case positive.

The term 'ships laid-up' means ships which are temporarily idle due to lack of cargo or which are temporarily phased out of commercial operations. Ships are laid-up when freight rates are not sufficient to cover the running costs. During times of economic crisis, laying-up is often preferred to the sale of the ship.

Within the vessel operating market, we can distinguish two types of lay-up:

- Hot laying up
- Cold laying up

[12] It should be noted that in the proposed location about CD -18m water depth is available. The waterdepth required for a 80,000 DWT vessels would be around 15m.

During 'hot laying-up' a ship is idle but can be brought back into service at short notice. 'Cold laying-up' means that the ship is taken out of service due to lack of business and is moored or anchored at a safe place waiting for new business.

In lay-up the shipowner removes the normal crew and the ship is only manned by safety guards. In this way, the shipowner is able to reduce its cost and waits till market demand picks up again.

The above description indicates that the lay-up business is cyclical and also marginal in terms for what a port authority can ask for sheltering the ship at its anchor grounds.

There are also other lay-up reasons, different than low freight rates. Ships can be put into laid-up in case major repairs have to be carried out or that the ship is "arrested by law" or is under sale or waited to be scrapped. The following locations are identified where ships may be laid-up.

Figure 5-8: Locations for Ship Lay-up

Indicative areas in the picture from left to right-above:

Area 1: Near Clappenburg, large 13 ha[13].
Area 2: Between Clappenburg bay and Sobar island, large 10.4 ha.
Area 3: Opposite Clappenburg bay, large 10.5 ha.
Area 4: Town bay, large 31.3 ha.
Area 5: Powder bay, large 25.9ha.

5.3.4 Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The shunting yard next to the port needs expansion space as well, if possible.

The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A connection starting from A15 near Lanka IOC heading north west will make it possible for port traffic to bypass the city traffic to A6. The land between road and rail can be used for industrial development.

Figure 5-9: Connectivity Trincomalee Port

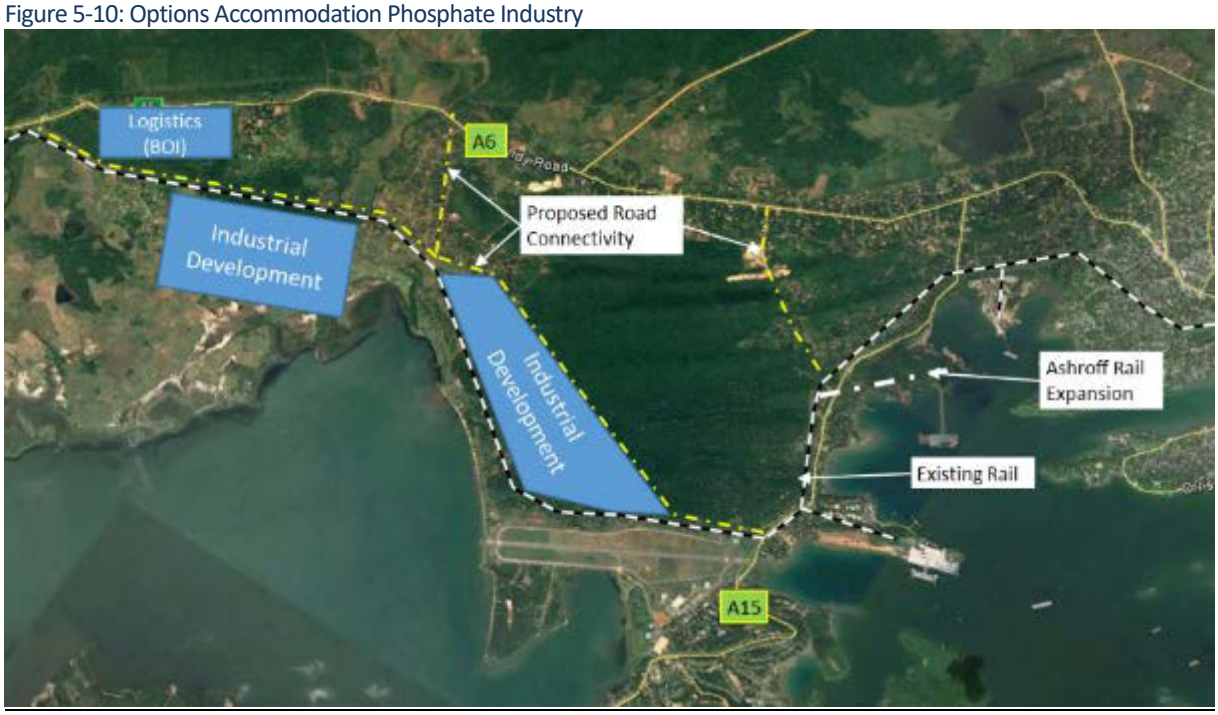
5.3.5 Industrial Development & Logistics

Currently, BOI has designated land for the development of logistics in Trincomalee. Some local companies have settled at this area. SLPA has two potential areas of both in this picture of 160 ha to be designated to either logistics and more probably large-scale industries. The road connectivity will ensure good access to the areas.

A prime user might be the fertiliser industry. The fertiliser manufacturer needs the port in its proximity to minimise transportation costs to produce the 1.8 M tons of fertiliser when fully operational. The facility is expected to import phosphate and sulphur.

[13] In case a LNG terminal is constructed this site will no longer be suited for anchorage

Figure 5-10: Options Accommodation Phosphate Industry



5.3.6 Other Long Term projects

Several projects have been identified for the long term, as sufficient demand arise for the project materialize. As such reservations have been made for the following developments.

- Development of Cruise facilities and Marina in front of Trincomalee City
- LNG Floating terminal location
- Sampur area development for energy supply and marine requirements
- Dockyards, shipmaintenance and repair
- Container terminal developments

Cruise Berth & Marina

The image below provides a possible design for a marina and cruise berth at the city of Trincomalee. The marina would be developed as phase 1 of the design. If enough demand arises based on market interest, the cruise berth could follow.

The berth provides just enough space for busses to pass and to turn. The shape is designed to locate the 360-m south berth along a stretch of a natural 10 m deep water spot. Dredging it to 11 metres would allow the accommodation of the largest cruise ships currently in operation. Smaller vessels can be accommodated on the East side. The area northeast along the connectivity pier would be suitable for a marina to concentrate touristic development.

Figure 5-11: Cruise Berth & Marina Concept

A	Phase 1 Marina	B	Phase 2 Cruise Berth

LNG Hub Terminal Floating Storage

Floating storage and regassification of LNG can be realised on a jetty near Clappenburg Island. This design minimises the cost, as no land development for tanks are needed. The facility can supply a power station and industry by gas pipelines. Ships of LOA up to 350 m with draught of 12 m need to discharge and load at the hub terminal. This often reaches depths up to 16 metres. The floating storage can be specifically used for the gas supply to a power station and for bunkering services to vessels and or for supplying industries with energy through gas. LNG has an important safety aspect and hence the region should stay clear of housing and other human activities.

The LNG terminal could also have a land-based storage area for gas tanks to match the storage supply with the power station demands in case this is beyond the vessel capacity. A common LNG land-based terminal which has for example three tanks (full containment tanks) with a net useable capacity of 180,000m³ each would require a terrain of approximately 42 hectares[14]. This is based on the LNG Gate terminal in the Port of Rotterdam which acts as supplier for the local gas networks, the LNG supply from/to seagoing ships, the LNG supply to inland vessels and bunkering, and the supply of LNG to road trucks.

[14] Based on the example of Rotterdam LNG Gate terminal of which specifications are provided in the annex

Figure 5-12: Options Accommodation LNG Hub Terminal

Sampur Area Energy Development

Several plans for development of energy plants for the Sampur area have been considered by the government. The two proposed coal plants have been cancelled by the government. No definitive decision has been taken yet as the energy development at Sampur. The possibilities include but are not limited to:

- An LPG fired power plant;
- A coal fired power plant;
- Solar panels.

Obviously, in case of a solar farm no marine side facilities are required, but in the former two cases, SLPA can provide facilities.

LPG (Option A)

To supply LPG the gas powered station an LNG jetty is projected in the bay close to the power plant. The jetty should have a length of 280 m and a depth of CD -14 m. This is sufficient to handle 80,000 cbm design vessels. The connection to the power plants would be through pipelines. A jetty in Sampur area will however be prone to possible high swells during the north easterly monsoon. Alternatively, a jetty can be constructed in the port of Trincomalee and then connected by pipeline. This would provide sheltered mooring. It can also be supplied by a FPSO, a floating storage unit for LNG with a re-gasification unit onboard. The later is described under a separate paragraph. The location and type of the jetty (Gas or LNG) and the pipeline connection paths are fundamental issues which shall be assessed when the location of the gas power station has been appointed.

Coal (Option B)

Figure 5-13 depicts possible locations of the plant and the jetty necessary to accommodate the dry bulk vessels. The jetty has a length of 400 m with a depth of CD -20m. It is to be noted that for 4 to 5 months a year the jetty cannot be used due to the Monsoon. Sampur cannot function as a coal hub for the entire country because there are no rail lines connecting it to the hinterland and the high cost component to construct one. The most efficient option would be to ship the approximate 2 M tons of coal annually needed for a 1000 MW

energy plant directly to Sampur. The rest of the coal would flow through the Ashroff Jetty by rail further inland to cement factories.

Figure 5-13: Sampur Coal Plant & Jetty

Dock Yard facilities development

The dock yard in Mud Cove can be expanded as presented in Figure 5-14. These options can only be developed if private initiatives see market potential. SLPA would then be responsible for the road connection to the facility. SLPA service vessels are to remain at the Ashroff jetty due to the distance between these facilities.

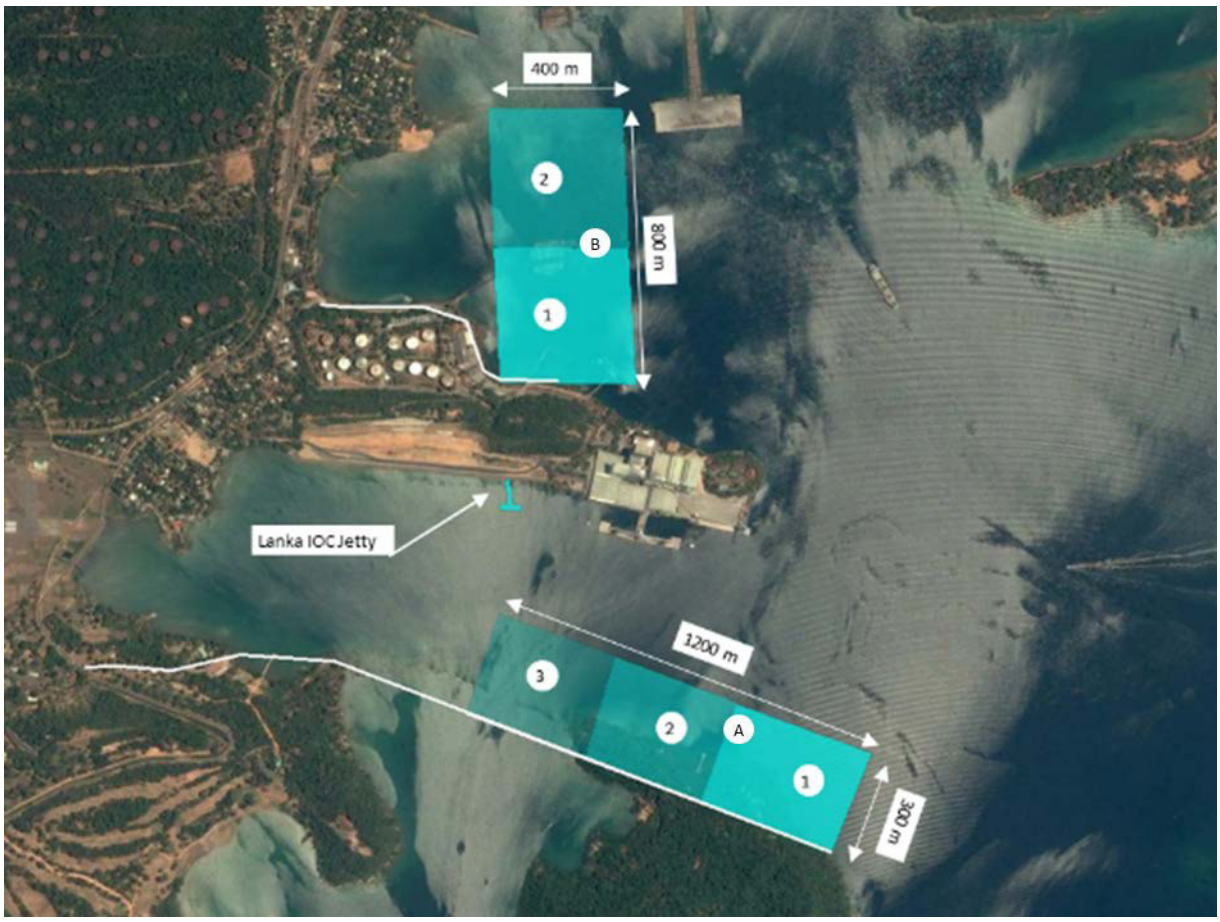
Figure 5-14: Options Accommodation Dock Yard

Container Terminal

The demand for containers in Trincomalee is still highly uncertain; the initial demand can be handled at Ashroff Jetty. In case a dedicated terminal is needed, the first option (A) would be to construct it in three phases on Sobar Island. This design will need a bridge to cross to the island for connectivity.

The second option (B) would be to construct a terminal in two phases between Lanka IOC and the Ashroff Jetty. The Lanka IOC jetty should then be replaced.

Figure 5-15: Two Options Accommodation Container Terminal



5.4 Port of Hambantota port directions

> Hambantota has ample industrial areas and combined with deep-water, the port is ideally suited for large voluminous products such as liquid bulk, cars, project cargoes and containers. It will act as anchor project for heavy and medium manufacturing industries port bounded industries which are not suitable for the heavy urbanised areas like the Western Province.

It is expected that Hambantota will encompass a bunker hub for vessels and emerge as an industrial port for Sri Lanka. The industrial value added activities can lead to economic gains to the region, and Sri Lanka as a whole, if Sri Lankan labour will be trained and employed in the facilities.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Hambantota followed by the main conclusions in part B.

Table 5-4 Hambantota Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	336	-	-
Transhipment	-	-	-	-
Total	**-**	**336**	**-**	**3,116**
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	-	228	-	-
Cement / Clinker / Gypsum	-	1,556	-	-
Fertiliser	-	-	-	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**-**	**1,784**	**-**	**-**
Liquid Bulk ('000 Tons)				
Crude Oil	-	5,007		-
Refined Oil	21	905	11.7%	-
LNG	-	1,994	-	-
Total	**21**	**7,906**	**19.1%**	**-**
General Cargo				
Non-containerised General Cargo	399	1,054	2.9%	750
RoRo ('000 Vehicles)				
RoRo	182	434	2.6%	515
Cruise				
Vessels	No data	10	-	-

Containers

- 9% of gateway containers in 2050 are assumed to be handled at Hambantota, due to the port's envisioned large-scale industrial and logistics zones and its proximity to main trade routes.
- The Hambantota expansion plans are not considered extensively due to the uncertainty of development and the fact that it is not under SLPA control.
- The current Phase II container terminal is sufficient to handle projected demand.

Dry Bulk

- Some cement volumes are foreseen for the port of Hambantota, in order to facilitate the region's envisioned future development.
- Hambantota may develop as agribulk distribution centre for South East Asia requiring berthing for large dry bulk vessels and silo's or dome-warehouses.

Liquid Bulk

- In the Base Case, industrial development in Hambantota will attract 20% of refined oil imports for further processing.
- It is assumed that 50% of LNG volumes will be handled at Hambantota port, and that the remaining 50% will be handled at Colombo.
- It is envisaged that a new refinery will be developed in Hambantota by 2025. In order to supply the refinery with crude oil inputs, substantial crude oil imports are expected in Hambantota in the medium to long term.

General Cargo, RoRo & Cruise

- By 2050, it is expected that Hambantota will handle 38% of non-containerised general cargo.
- 90% of gateway vehicles and 100% of transhipment vehicles are expected to be handled in Hambantota in the future, due to the ample available space and the highway connection to Colombo. Current handling capacity in the port is sufficient to accommodate the estimated growing demand over the forecasting period. However, it is noted that some of the space that is currently used towards vehicle storage may be used for other purposes in the future.
- Hambantota serves as a way port for Colombo for cruise vessels. No dedicated facilities are needed.

Other Port Functions

- At Hambantota, a marina is expected to be developed.
- A new naval base could be established in the port.
- A new sugar plant is projected
- A grain terminal is projected

Observations Capacity & Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Hambantota.

Table 5-5: Hambantota - Port Issues

Category	Issue	Severity
Institutional Setting		
Structuring	There is no clear institutional structuring, hampering a swift start of operations of the container terminal	High

Category	Issue	Severity
Infrastructure	Container yards and feeder yards are not at same ground level, increasing operational constraints	Medium
Equipment	For the container terminal panamax cranes have been ordered, used for feeder business	High
Equipment	For break bulk or bulk handling, mobile cranes are lacking	High

The table below provides an overview of short-term priority projects that have been identified to mitigate the most severe issues. From this priority project list, only projects that fall under the responsibility of the SLPA will be considered for further analyses.

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Hambantota:

SP1. **Container Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP2. **Break Bulk Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP3. **Industrial zone development plan -** A clear development plan sould be made to attract new businesses

SP4. **A dockyard development plan -** A feasibility plan for the development of a dock yard for large commerical vessels should be made.

SP5. **The refinery development plan** should be prepared - A feasibility plan for the development of a refinery should be made.

SP6. **SLPA Role** - The role of the SLPA/Customs/Navy in Hambantota port has been clarified and institutionalized under the concession contract and have to be implemented. These roles are important and comprise (i) the harbour master function; (ii) port safety and security; (iii) tugging and pilotage; and (iv) customs activities by Customs and (v) Navy should have a permanent base with mooring facilities for their largest ships.

Hambantota development plan

Short term development plan

The short term development focusses on:

- RoRo;
- Bunkering and LNG;
- Establishment of Dockyard and repair of large commercial ships;
- Development of Industrial zone;
- Concession of the conventional break bulk quays;
- Concession of the container terminal (phase I);
- Prepare for cement factories;
- Prepare for a refinery development;
- Prepare for a sugar plant;
- Prepare for a grain terminal.

RoRo operations

Sind 2012 when the RoRo was diverted from the Port of Colombo to the Port of Hambantota, the transhipment and local RO-RO operations have grown fast by utilizing its inherent features of land availability and well developed road network. In the short term development plan, priority has been given for this

business by allocating wide yard space of 25 ha for RO-RO operation. Further measures have been identified to improve the quality, safety, security and efficiency of operation.

Bunkering/LPG/LNG and oil storage

Bunkering facility and tank farm in Hambantota will increase business after low utilisation during start-up periods. The private party offers bunker services, LNG and LPG. Further oil storage facilities (on total of 61 ha) has been established at some distance from the berths.

Dockyard for commercial ships

Establishment of a dockyard on 85ha of land for repair and building of ships has been considered in the short term business plan as a private investment project. It is envisaged to generate considerable employment opportunities in addition to the port income out of the project.

Industrial zone development

Utilizing the extensive land area available and the dedicated and integrated infrastructure, setting up of a planned industrial zone has been identified as a major development proposal in short term business plan. Successful bidders under RFPs will be given lands to establish their businesses and fresh RFPs will be invited for more investors to establish industries. Cement manufactures will be one of the first tenants for the zone.

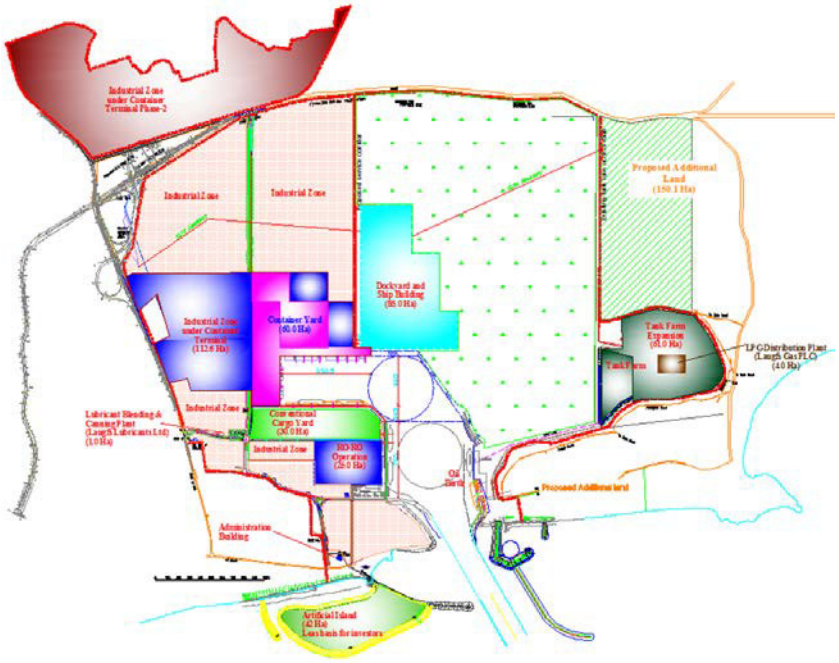
Conventional cargo

Conventional cargo or break bulk can be handled at the new facility. The total area is 30ha and has a berth length of 835m. A private operator shall be attracted to operate on this new facility. Cement and steel products are expected one of the first commodities.

Container terminal

The container terminal Phase I developed under Phase-II of the Port Development Project has been identified to develop and operate as a public-private partnership business. The new container terminal is planned to comprise 60ha. Currently only the feeder yard has been developed, the container yard at the back of the container apron has not yet been developed. The private investor will be offered land to establish industries and an area large 112.6 ha on the opposite site of the port road. This container terminal will facilitate importing raw materials and exporting finished products generated in the industrial zone.

Figure 5-16: Hambantota Short Term development



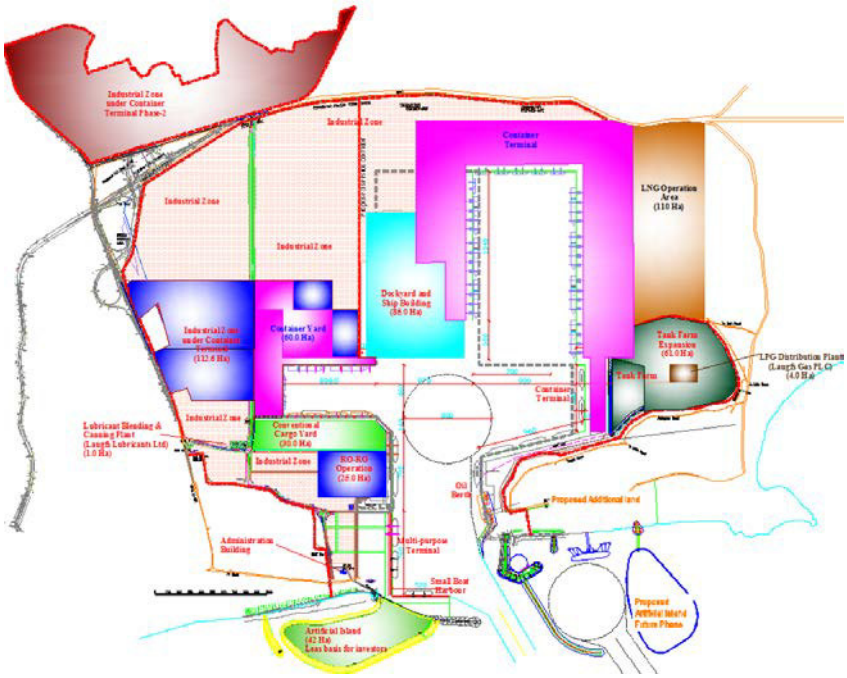
Long term development

Under the long term development, the following additional elements are envisaged:

LP7. Develop a refinery in the industrial area near the port;
LP8. Should demand exists a Container terminal development (phase II) of additional 3960m quays;
LP9. An artificial island of 42ha for real estate commercial project development;
LP10. LNG operations and development on 110ha of land;
LP11. Small boat harbour (marina);
LP12. Additional industrial zones for the port.

This is illustrated in the picture below.

Figure 5-17: Hambantota Long Term development



5.5 Galle Port Directions

Galle port future is drafted around the touristic attraction of the heritage of the port. It is well suited for a cruise berth and additional touristic attraction including hotels. Galle's beaches; cultural heritage and future resorts can be a prime location for cruise and yacht vessels. The cement operations in Galle does not nicely combine with the tourism function. However, under strict conditions the facility may actually be able to upgrade and expand.[15] The ports Out Port Limit Services (OPL) consisting of crew changes services, supplying goods and spare parts shall remain acting in competition to possible new services from Hambantota. The marina for yachts is nicely combined with the tourisms attraction of the city and is rightly positioned.

Currently there are out of port limit services being performed at Galle which requires customs and immigration presence at the port. These businesses should be sustained as long there is a sustainable and profitable business model to the port. The passenger vessels or cruise vessels is a growing market for Galle port. Galle has a number of attractions including, the old fort and city heritage, world heritage rain forests Singharaja and Kanneliya, natural beaches (Unawatuna, Rumassala, corals and underwater attractions for divers. Galle is well connected to the national highway and daytrips are be planned frequently.

Combining the touristic values of Galle (Boating industry and cruise) with the existing cement manufacturing is not an ideal combination. However, modernisation of the cement plant with proper dust prevention through belt systems and green segregation between the facility and the port under a new concession with clear environmental criteria could make the facility sustainable. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.

Summary Conclusions

The table below provides an overview of the cargo flowing to Galle followed by a summary of conclusions.

Table 5-6 Galle Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Galle		
Cement / Clinker / Gypsum	771	778
Non-containerised General Cargo	36	28
Cruise Vessels	no data	29 vessels

- It is expected that the cement facility in Galle will remain after major rehabilitation, resulting in ongoing cement handling operations in the port. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.
- Galle is expected to have some local general cargo throughput.
- Galle is an attractive location for cruise passengers. A dedicated cruise berth can service demand; it is not foreseen that a dedicated passenger terminal is required.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Galle.

[15] The cement expansion plans came in after the submission of the first draft and hence not yet incorporated into the forecast.

Category	Issue	Severity
Galle		
Infrastructure	Apron of Closenberg berth, yard and warehouse are in poor status and needs rehabilitation as it is the only wharf and warehouse available in the port.	High
Infrastructure	Breakwater is at dilapidated stage as new outer breakwater project was not commencing	High
Marina	The existing yard marina is relatively small and lacks facilities for boating maintenance and repair.	Medium
PPP	Crew service to Liners vessels or out port limit services (OPL) require additional mooring facilities when expanded	Medium
PPP	Boat building and repair facility is not available	Medium
Superstructure	Customs and Immigration are not located in one building	Low
Infra and super structure	The upgrading of the marina including expansion is envisioned	Medium
Infrastructure	There is no adequate dedicated passenger terminal to accommodate cruise vessels	Medium
IT	No adequate Vessel Monitoring System and communication system are available to the harbour master	High
Infrastructure	Deputy harbour master and regional manager lack proper offices	High
Operations	There are plans to place a power generation barge in Galle	High

Priority Projects

The table below details priority projects for the port of Galle.

Table 5-7 Port of Galle Priority projects

Category	Priority Project	SLPA Responsibility
Galle		
Infrastructure	Rehabilitation of Closenberg berth, yard and warehouse. Est. cost 70 million SLR	Yes, Short term
PPP	The upgrading of the marina including expansion from 22 berths (15m at 3m draft) to 100 berths is envisioned, including promoting the industries related to tourism and ship repair.	Yes, Short term
Infrastructure	Land developed of two land plots (0.25 ha) and (0.35 ha) for marine and port related activities. Optional PPP project	Yes, Short term
Land lease	Sri Lanka Telecom requires warehouse facility (2100m2) at port of Galle for storage of submarine cables. This can be accommodated by leasing out warehouse space.	Yes, Short term
Operations	Cement manufacturer in Port of Galle plans rehabilitation and modernisation of its factory. Quay access will be through modern (dust free) belt systems. SLPA is to decide on a new (green) concession for the modernised facility.	Yes, Short term
PPP	Crew service to Liners vessels or out port limit services (OPL) require additional mooring facilities when expanded	PPP, Medium term
PPP	Boat building and repair facility to be accommodated in the port. The project would focus on economic development of the sector by promoting industries for boat building and repair	PPP, Short term

Category	Priority Project	SLPA Responsibility
PPP	Marina extension (phase II), close to Galle ancient city, berthing for 100 yachts of 15m at 3m draft. Land area approx. 2 ha and water area 5ha. The project would be under BOT terms.	PPP, Long term
IT	An improved Vessel Monitoring System and communication system should be provided	Yes
Operations	Plans for a potential power barge are to be further discussed and developed in cooperation with the Ceylon Electricity Board (CEB)	Yes, in cooperation with CEB
Infrastructure	The breakwater needs re-enforcements as a new outer breakwater was planned but not started yet. Est 3850 million SRL or USD 25 million	Yes, Short term
Superstructure	Customs and immigration can be located at one station, when land is leased Customs can build own office	Customs, Medium
Superstructure	Separate offices for deputy harbourmaster and regional manager. Est. 40 million SRL	Yes, short term
Infrastructure	Land of SLPA outside the port is to be assessed on future developments options. Est. 10 million SRL	Yes, short term
Infrastructure	The development of the cruise berth	Yes, Long term
PPP	Marina (phase III) development as demand arises	Yes, Long term

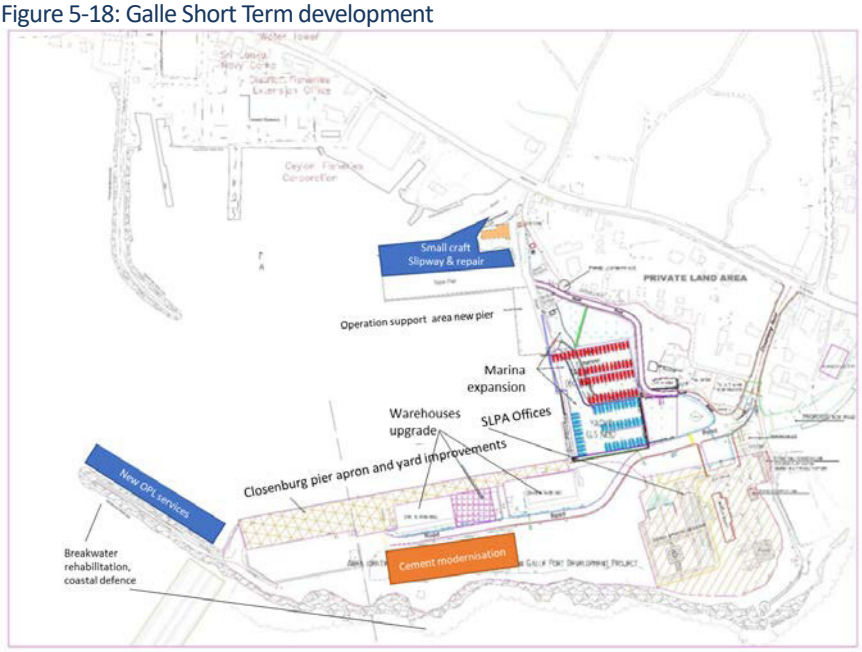
In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Galle:

SP1. An improved **Vessel Monitoring System (VMS)** and communication system should be implemented.
SP2. **Power Barge** – The plans for a power barge should be further discussed and developed in cooperation with the Ceylon Electricity Board (CEB).
SP3. **Existing Marina extension under PPP** to about 100 berths (15m at 3m draft).
SP4. **Boat building and repair PPP facility** to be accommodated in the port.
SP5. **Decision by SLPA on modernisation of cement manufacturer at the port.**
SP6. **OPL additional mooring facilities** at breakwater under PPP.
SP7. **Breakwater works,** rehabilitation existing and creating a new outer breakwater.
SP8. **Customs and Immigration to be located at one building.**
SP9. **New offices** for deputy harbour master and regional manager.
SP10. **SLPA Land ownership** outside the port needs to be mapped and development options identified.

Galle development plan

Galle development plan is illustrated in the picture below.

Figure 5-18: Galle Short Term development



Following long term developments has been identified:

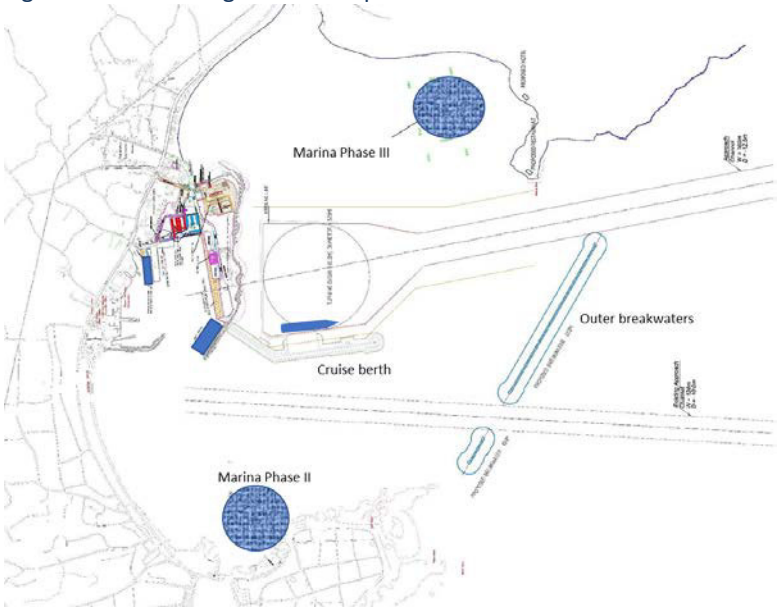
LP1. **Marina (phase II)** – Marina extension (phase II), close to Galle Ancient city, berthing for 100 yachts of 15m at 3m draft. The project would be under BOT terms.

LP2. **Marina (phase III)** – Marina extension (phase III) closer to Rumassala Hill as demand rises, berthing for approx. 100 yachts of 15m at 3m draft. The project would be under BOT terms.

LP3. **Cruise Berth** – A cruise berth should be developed in the long term to cater to the growing number of cruise vessel arrivals.

Long term developments are displayed in the next picture, including the short term outer breakwater.

Figure 5-19: Galle Long Term development



5.6 Kankesanthurai Port Directions

Kankesanthurai (KKS) Port Directions

Kankesanthurai has a high development potential due to its proximity to a densely populated area and its (cultural) connection to India. The SLPA has several development options regarding the enabling of passenger transport and of the food and agriculture sector. Regarding port development, a need for a multi-purpose is apparent to service the region, but further studies should go into detail about the need for the railway line for cargo transport and passenger transport. The estimation in the SLPA master plan assumes 500 passengers per day in both ways which is an estimation of before 1984. The passenger estimation thus needs an update.

KKS can retain its navy presence for security and other auxiliary functions should be developed per demand.

Summary Conclusions

The table below provides an overview of the cargo flowing to KKS followed by a summary of conclusions.

Table 5-8 Kankesanthurai Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
KKS		
Non-containerised General Cargo	31	277

KKS is envisioned to fulfil a major role in Sri Lanka's northern regions' throughput of general cargo to and from India.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of KKS.

Table 5-9 Kankesanthurai - Port Issues

Category	Issue	Severity
Kankesanthurai		
Connectivity	There is no rail connection to the port	Low
Infrastructure	Water depth is restricted in the port	Medium
Warehouses	The port lack proper warehouses	Medium
Gate	A proper gate is lacking	High
Infrastructure	The port lack zoning for logistics and industrial activities	High
Infrastructure	Some sections of the breakwater have been damaged during storms and need to be rehabilitated	Medium
Infrastructure	Pier 1 is in a partially deteriorated state and has tilted slightly due to missing support of the top concrete slab	Medium

Priority Projects

The following priority projects have been defined for the port of Kankesanthurai:

Table 5-10 Kankesanthurai Priority projects

Category	Priority Project	SLPA Responsibility
Kankesanthurai		
Warehouses	Two small warehouses (22m*27m) will be created using dismantled materials from port of Trincomalee for multi-purpose usage (for example cement in bags and fertilisers). Est. 15 million SRL.	Yes, short term
Gate and gatehouse	Gate, and gatehouse buildings are required to accommodate staff of SLPA, Customs and Navy. Dimensions of the gate will be 4 lanes with truck queuing for 16 trucks. Est. 40 million SRL.	Yes, short term
Breakwater and new multi-purpose berth	The breakwater needs rehabilitation and a plan exists to construct a new main pier to create Port of KKS as feeder port and facilitating trade with India. Project depends on Indian credit line. Est. 7,200 million SLR.	Yes, Possibly Short term
Pier I extension	Pier I can only handle vessels up to 4m draft. The pier extension is planned to make a berth of 120m at 6m water depth. Est. 400 million.	Yes, Short term
Infrastructure	Develop an economic zone for the port.	Yes, Short term
Access road	A new port road is required from the breakwater to the main road. Est. 50 million SRL	Yes, Short term
Rail connection	The rail could be extended by 1.5km connecting the port with the national railways. Est. 165 million SRL	S.Railways, Long term

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Kankesanthurai:

SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.
SP2. **Port Planning** – A comprehensive port development plan should be prepared, including a demand study for passengers and cargo activities. Three piers will be developed, one dedicated for the navy.
SP3. **Development of two small multi purpose warehouses**.
SP4. **Gate and gatehouse development**.
SP5. **Breakwater rehabilitation.**
SP6. **Pier I extension** to 120m at 6m waterdepth.
SP7. **Port road** connecting facilities at the breakwater to the main road outside the port.
SP8. **Develop economic zone near the port.**
SP9. **New Multi-Purpose feeder berth** – A multi-purpose berth should be developed under an to be granted Indian credit line.

KKS development plan

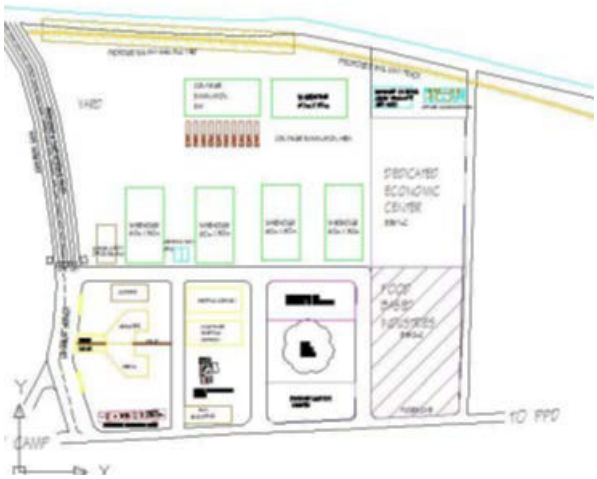
Kankesanthurai developments are illustrated in next pictures.

Figure 5-20: Kankesanthurai port developments

In the short term, an Economic zone development of about 9ha in planned for:

- Warehousing
- Container depot
- Mineral depot
- Rail shunting yard
- Dedicated economic centre
- Food based industries
- Customs inspections
- Offices

Figure 5-21: Kankesanthurai Economic Zone and Railway connection



The long term plans are:

LP2. Rail connectivity at the port through rail extension of 1.2km.

5.7 Oluvil Port Directions

Oluvil Port Directions

Oluvil will be a small port serving local, mainly fishery, needs. The port is not near an Expressway or any planned Expressway and therefor remains a small regional focussed port. SLPA plans to expand commercial operations for the food processing industry at Oluvil alongside the development of the fishery sector to allow for a mechanised fishing fleet and increased fish processing. The agricultural hinterland of Oluvil is expected to generate 25% of the nation's maize production and paddy production which is mainly processed locally and transported by truck. The agriculture sector generates also some fertilisers and storage facilities and packing facilities can be a target area. Also, the livestock sector is a possible market sector in which this port may become active. The eastern region contributes to 17% of the national milk production and possess 14% of the cattle population and 11.7% of the goat/sheep population and 11% of the buffalo population of the country. Hence it is viable to develop livestock related industries in the region such as meat processing and production of dairy products like Milk/Yogurt/Curd. These would require additional cold storage facilities.

Hence, in the proximity of the port a FTZ/ EPZ zone should be created with the focus to accommodate the industrial value added activities, processing and warehouse services for the following sectors:

- Fish industry (fish processing and canning)
- Agri sector (maize, paddy)
- Livestock sector (meat and dairy products)
- Agro chemical sector (warehousing and packaging of fertilisers).

The majority of the output of the region is for national consumption but export oriented processing can be developed through sea transportation. Also, some domestic feeder vessel can be expected in the future connecting to main ports of Colombo, Trincomalee and Hambantota.

Summary Conclusions

The table below provides an overview of the cargo flowing to Oluvil, followed by a summary of conclusions.

Table 5-11 Oluvil Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Non-containerised General Cargo	no data	28

Oluvil is expected to have some local general cargo throughput.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Oluvil.

Table 5-12 Oluvil - Port Issues

Category	Issue	Severity
Oluvil		
Dredging	There are major siltation issues, resulting in recurring dredging requirements	High

Category	Issue	Severity
Coastal protection	The lay-out of the breakwater causes heavy coastal erosion	High
Fishery sector	The port is very occupied by the fishery sector and they like to increase vessel sizes but the siltation issue is hampering this trend	High
Equipment	Port has no mobile harbour cranes	High
Institutional	An institutional framework for Port zoning and settlement of industrial activities is to be implemented	High
Ship repair	There is no ship repair / maintenance facility for fishery vessels and small boats	Medium
Zoning	FTZ and EPZ zones to be developed to attract industries	High

Oluvil is about 56km away from the nearest railhead in Batticaloa. There is no commodity-volume in Oluvil which would justify a rail development.

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Oluvil:

Table 5-13 Port of Oluvil Priority projects

Category	Priority Project	SLPA Responsibility
Oluvil		
Dredging	Solve siltation issues in the port, protect coast from erosion	Yes, Short term
Land lease	Attract Fishing processing/canning industry through EIO for private development on 2 acres of land near port. Project value 150 million SRL. Note the project can be implemented without addressing the port siltation issue. An ice plant and cold store is ready available. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private fish net manufacturing industry on 2 acres near the port. Est. project value 150 million SRL. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private fertiliser storage and packing industry at 3 acres of land. Est. project value TBD. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private organic waste producer which use the waste from fish manufacturing for fertiliser production. At about 4 acres of land.	Yes, Short term
Land lease	Development of private Agri cluster for processing and storage of maize and paddy production and distribution. At about 2 acres.	Yes, Short term
Land lease	Development of private Livestock cluster for dairy products and meat processing. Est. project value 20 million SRL.	Yes, Short term
Ship repair	Call for EIO for development of ship repair as private facility. Est. About 3 acres of water and 5 acres of land in the port. project value 300 million SRL. Expected employment 100 – 200.	Yes, Short term
		Yes, Short term

The following short term priority projects have been identified:

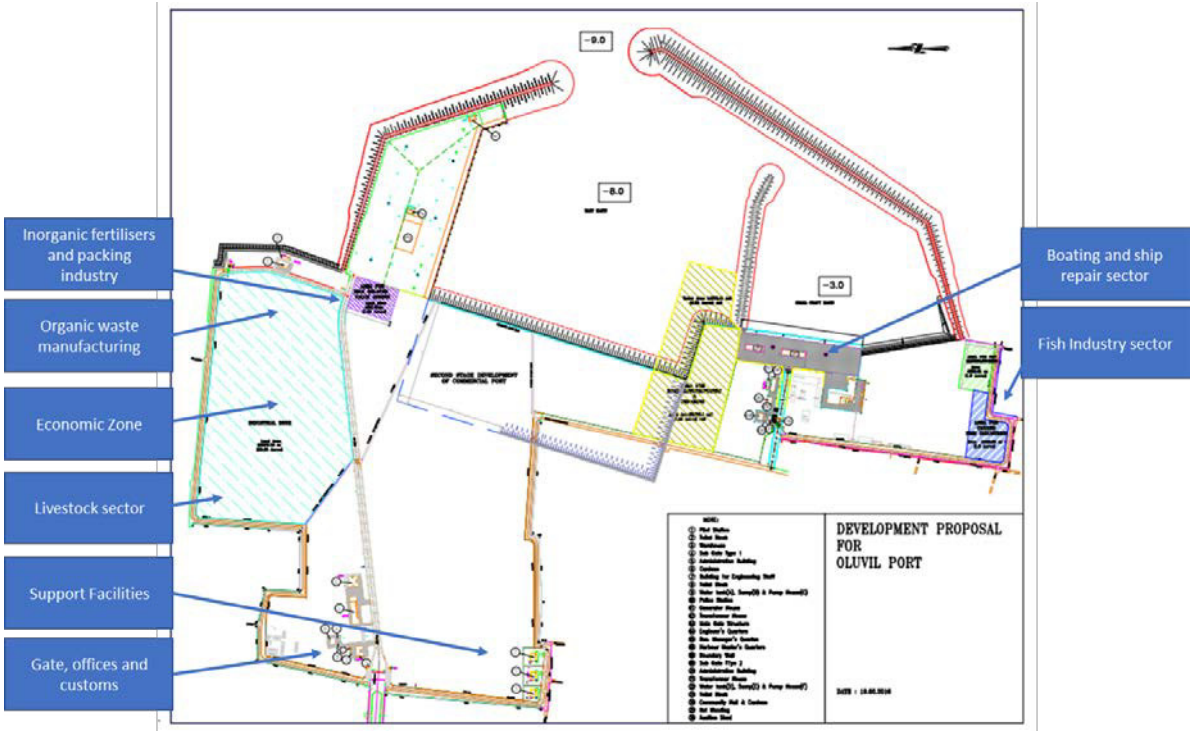
SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.

SP2. **Solve Siltation and Erosion** - Solve siltation issues in the port, protect coast from erosion
SP3. **Develop the fishery sector** – Attract fish processing and net manufacturing.
SP4. **Develop the agri sector** – Attract processing and warehousing for maize and paddy.
SP5. **Develop the organic waste –** Attract organic waste producer which utilise waste from fish manufacturing.
SP6. **Develop the inorganic fertiliser packing industry –** Attract packing and fertiliser processing industry.
SP7. **Develop livestock sector** – Attract cluster for dairy and meat processing.
SP8. **Develop the shiprepair industry for small boats and fishery vessels –** Attract shiprepair industry

Oluvil development plan

The following picture shows the proposed developments near the port.

Figure 5-22: Oluvil port development



5.8 Puttalam

Puttalam Directions

They jetty in Puttalam is used to barge coal to the stockpile next to the Norochcholai power plant. The jetty cannot be operated during Monsoon season leading to high stockpiles of coal, which add to storage and purchasing costs of coal.

The solution is found in rail transport of coal through Trincomalee. The latter already takes place but a rail connection to the power station is lacking. Currently, an operational rail line runs from Maho Junction in Cenral Sri Lanka to the China Bay station near the Port of Trincomalee. However, no rail exists between Maho Junction and Puttalam; a pre-feasibility study has been conducted for development of this rail line, but no detailed plans and development timeline have been established. Currently, efforts are ongoing to attract funding from private parties that could benefit from a rail line to Puttalam.

Summary Conclusions

The table below provides an overview of the cargo flowing to Puttalam followed by a summary of conclusions.

Table 5-14 Puttalam Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Coal	1,836	2,280

Puttalam is to retain its function as coal import facility for the power plant.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations at Puttalam.

Table 5-15 Puttalam - Port Issues

Category	Issue	Severity
Puttalam		
Connectivity	There is no rail connection from Trincomalee to the power plant	Medium
Operations	Midstream operations are carried out in an unprotected area and are not possible during the monsoon season.	High

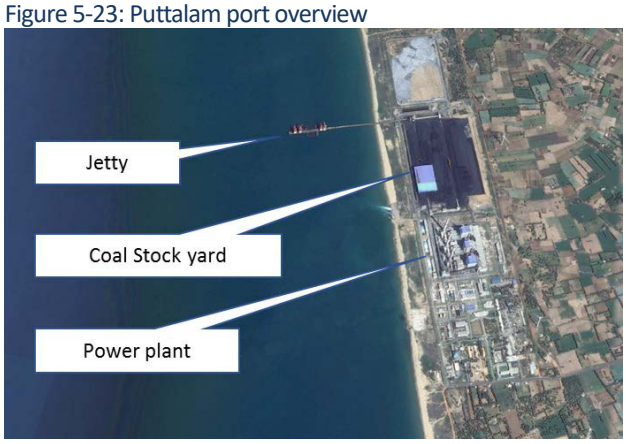
Priority Projects

No priority projects have been identified for Puttalam.

Puttalam development plan

The Puttalam coal fired power station remains an important contributor to the energy sector.
Developments on the jetty are focussed around maintenance. No major changes are expected except for the option that local cement manufacturers should explore the possibility to co-use the coal facility for their supply.

Figure 5-23: Puttalam port overview



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PART C: Port Connectivity & Logistics Hubs

6 National Port Connectivity

6.1 Introduction

This chapter describes the National roads and the connectivity to ports.

The following approach has been used for this chapter:

- Paragraph 6.2 describes existing national roads in Sri Lanka including a section on the Port Elevated Highway and recommendations of development;
- Paragraph 6.3 shows the important port connectivity projects.
- Paragraph 6.4 describes existing rail in Sri Lanka and recommendations for development;
- Paragraph 6.5 describes opportunities for coastal shipping in Sri Lanka; and
- Paragraph 6.6 describes opportunities for inland waterways in Sri Lanka.

6.2 Port Connectivity Projects

Substantial works are underway concerning the improvement of ports to the national highways and rail networks. This is an essential step in creating efficient ports and supporting the nations export ambitions through connecting Logistics Hubs with ports. The table below summarizes key connectivity projects for each of Sri Lanka's main ports.

Table 6-1 Key Connectivity Development Projects

Port	Modality	Project	Need
Colombo	Road	Widening of port access road to 6 lanes	High
	Road	Development of PAEH and fort-end ramps	High
	Road	Optimization of the gate process (main gate and PAEH gates)	High
	Road	New Kelani bridge for highway connecting E03, E02 and the PAEH	High
	Road	Connecting North Port development with the E03 passing along the coast	Planned
	Rail	Development of a rail connection to South Harbour (potential)	Medium
Trincomalee	Rail	Development of a rail connection to Ashroff jetty	High
	Road	Connecting port with port road to A6 and planned highway	High
Hambantota	Road	Extension of the E01 Expressway from Matara to Hambantota	High
	Rail	Extension of the railway network from Matara to Hambantota port	High

Main conclusions of analysis:

- Port connectivity by highways is required for all major port: Colombo, Hambantota and Trincomalee
- Port connectivity by railways is required for cargo commodities connecting:
  - Colombo port with inland dry ports (dedicated cargo rail)
  - Hambantota with western region (cargo & passengers)
  - Colombo and Trincomalee connection by railway (cargo & passengers), also connecting main inland dry ports in western region and connecting to Puttalam
  - Rail to smaller ports such as KKS, Oluvil and Galle.

6.3 National Roads

Ports cannot function without proper connections to the hinterland where goods have to be transported to and from. Connections can consist of road, rail or waterways. For some industries pipeline connections are important as well but this chapter will focus on the first three. It assesses, from a national perspective, the existing connectivity of roads, rail and coastal shipping followed by the needs for future development related to port connectivity. The detailed description of each port and its connectivity is described into more detail in each port development as part of the port specific masterplans.

6.3.1 Current situation

Sri Lanka has a relatively developed road network, with a distinction being made between four categories of roads:

- Class E Roads – High speed, high capacity corridors, aimed at relieving congestion along key corridors.
- Class A Roads – Sri Lanka's primary highway network (separate lanes).
- Class B Roads – Major provincial roads that mainly act as branch roads from the primary highways.
- Class C Roads – Local roads.

The table below provides an overview of the classes of roads within the country. Subsequently, Table 10-1 shows the country's road network.

Table 6-2 Overview of Sri Lanka Road Network

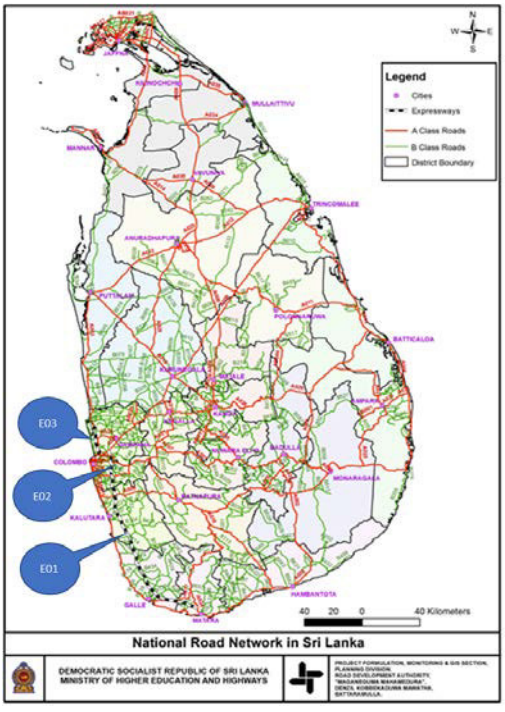
Road Category	Total Length (Km)	Speed Limit (Km / H)
Class E	169.13	100
Class A	4,217.42	70
Class B	7,992.94	60
Class C	N/A*	50

*No statistics were available for class C Roads
Source: RDA

Overview of Expressways:
The country's first expressway, the E01 (also referred to as 'the Southern Expressway'), was first opened in 2011, connecting Colombo to Galle. Subsequently, a section from Galle to Matara was opened in 2014, resulting in a total Expressway length of approximately 126 km.

Table 6-3 Expressway overview

Interchange	Airport Expressway E03	Distance between interchange in km
1	New Kelani Bridge - Peliyagoda	1.82
2	Peliyagoda – Ja Ela	14.58
3	Ja Ela - Katunayake	9.4
Total distance	New Kelani Bridge – Katunayake (BIA)	25.85



Interchange	Outer Colombo Expressway E02	Distance between interchange in km
1	Kaduwela - Aturugiriya	6
2	Aturugiriya- Kottawa	5
Total distance	Kaduwela- Kottawa	11.0

Interchange	Southern Expressway E01	Distance between interchange in km
1	Kottawa-Kahathuduwa	6
2	Kahathuduwa-Gelanigama	8
3	Gelanigama-Dodangoda	21
4	Dodangoda-Welipenna	11
5	Welipenna-Kurundugahahatakma	22
6	Kurundugahahatakma-Baddegama	12
7	Baddegama-Pinnaduwa	16
8	Pinnaduwa-Imaduwa	12.4
9	Imaduwa-Kokmaduwa	7.9
10	Kokmaduwa-Godagama (Matara)	9.9
Total distance	Kottawa- Godagama (Matara)	126.2

Observations & bottlenecks

Currently, Sri Lanka's road network faces several issues. The following key issues have been identified:

- Generally, there is severe congestion in Colombo city roads, especially during peak hours. This congestion hampers efficient cargo movement from the port to the cargo owners. The congestion caused by a mix of urban and cargo traffic combined with congested routings towards customs inspection areas.
- Port access road Colombo – the port access road suffers from severe peak congestion, due to an inadequate number of lanes and inefficient gate operations.
- The majority of gateway cargo is destined for a 50 km zone from
- Major truck road stretches of A01 and A02 near Colombo are heavily congested with mix of urban, suburban and regional traffic.
- A01 Colombo to Ambepussa stretch faces congestion and capacity issues as primary access route for local industrial areas.
- A06 Highway to Dambulla passes through urban settlements and experiences congestion due to mixing local short distance traffic with long distance traffic.
- A06 stretch between Dambula and Trincomalee is not very congested and further land area is available for expansion in the future to a full expressway.
- E01 Expressway – A highway connection from Matara to Hambantota is lacking.

Recent Developments

The road authority RDA is developing a national road masterplan.

The following key developments on Express roads are being implemented as part of the masterplan:

- Development of the Port Access Elevated Highway, 5.27km (Fort to 2nd New Bridge Project).
- Development of improving Colombo port roads and connectivity to PAEH.
- Development of 2nd New Kelani Bridge project with connection to PAEH and E03
- Development connection 2nd New Kelani Bridge to E02.
- Development of the E04 Expressway, which connects Colombo to Kandy.
- Development of E01 Expressway extension from Matara to Hambantota.

The PAEH from the Ingurukade Junction to Gate No 06 the ground clearance is 5.2m and from there onwards only inside the port the ground clearance is 10m. The total length is 5.27km.

The following Express roads are proposed:

- Central Expressway Colombo to Trincomalee (partly using E04)

6.3.2 Recommendations and development plans

The national highway structures should provide connectivity to all major ports and connect between them through nodal points near the Western region.

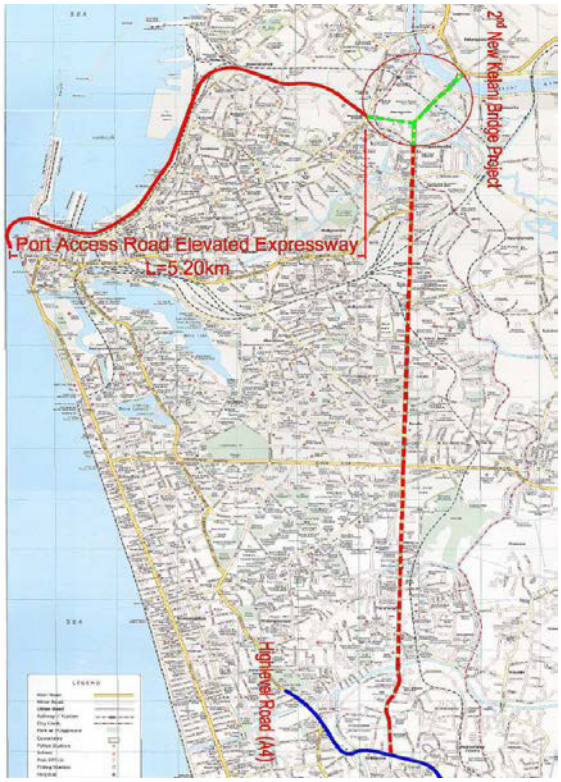
Regarding road connectivity, the following key developments for ports have been identified:

R1. Development of the Port Access Elevated Highway, 5.2km (Fort to 2nd New Bridge Project).
R2. Development of improving Colombo port roads and connectivity to PAEH.
R3. Development of 2nd New Kelani Bridge project with connection to PAEH and E03
R4. Development connection 2nd New Kelani Bridge to E02.
R5. Development of the E04 Expressway, which connects Colombo to Kandy.
R6. Development of E01 Expressway extension from Matara to Hambantota.
R7. Proposed Central Expressway from Colombo to Trincomalee (partly using E04).

Port Access Elevated Highway

The Port Access Elevated Highway (PAEH) is a project launched by the RDA to reduce traffic congestion to and from the city. The figure on the right shows the envisioned route of the PAEH.

Figure 6-1 Port Access Elevated Highway



The port access elevated highway runs from the New Kelani Bridge Project (NWB) (northern part) to the Fort at the southern part of the port. The path of the PAEH slightly deviates from the existing internal port road. The ground clearance from the Ingurukade Junction to Gate No 06 is 5.2m and from there onwards only inside the port the ground clearance is 10m. The total length is 5.27 km.

The PAEH project is currently in the detailed design phase, and comprises the following key features:

- Total length of 5.27 km.
- 2 city ramps and 1 port ramp at Fort end.
- Duel lane in both directions.
- 80 km per hour speed limit.

Port Sector Impact

- The PAEH may substantially reduce congestion in Colombo, thus enabling more efficient truck transport between the port and the cargo destinations/origins.
- As the PAEH will run at several places directly above[16] the port access road, the development may impede subsequent development of the port access road and hamper port traffic during construction. This in studied under the detailed design of the PAEH.
- The construction of the PAEH impacts temporarily the availability of the port rail track. This is studied under the detailed design of the PAEH. The rail track is requested to be available again in advance of arrivals of newly purchased rail wagons and locomotives.
- The rail track reservation towards south port is included in the detailed design study.
- The PAEH port ramp at Fort is studied by SLPA and addressed in the Masterplan of Port of Colombo.

Extension of E01 Expressway

The E01 Expressway currently provides a high-speed connection between the Colombo area and Matara. Currently, design and construction works are underway to extend the E01 towards Hambantota. For this 96-km development, four sections have been identified; these sections, and their characteristics and current progress are presented in the table below.

Table 6-4 E01 Expressway Extension Project

Road Section	Section Length (km)	Current Phase	Target Completion Date
Matara to Beliatta	30	Construction in progress	H2 2019
Beliatta to Wetiya	26	Surveys in progress	N/A

[16] The centre line does also deviates at several locations from the ground Port Access road.

Road Section	Section Length (km)	Current Phase	Target Completion Date
Wetiya to Andarawewa	15	Designs in progress	H1 2018
Hambantota to Mattala (via Andarawewa)	25	Construction in progress	H1 2019

Port Sector Impact

The envisioned high speed and high capacity connection between Colombo and Hambantota may have a substantial impact on the port sector, as it drastically improves the hinterland connections from the Hambantota port. As such, it may boost the development of the Hambantota port.

Development of E04 Expressway

The envisioned E04 Expressway, also known as the "Central Expressway", will connect Colombo (Kadawatha) to Kandy. In later phases of the development, the Expressway is envisioned to further connect Eastern and Northern regions of the country.

The project is aimed at improving inter-regional connectivity; thereto, the expressway will directly connect to the Colombo Outer Circular Highway (E002), Colombo – Katunayaka Expressway (E003), Colombo – Puttalam Road (A003), Colombo – Kandy Road (A001 Road), Kandy Jaffna Road (A009 Road), Ambepussa – Kurunagala – Trincomalee Road (A006 Road), Katugastota – Kurunagala – Puttalam Road (A010) and many other highways.

The first phase of the road development has been divided in four stages, which are presented in the table below. Additionally, Figure 6-2 shows the sections of the phase 1 development.

Figure 6-2 Central Expressway Project Phase 1

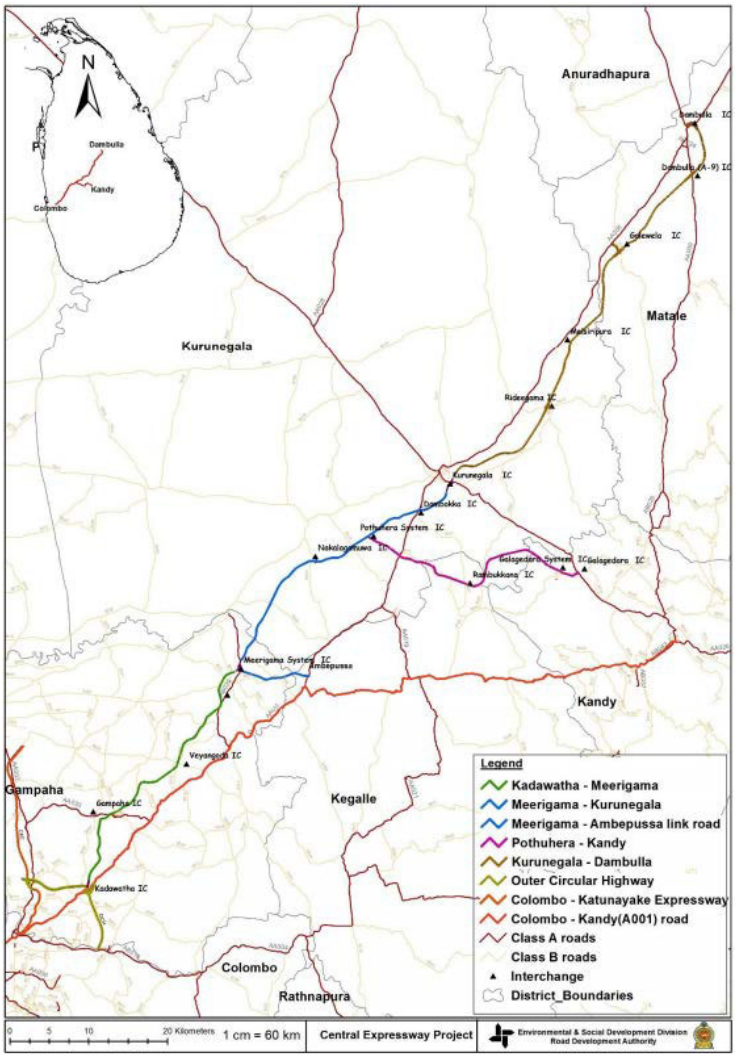


Table 6-5 Central Expressway Project Phase 1

Road Section	Section Length (km)	Current Phase	Target Completion Date
Kadawatha to Meerigama	37.1	Land acquisition ongoing Studies and designs ongoing	2020

Meerigama to Kurunegala and Ambepussa link road	49.0	Studies and designs: complete Procurement of construction supervisors: complete Procurement of contractors: complete Land acquisition: 70% Construction: commenced	2019
Pothuhera to Galagedara (Kandy)	32.5	N/A	N/A
Kurunegala to Dambulla	60.3	Land acquisition ongoing Studies and designs ongoing	2020

Port Sector Impact

The project will add substantial high speed traffic capacity between Colombo port and central hinterland regions, thus reducing hinterland transport costs and cargo lead times.

The project may relieve congestion on the roads between Colombo and Trincomalee, making land transport of cargo volumes from Trincomalee port to the Colombo area and vice versa more cost-efficient.

Improvement of Colombo Port Connectivity

Despite the considerable amount of road projects that are underway regarding the improvement of Sri Lanka's key transport corridors, projects that adequately address the direct connectivity of the port of Colombo except of the PAEH are lacking. To relieve the current port road congestion, the following two development projects have been identified:

- Optimization of the gate process – automation of the gate process could substantially reduce the truck waiting times. Additionally, a flexible gate system, which enables most gates to function as entry (exit) gates when substantial truck inflows (outflows) occur, could further decrease truck waiting times.
- Widening of the port access road – irrespective of the PAEH development, the port access road should be widened from 4 to 6 lanes, in order to increase the capacity. The section underneath the Aluthmawatha road cross-over, shown in the figure below, should also be widened to a 6-lane road.
- Signalling should improve the use of the six lanes, for example two lanes for the gates and one lane for interterminal traffic.

Figure 6-3 Aluthmawatha Road Cross-Over

6.4 National Railways

This section describes the rail cargo transportation from a national perspective. The current role of the national railways for cargo is extremely limited. It focuses on the transportation of liquid bulk from the refinery to the Airport and from Colombo and Trincomalee to distribution points. Other rail cargo activities are the transportation of wheat and coal. The modal split on rail cargo transportation is 1%, the remaining 99% is carried by truck. The reader should note that rail passenger transportation is a more dominant sector for the National railways. Considerable plans have been formulated on passenger transportation both by Ministry Megapolis and Western Development (including light rail transit solutions (RTS)) as well as by the Sri Lankan Rail Authority. Passenger transportation is however not addressed in this document.

6.4.1 Current situation

Initially established by the British in 1864 as Ceylon Government Railways, the Department of Sri Lanka Railways (SLR) operates the country's rail network. The country's rail network consists of 1,449 km of tracks; most the track comprises broad gauge (1,676 mm), the remainder comprises narrow gauge.

In the first half of the 20th century, more than half of Sri Lanka's freight transport and more than a third of passenger transport was done by rail; currently, only 1% of freight and 5% of passengers are transported by rail. This substantial decline in the modality's share is mainly the result of deteriorating rail infrastructure (tracks and bridges) and rolling stock, and the concomitant development of the roads and trucking sector.

Most current rail transport activities concern commuter transport in and around Colombo, which is subsidized by GoSL. There are approximately 330 commuter trains; approximately 250 of these trains operate in the Southern provinces; the remainder of the trains are used for long distance routes.

Observations & bottlenecks

The following key observations have been made:

- The country's main ports (Colombo, Trincomalee, and Hambantota) are not adequately connected to the railway network.
- Railways work with old rolling equipment. 65% of the rolling stock is 30-35years old and has high maintenance costs. Track upgradation is required before rolling stock is upgraded.
- The Port of Colombo is the only port where railwagons and locomotive can be loaded onto the track.
- More than 40% of trains face more than 30 min delay. Only half the local trains run on time.
- More than 60% delays are caused by infrastructural issues on rails and sleepers.
- Approximately 30% of the rail network has severe speed restrictions (down to 30 km per hour) due to safety issues. Only 22% of the network accommodates speeds of 100 km per hour or more.
- Existing rail mode on freight (1%) is low due to network inefficiency and delays.
- Rail is barely used for freight transport; only some volumes of oil (mainly to the airport), coal, and wheat flour are being transported by rail from Trincomalee to the Colombo area and coal to Puttalam.
- Urgent need for track improvements to enhance track speed from 30 km/h to 100 km/h.
- Most of the rail network is single track.
- A share of the rail network is low-capacity narrow gauge track.
- Infrastructure is deteriorated and should be rehabilitated; especially rail bridges should be restored for safety.
- Signalling and communications systems are outdated.
- The track is used as a walkway when there is no train.
- The rail network is restricted; as such, large parts of the country are not (efficiently) accessible by rail.
- Train load restrictions result in inefficient operations. On the China Bay – Maho Juntion line, trains are operated with 12 wagons that carry 2 20' containers each. Containers are loaded with approximately 25 tons each, in order to restrict axle load to 15.5 tons.
- The number of trains per day are limited on many sections of the rail network, especially for freight transport. On the China Bay – Maho Junction line, 1 daily freight rail service is operated.

Figure 6-4 Sri Lanka Rail Network Map

Recent Developments

Containerized coal transport by rail from Trincomalee to Maho junction has been introduced, in an effort to increase the cost-efficiency of rail transport. Currently, 1 cargo train runs each day, carrying 24 TEU with a total volume of 600 tons of coal.

6.4.2 Recommendations and development plans

Rail cargo should be further developed, especially for the bulk cargoes transported through the axis Trincomalee and Western Region and dedicated rail for containers to connect Port of Colombo with inland dry ports. The rail track to KKS holds promises for the transportation of bulk cargoes as well.
Once industries and or logistics are developed near Hambantota, a rail connection from this port to the Western region will also be required.

Rail cargo in a small country like Sri Lanka may not be very cost efficient as major rail infrastructural works are required to create the rail networks and limited tracks at are available.

Rail cargo would aim on the bulk transportation between Trincomalee and Western region and, depending on industrial development near Hambantota, on the Hambantota to western region (containers and bulk) and Colombo to dedicated inland dry ports (containers).

For the improvement of cargo rail transport, the following development projects recommendations have been identified:

R8. A rail track reservation in the Port of Colombo with extension to south port will enable direct rail handling near the terminals. The future rail cargo transportation according to the national rail masterplan towards newly developed inland dry ports can then be accommodated.

R9. Extension of network from China Bay station to Ashroff jetty – like the development of a rail connection between Maho junction and Puttalam, an extension of the rail network to the Ashroff jetty would reduce transhipment costs from truck to rail (at China Bay station), making rail transport from the port of Trincomalee more competitive.

R10. Extension of network from Maho junction to Puttalam – currently, coal for the Puttalam cement factory is shipped to Trincomalee, trucked to China Bay station, transported by rail from China Bay to Maho Junction, and then trucked to Puttalam cement factories. A direct rail connection to the Puttalam facility would substantially improve the cost-efficiency of coal transport to the cement plants, as it removes the need for the last transhipment from rail to truck. A more cost-efficient connection between Trincomalee and Puttalam could also make coal transport to the Puttalam power plant more attractive.

R11. Extension of network from Matara to Hambantota – it is envisioned that Hambantota port will handle several types of gateway cargo for Sri Lanka; currently, the port already handles vehicle imports, which are mainly destined for the Colombo area. A rail connection between Hambantota port and Colombo could substantially reduce land transport costs.

R12. Extension of network from Kankesanthurai to Kankesanthurai port – the city of Kankesanthurai is already connected to the national rail network; through a short extension of the existing network, the port of Kankesanthurai can be included in the network.

The main characteristics of these projects have been summarized in the table below.

Table 6-6 Sri Lanka Rail Development Projects

Project	Track Length	Current Stage
Maho Junction – Puttalam	75 km*	Pre-feasibility completed
China Bay - Ashroff jetty	1 km	Detailed surveys completed Funding arrangement ongoing
Matara – Hambantota	130 km	Matara – Beliatta section: construction 80% complete Beliatta – Hambantota: funding has been requested
Port of Colombo	2 km	Rail track reservation to reach South port
Kankesanthurai - Kankesanthurai port	1.2 km	Under discussion

*estimated

The rail track reservation at the port of Colombo should be made in advance of the PAEH development to ensure future possible connection to Colombo south harbour connecting to inland dry ports under the multimodal connectivity concept. In the case of Sri Lanka, such a rail development may not be competitive vis-à-vis trucks, as rail transport typically becomes competitive at long distances. Distances in Sri Lanka are relatively small, especially considering that the majority of cargo demand is concentrated within a radius of 50 km from Colombo. However, the rail connection may be used to relieve congestion on the port access road and city roads, at times when the road network cannot cope with truck traffic. If a Colombo South Harbour rail connection is to be established, it is crucial that such a development is taken into account in the PAEH development plans. In that case, container terminals should be connected with a railhead and a rail shunting yard is required. So far, the South Harbour was not designed to include rail connectivity. Alternatively, one railhead can be developed for the port near the Bloemandhal Area but this has major cost implications as containers will face double handling.

Rail Cargo Ambition and modal split

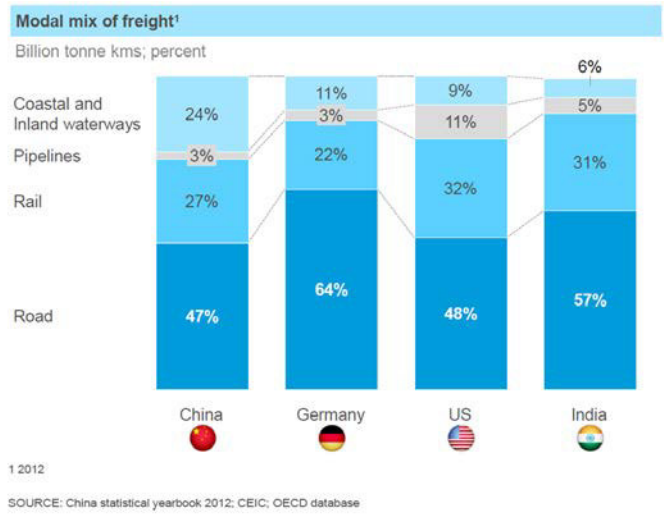
As can be observed from Figure 6-5, the share of cargo transported by rail can increase to 20% - 30%. However, as stated, the distances between Sri Lanka's main economic centres are relatively small, making rail transport less attractive. As such, it is expected that the modal split is only 2% - 3% of cargo transported by rail in the future with increased volumes through the unlocking of Hambantota over time. This requires considerable upgrade of the national rail tracks. A new national rail plan is under construction to formulate this in detail. The expected volumes also very much depend whether Hambantota is connected through a pipeline or not. If not, liquid volumes maybe handled by rail, boosting the modal split. The future mode of rail connections should focus on the cross-country bulk trade from/to Trincomalee; additionally, connections may be offered to the smaller ports (KKS) in the north. The connections to Colombo and Galle require upgrades to create new efficiencies while retaining a healthy port-city interface. A new railhead near Bloemandhal Area is planned to link the logistics facilities to the railnetwork in the future. A new rail connection to Hambantota is under review and shall add to the longer rail haulage possibilities for bulk cargoes, RoRo, liquid bulk and containers. In principal, the national rail masterplan would determine the rail cargo possibilities, the ports shall be timely equipped with railheads (with excepton of Oluvil).

6.5 Coastal shipping

The role of coastal shipping in Sri Lanka is very limited but holds promise when it is further developed. The following picture shows the role of coastal and inland waterways for a number of nations. Sri Lanka is an island with very limited navigational rivers so the future should be sought in coastal shipping, especially in the sectors of bulk transportation and container transportation.

It is noteworthy that India depends for 90% on land transportation, not utilising their coast line of 7,500km and navigational rivers of about 14,500km. This issue has been addressed in masterplans in India with the focus to increase coastal shipping.

Figure 6-5: Modal split examples of countries



6.5.1 Current situation

Currently, there are no developed coastal shipping services in Sri Lanka, except for Siam Cement's small-scale coal & clinker shipping activities between Trincomalee and Galle, liquid bulk between Colombo to Trincomalee and some Cruise lines which call at multiple ports. Coastal shipping is expected to increase in the future due to the development of the nation and related port infrastructure. Further, the possibility of a formal RoRo connection with India may (re-)emerge. Finally, when Hambantota becomes a major player as industrial port, short sea shipping activities can be expected between that port and the ports of Colombo and/or Trincomalee.

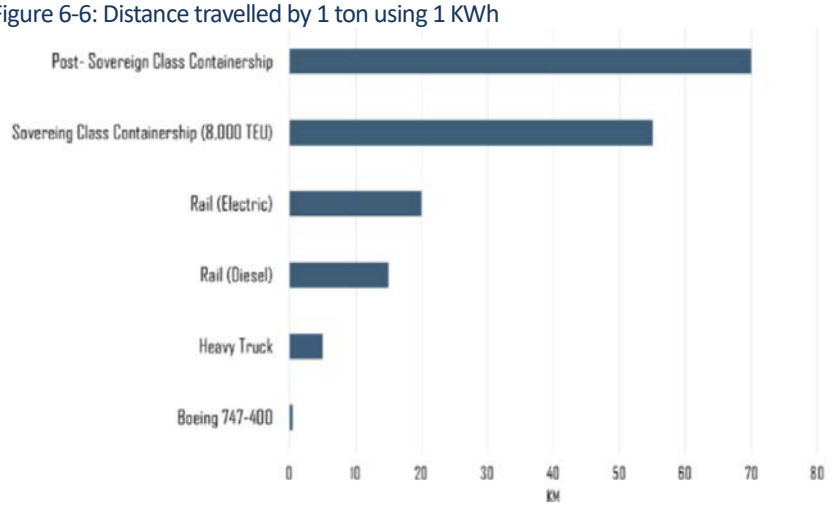
6.5.2 Recommendations and development plans

Coastal shipping is expected to increase due to the development of the nation and related port infrastructure. The logic lies in gains of economies of scale as small coastal ships can carry many truck loads at once. This would reduce the number of trucks on the road. This is of interest from a logistical point of view and a cost perspective but also from an emission point of view once "green ships"[17] are used.

The figure below shows the efficiency of various modes of transport measured in kWh. It is clear that ships have the lowest ratio's and are about 18 times more effective than trucks due to the economies of scale. But is noteworthy that Rail is also 5 times more efficient than trucks.

[17] Green ships are ships with the latest engine technologies for emission reductions able to sail in ECA zones and tier II or Tier III engines for NOx. Often an ESI index of 50 and higher is required for rebates on the port tariffs.

Figure 6-6: Distance travelled by 1 ton using 1 KWh



Source: Energyskeptic using US data

Unlike India, Sri Lanka has no cabotage law[18] that requires shipping lines to sail under the national flag. Once demand improves, national and international shipping companies can offer coastal shipping.

There are five types of coastal shipping opportunities which are recommended to be developed:

R1. Development of coastal Container feeder transportation development
R2. Development of coastal Bulk transportation
R3. Development of coastal Liquid bulk transportation
R4. Development of Passenger transportation
R5. Development of Cruises for Multiple ports in Sri Lanka

Development of coastal Container feeder transportation development

Container transportation along the coast of Sri Lanka can be developed when it proves to be more cost effective than trucking the goods through the nation. Most of the time the development of such services depends on the size of the allotment and the frequency of this demand. Some regional demand at or near small ports may drive the flow of containerised traffic in small feeder vessels but this may remain rather small due to expansion of the road highway networks. Once, Hambantota performs transhipment volumes additional feeder traffic between Colombo and Hambantota may emerge to make the connection to other feeder networks and to distribute containers from Hambantota to destination in Colombo district. It is likely that feeders towards East Coast of India will in future also call at Hambantota once transhipment is offered in this port.

Development of coastal Bulk transportation

Bulk transportation is already performed on occasion. For example, coal and clinker transportation from Trincomalee to Galle. Construction materials (stones, rocks), sand) are also transported along the coast but

[18] India is in the process to deregulate the cabotage rules to allow international lines to operate on coastal trades

this is mostly pure building projects related. Other bulk commodities may be transhipped along the coast such as grains and fertilisers. This is not expected to become a large trade but merely regional distribution.

Development of coastal Liquid bulk transportation

Liquid bulk transportation in coastal vessels is usually done because of the fuel demand at local ports, airports and regional hinterlands. Next to refined fuels (diesel, gasoil, kerosene) also vegetable oil such as palm oil and light chemicals can be moved via coastal transportation depending on the type of industries developed along the coast. Due to the sheer size of tankers (1,000t to 3,000t) compared to truck loads (40t) it is often of interest to use small tankers to achieve economies of scale. Also, the supply of fuel to the navy basis and fish ports around the nation are of interest to be carried by small tankers. A 1,000 DWT to 3,000 DWT bunker tanker are often used in this trade. A prerequisite for this trade is the development of local fuel storage facilities in the ports. Several ports already have such facilities such as Colombo, Hambantota and Trincomalee. However, it is expected that also liquid bulk storage is further developed at port of Galle, Oluvil and KKS.

Examples:

- At the port of Galle for example an oil power barge will be located to boots electricity supply in the region. This barge should be supplied through coastal transportation.
- The navy uses gasoil, diesel and kerosene and is located at several ports. The supply to strategically located tanks near ports should be supplied preferably through maritime transportation.

Development of Passenger transportation

Sri Lanka has limited ferries between India and Sri Lanka. With the development of the southern part of India passenger transportation is likely to be developed. This would require a RoRo berth / ferry berth for passenger traffic. Optional development areas are:

- Rameswaram (India) – Mannar (shallow water RoRo)
- Thoothukudi (Tuticorin) (India) – Puttalam / Colombo area (deep-sea RoRo)
- Kanyakumari (India) – Colombo area (deep-sea RoRo)
- Rameswaram (India) – Jaffna (shallow water RoRo)

Development of Cruises for Multiple ports in Sri Lanka

Today already some cruise vessels make multiple call at Sri Lankan ports. The most common combination is Colombo and Galle. Some Cruises also make the combination Colombo – Trincomalee or Colombo combined with Hambantota. It is expected that this trend will strengthen in future with increased cruise calls to Colombo and a spin off to combinations with other Sri Lankan ports. Cruise berth developments in Trincomalee and Galle shall support this trend.

6.6 Inland waterways

Sri Lanka has several inland rivers some of them can be used as navigational rivers especially in the estuary section of the river. These sections can then be regarded as inland waterways. Most of the rivers have low bridges near the sea and as such make them not suited for cargo transportation. Whilst several river estuaries are already used for fishery vessels, the rivers also hold promises for the development of the boating sector and river cruises.

Figure 6-7: Inland Waterways Colombo Area

6.6.1 Current situation

Fishery at river estuaries

The Fishery sector is using the shallow water estuaries of the rivers for example at Colombo, Negombo and Kochchikade. To accommodate fishery vessels a new Fishery port was developed north of Colombo Port which moved the majority of small vessels from the Dutch canal near Kelani Bridge. The fishery sector is domain of the Ministry of Fishery and hence not further discuss here.

Boating sector

The boating sector in Sri Lanka is still very underdeveloped at certain touristic places leisure boating is offered. This is often done from beaches and not supported by marina's.

River passenger transportation

The river transportation is not development in Sri Lanka. Locals are using small boats and offer some offer transportation across and over the rivers. Especially in dense urban area's there is a potential to offer high quality and frequent water transport services to offer an alternative to congested roads.

Leisure cruising

Leisure cruising is something which is not developed in Sri Lanka. Some rivers offer excellent scenic views from the waterside and in combination with touristic places this industry can be developed.

6.6.2 Recommendations and development plans

Colombo region

The inland waterways around Colombo are regarded of interests for the development of river passenger transportation, river cruising and leisure boating. Especially due to congested roads river transportation provides a new east-west connection which is otherwise only offered by specific busses. Connection points could be made at major junction crossings. By using the existing canal systems, strong east-west transport connectivity can be generated for the commuters' convenience. Comfortable air conditioned boats will ensure a smooth comfortable ride for passengers.

Ministry of Megapolis and Western Development has identified three inland waterways for investigation on the feasibility of such developments.
Following three inland water transport lines were identified as shown in the figure below:

- Wellawatta – Battaramulla Line (IW1)
- Fort – Union Place (along Beire Lake) (IW2)
- Mattakkuliya – Hanwella (along Kelani River) (IW3)

According to the Ministry Megapolis and Western Development masterplan the three inland waterways have to be studied for feasibility. Especially Wellawatta-Battaramulla (IW1) has the most potential to provide an urban transport solution. It intersects 6 main road including Marine Drive, Galle Road, Highlevel Road, Baseline Road, Nawala Road and Parliament Road out of which 3 of them are main 7 corridors. AS previous studies have been conducted in the past this transport solution could be implemented quickly once studies are updated with the latest traffic situations.

The Beira lake (IW2) is currently used for leisure boating only and may provide a water taxi across the lake which is of interest especially during congested periods on the road.

The Kelani River (IW3) passenger transportation would provide alternative transport solutions in a region where the public transport is poor. Due consideration has to be made in regard to environmental impacts prior to implementation as the main water intake for Colombo City is from Kelani river. The feasibility of the mode with electrified or solar powered boards can be considered when the study on the route is done. Prior to the canal boat system, the cleaning and dredging of the canals should be done in addition according to the Ministry Megapolis and Western Development masterplan. Parallel to the provision of boats, construction of boat stations, yards and access roads should be addressed. A proper type of boats should be used during this service and a proper regulatory mechanism should be established for the continuous monitoring and for the operation and maintenance processes. As this is transport solution may impact the environment, feasibility studies should cover this aspect and offer mitigation where possible.

R1. Perform feasibility studies for the inlandwaterways passenger transportation (taxi, cruising and crossing) on the three identified rivers in the Colombo district (Kelani, Beira lake and Wellawatta – Battaramulla Line)

National boating opportunities

The nation hold promises especially in the leisure boating sectors. Due to numerous touristic places and nice lagoons and river estuaries there are options to develop these touristic places with marina's, offering day-trip with leisure boats. Nearly each coastal district has options to develop this sector. It is however advisable to make a national plan for the tourism sector focussing on boating and marina's and identify first the most promising areas for developments.

- National rivers such as Benthota river (South District) with the tourist centre Aluthgama in its estuary is of interest to offer leisure boating and river cruising. Marina's can be developed to support this sector.
- Tourist attractions could be developed on the rivers like on Walawe river in Ambalanthola with Uda Walawe national Park in the hinterland.
- In the East, Lagoons and rivers near Batticaloa are numerous and will be subject to tourism and boating sector development.
- In the North East Trincomalee district offers numerous options for marina's and boating industry which has also been identified in the Trincomalee Masterplan.
- The northern province also numerous lagoons and options for marina's both in the Jaffna district and in the Mannar District.
- Finally Negombo area is earmarked for tourism development having nice beaches and river outlets. Also this area is earmarked for marina developments.

R2. Create a national overview for the development of the boating industry at river estuaries/ lagoons taking into account the development to touristic centra, local geography and attractiveness of nature and/or wildlife. Some place would be ideal for (speed)boating whlist other should be developed for ecotourism.

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7 Logistics hubs with Dry Ports & Corridors

7.1 Introduction

In this chapter the Logistics hubs with dry ports and corridors are explained.

The legal obligation is to declare all goods (imported and exported) correctly and pay the correct amount of duty before the goods are cleared and free circulations/ export is allowed. On goods, import and or export duties and VAT are to be paid.

The following approach has been used for this chapter:

- Paragraph 7.2 describes the institutional best practice on Logistics Hubs and Dry ports;
- Paragraph 7.3 describes the current situation in Sri Lanka;
- Paragraph 7.4 reviews Sri Lanka Integrated logistics hub concepts; and
- Paragraph 7.5 reviews the Colombo Trincomalee Economic Corridor.

7.2 International best practice

The international best practice is explained through explaining the concept of a Logistics hub where after the Dry port concept is explained.

7.2.1 Logistics Hub

Introduction

A logistics hub is a dedicated area where a variety of services is offered to different players in the supply chain. Logistic hubs can be developed either within or nearby the port area – close to the (container) terminals – or next to a (inland) dry port located more into hinterland, i.e. closer to production facilities or the consumer market.

Typical services

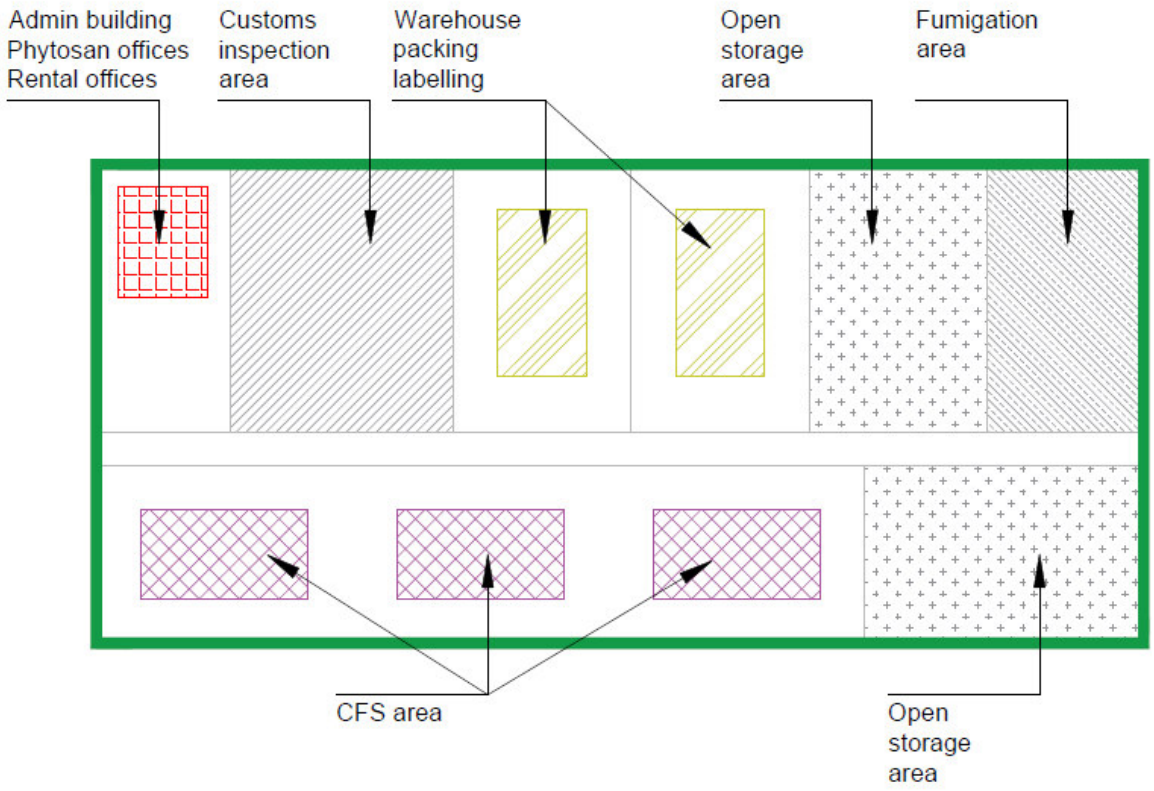
Within a logistics hub, a range of additional services can be offered to the clients:

- CFS activities;
- Multi Country Consolidation (MCC);
- Customs inspection;
- Warehousing, packaging & labelling activities;
- Open storage
- Phytosanitary inspection;
- Fumigation;
- Rental offices for agents or clients; and
- Empty depot**.**

Typical layout

The figure below shows a draft layout proposal of the Logistics Centre, indicating the various types of activities that can be organised within this area.

Figure 7-1 Logistics Centre Layout



CFS area

In this area, the typical CFS activities will take place. CFS stands for container freight stations, i.e. the area entailing both covered warehouses and open storage areas where containers will be 'stripped' after import, i.e. unloading the products out of the container before (the last miles) distribution to the client's destination, or where products will be 'stuffed' into containers before shipping the container overseas.

Multi Country Consolidation (MCC)

MCC activities are logistics services typically seen in container transhipment ports. Contents of transhipment containers from different origins are stripped and restuffed to aggregate cargoes with similar destinations, in order to optimize the contents of each container for further transport. In contrast to stripping/stuffing activities for domestic cargoes, MCC activities should be placed within the port as transhipment containers should be fully handled within the port area.

Customs Inspection

Depending on the local regulations and policies, Custom Authorities sometimes require a dedicated area to do in-depth inspection of the cargo and/or the containers. One can identify various levels of inspection based on different technologies and/or levels of automation with corresponding area requirements:

- Container scanning: X-ray scanners can scan the cargo inside a container fully automatically; a fixed drive-through X-ray tunnel installed on the main container terminal or a mobile X-ray truck are required to do the proper container scanning;
- Quick visual inspection: customs officers will open the doors of the container and do a quick check whether the type of cargo and the number of products is in line with the cargo documentation; this type of activities can be integrated with the gate-in and gate-out activities at the container terminal;

- Detailed physical inspection: customs officers will offload the container and place all the products separately on a temporary stacking area (e.g. under a shed) in order to do a detailed check on the type of products and the corresponding amounts of each product; this type of inspection requires a serious amount of space because every container needs to be parked at the specific customs inspection area (in most cases on top of a trailer or chassis) and a temporary storage area of about 30 to 40 m² needs to be reserved to unload the products out of the container.

Warehousing, packaging & labelling activities

Various types of logistics and commercial activities can be organised in the Logistics Hub area. Most popular type of activities are related to warehousing, packaging, unpacking or re-packing various types of products, labelling or stickering products, etc. This type of activities requires industrial warehouses. Depending on the type of product, sometimes a conditioned warehouse will be required. Typical size of a CFS or logistics warehouse is 3000 m.

Open storage

Not all the import goods and products discharged at the container terminals or the multipurpose terminals will be transferred directly to their final destination (at the client). Similarly, export goods will be collected and temporary stored before shipping. For this type of (temporary) storage activities an open storage area is required.

Phytosanitary inspection

In this area, verifications are carried out by agricultural authorities to verify a shipment has been inspected and is free from harmful pests and plant diseases. Phytosanitary certificates are issued to indicate that consignments of plants, plant products or other regulated articles meet specified phytosanitary import or export requirements and are in conformity with the certifying statement of the appropriate model certificate. Phytosanitary certificates should only be issued for this purpose.

Fumigation

Fumigation services prevent the spread of pests and minimise the risk of damage to (export) goods before shipment according to international (quarantine) standards.

Fumigation services require a dedicated – preferably isolated – space where the fumigant (gas) can be released into the container to fumigate both the products inside the container as well as the (wooden) floor and other parts of the inner side of the container. After a specific period, the container can be ventilated to allow the fumigation gas to escape and render it safe before shipment.

On average, for every container that needs fumigation, a dedicated space of about 50 m² will be required. Considered the chemical environment of fumigation activities, it is recommended to identify a dedicated area outside the container terminal for fumigation services.

Rental Offices for Shipping Agents or Freight Forwarders

Freight forwarders and shipping agents are the companies that arrange the importing and exporting of goods. In fact, the agent or freight forwarder acts as an intermediary between a shipper and various transportation services such as ocean shipping on cargo ships, trucking, expedited shipping by air freight, and moving goods by rail.

Shipping agents and freight forwarders are based either in the commercial centre of the port or in an office building within the Logistics Centre. Depending on the number of different agents and freight forwarders, the need for office area will range from 100 m² up to 500 m².

Empty depot

In most of the major container terminal ports around the world, specific areas will be dedicated for empty container depots. Typical activities at empty depots are:

- Reception and/or delivery of empty containers to truck, rail or barge;
- Maintenance and repair of the container equipment fleet;
- Cleaning of the (inner side of the) container;
- Sales and inspection.

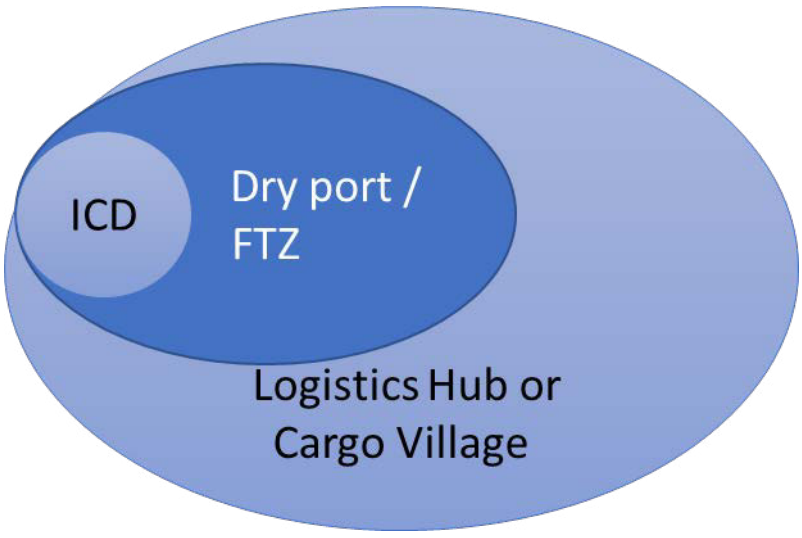
Empty container depots are mostly located nearby the logistics centre or commercial and business centres close to the market and are an essential part of the logistics chain, because they allow the importers to leave their empty containers and exporters to pick up empty containers for shipment in the close vicinity of the logistics centre instead of at the deep-sea container terminal. This saves on transportation costs and time.

7.2.2 Dry Port / Free Trade Zone

Introduction

A dry port is an inland located terrain which acts as a port, it has therefore bonded areas often also classified as Free Trade Zones (FTZ). The concept of a dry port (or FTZ) is strongly related to the 'extended gateway function', meaning that all customs procedures and inspections are taking place at the dry port, instead of at the seaport/border crossing. In other words, all custom procedures and inspections are executed in the dry port as if it was done at the seaport/border crossing. This requires the approval of all relevant authorities involved in the Sri Lankan transport chain, of which the Customs Authorities are the main stakeholder. Also, the legal regulations should facilitate the introduction of the dry port concept. The inland container depot (ICD) can be regarded as smaller subset of the Dry Port concept focussing on (empty-)containers.

Figure 7-2: Conceptual naming ICD Dry Port /FTZ cargo village



A dry port area contains all the services and operations that require a custom bonded zone (under custom regime). The logistics centre is usually located adjacent to the dry port area (or at separate locations) where services/operations take place that do not require a custom bonded area. This primarily relates to non-bonded warehouses, value added services and commercial offices. The total areas of the Dry Port /FTZ and surrounding logistics areas can be classified as "Logistics Hubs" or "Cargo villages" or "logistics villages". Economies of scale can be reached once logistical services and value added services are combined at these FTZs and Logistics Hubs.

Typical services

Within a dry port area or FTZ, the following services can be offered to the clients:

- Truck handling (loading/unloading containers/cargo from/to trucks)
- If available, rail handling (loading/unloading containers/cargo from/to trains)
- Stripping and stuffing of containers (container freight station)
- Bonded storage of containers/cargo
- Receipt and despatch of cargo; custom inspection and clearance
- Gate checks and security
- Container repair
- Workshop

Within the free trade zone (FTZ) often light manufacturing, assembly and value-added services are allowed providing benefits to importers and exporters established in the FTZ.

Dry port: containerised cargo and non-containerised goods

The forecast of containerised traffic forms the core of a dry port development. This is because (full) containers are suitable to transport under customs regime to the dry port location and typically require storage and de-consolidation activities. At the dry port (when ordered by the importer) the goods are inspected and customs cleared and further transported to the importer's own premises. This is considered one of the key functions of a dry port.

Transport of non-containerised goods under customs regime is more difficult to realise (e.g. sealing, track and trace, safety), and therefore in many cases non-containerised goods are often cleared at the seaport/border crossing.

Connectivity:

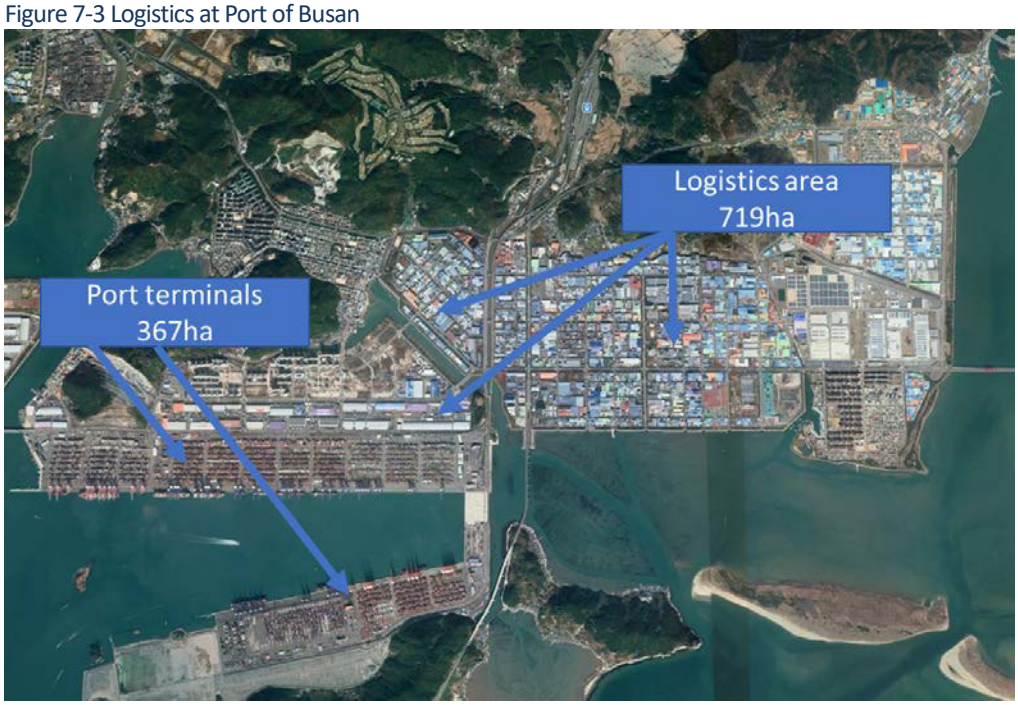
Dry ports can be either single modal – only accessible via road – or bi-modal – accessible by road and rail or tri-modal – accessible by road, rail and barge. Depending on the available infrastructure and the corresponding transport costs for each mode of transport, the most cost-efficient way of transport will be selected by the different players in the logistics chain. For comparisons reference is made to the Port of Busan (South Korea).

Table 7-1 Port of Busan and Colombo compared

Port description	Busan	Colombo
Throughput (2015)	12.9 million TEU	5.1 Million TEU
Gateway cargo	6.5 million TEU	1.2 million TEU

MCC cargo	1.2 million TEU	15,000 TEU
Transhipment cargo	6.4 million TEU	3.9 million TEU
Container terminals	367 ha (total port 408 ha)	125 ha (total port 202 ha)
Logistics area near port	718 ha	scattered
Utilisation logistics area	68 Companies: Logistics, Value added, Warehousing, MCC activities	Logistics areas scattered

Figure 7-3 Logistics at Port of Busan



The figure above shows that logistics areas are about times a factor 2 compared to container terminal areas. This would indicate that Colombo would require 250 ha of logistics land today versus about 480 ha to 700 ha once throughputs triple towards 15 million TEU and depending on the success of Sri Lankan Export strategies.

Key Success Factors of a dry port concept

To improve the logistics sector in Sri Lanka, the (to be developed) dry port(s) should meet certain criteria. These criteria are listed as key success factors for dry ports.

Extended Gateway for the (congested) seaport

The dry port should be a true extended gateway. This implies that a variety of services that are commonly provided in the seaport are transferred to the inland dry port. The main advantage of this is congestion relief of the sea port for these kinds of services. An important condition for a successful extended gateway is that the goods are allowed to be transported under a favourable customs regime. This entails that all customs clearance, including the physical inspections and administrative checks are executed in the dry port. Also, other inspections that normally take place in the seaport are to be executed in the inland port.

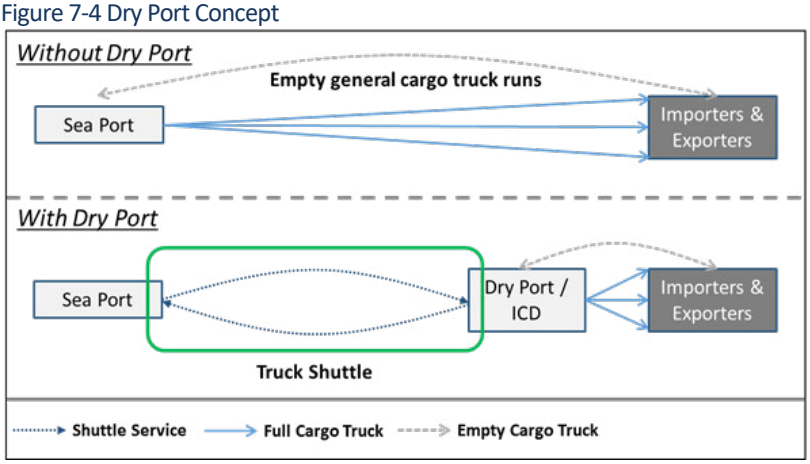
Cluster concept

The inland port should cluster all logistical services required in one location (customs inspection & clearance, stripping & stuffing, value added logistics, container freight station). Clustering all logistical services provides for a reduction in total transportation costs and time efficiency. A one-stop-shop offers a full suite of services to the end user.

Strategic location

The dry port should be located in the proximity of major consumer and industrial areas and in the proximity of infrastructure (road and/or rail). Short delivery time to the final customer destination is important to realise the most efficient supply chain of products. A direct and efficient link with the seaport is required to provide for an efficient transportation route. Ideally, the inland dry port is connected not only by road but also by a high-density transport mode such as barge or rail to provide for more cost-effective environmentally friendly method of transportation.

Figure 7-4 Dry Port Concept



Corridor: secure transportation channel

There should be a secure corridor between the seaport and the dry port. This could be realised with shuttling service with trucks, and in the long-term potentially via rail. A shuttling service executed by licensed trucking companies is a time and cost-efficient way to move full containers to the dry port. Containers can be monitored by customs more easily and licensing can lead to more safety. By using licensed truck companies, tracking and tracing through GPS seals is also possible. Once you have several Logistics Hubs along a major trunk route you can speak of a "Logistics corridor".

7.3 Current situation

Logistic Zones and Dry Ports

Currently, Peliyagoda is designated as logistical zone where warehousing takes place, but it is not yet offering full operational services associated with a dry port. Colombo can benefit from a central location Inland Container Depot (ICD) with a customs and CFS function, commonly called a "Dry Port". The facilities in Colombo are dispersed and in urban areas. This leaves room for optimisation of locations of empty depots, inland customs scanning locations, CFS operations and LCL handling locations. These functions can be combined in "logistics hubs" with specific FTZ classifications, but space availability around the existing Peliyagoda is an issue. Furthermore, connectivity to the importers and exporters locations, often located within the city is a logistical nightmare. Incentives should be provided to attract the major importers and exporters away from the congested urban city areas to establish them in at logistic hubs or cargo villages with ample space for economies of scale and with good connectivity to ports.

Geographically well located land plots for dry ports are needed to form a cluster of logistics hubs around a network of corridors which connect to the ports and the urban areas. These dry ports or FTZ, but also referred to as cargo villages, are used to ease congestion in the port and in urban city districts. The concept makes use of economies of scale for which ample space is needed to combine multiple functions and create synergies of clustering business activities.

7.4 Sri Lanka Integrated Logistics Hubs – Dry Port – FTZ – Corridor development

Integrated development

The National Export Strategy has identified six focus sectors for innovation and export diversification. In line with the realisation of (additional) main corridors, Free Trade Zones (FTZ) and corresponding Logistics Hubs / Dry Ports can be developed in the regions or areas identified as the best locations to deploy these additional activities and/or attract additional businesses.

In terms of area requirements, a small Free Trade Zone as such can be developed already within an area of about 20 hectares (200,000 m²). In combination with a dry port and a logistics centre, the area requirements will be considerably higher, ranging from 50 up to 200 hectares. As mentioned before, it is wise to cluster the Free Trade Zones and or Export Processing Zones to ensure synergies and spin-offs creating larger "Logistics hubs".

To secure a successful implementation of an integrated FTZ-Dry Port-Logistics Hub project, close communication and interaction between various Government Agencies, Western Region Mega Polis, UDA, Customs and SLPA will be of paramount importance. Apart from a dedicated Customs office within the FTZ-Dry Port area, electricity and water supply and basic infrastructure is required at the FTZ to ensure land plots can be conceded to importers and exporters. Connectivity with High ways and optional railways is further required as part of an overall freight corridor policy to connect to the ports. Housing for labour should be planned for in commuter proximity of the FTZ in logical areas not effected by future expansion of the FTZ and clear from any emissions related to the FTZ.

Four studies have mentioned above concepts to be implemented in Sri Lanka and reference is made to these studies.

- Ministry of Megapolis and Western Development Masterplan, November 2016
- Multi Modal Transport Project, ADB and Japan Fund for Poverty Reduction, 2012
- SLPA Port Development Masterplan 2016
- Colombo - Trincomalee Economic Corridor (CTEC), ADB November 2016

The latter study is detailed in a separate paragraph as it covers a wider region for development compared to dry ports solutions offered in the direct hinterland of Colombo by the other studies.

The studies highlighted following developments:

Table 7-2 Studies with Logistics concepts

Study	Content
Megapolis and Western Development Masterplan	Masterplan for the Western region covering: Overview of Western region, dimensions of growth, Strategic

Study	Content
	framework, Transport- energy and water, Housing and relocation of administration, Environment and waste management, The aero-maritime trade hub, "The high rise" central business district, industrial and tourist cities – Meerigama, Horana, Negombo, Aluthgama. "Techno City", "Eco habitat and plantation City", "Smart city infrastructure project", The spiritual development facilitation, planning regulations, way forward
Multimodal Transport Project	The latest 2012 Multimodal study financed and supervised by ADB and Japan Fund for Poverty Reduction. Volume I: Market evaluation, Engineering & operations. Volume II, costs, revenue financial analysis and economic appraisal.
SLPA Port Development Masterplan 2016	This masterplan shows the initial development proposals including 450 ha area for CFS and cargo value added services.
Colombo - Trincomalee Economic Corridor (CTEC), ADB November 2016	Development context, Vision of Sri Lanka, Role of the Corridor and corridor development framework, Analytical framework. Economic analysis (manufacturing and tourism), delineation and node selection framework, industry selection framework and shortlisting of industries, tourism as driver growth. Infrastructure planning for the corridor. Power, Transport and Urban. Regulatory framework assessment, Institutional framework, financing framework

7.4.1 Megapolis logistics hubs near Port of Colombo.

- **Megapolis -** The masterplan of the Ministry Megapolis and Western Development plans identify the creation of the "Logistics City" between the port and airport to cater to the logistics needs of both international nodes and creating the basis for new business development. The figure below outlines the phasing. In this study Peliyagoda is a phase 1 and Enderamulla is a phase 4 development.

The Western Mega polis has highlighted in their Masterplan two important concepts related to logistics.

- The Areo-maritime Trade hub concept.
- The logistics "city" at a Corridor between Colombo Port – and Airport

Areo-maritime trade hub concept

The Areo-maritime trade hub concept describes the role the Air Port and the Maritime City can offer to trade creating a "unique maritime, Aviation, Logistics and trade hub in Asia". The Maritime City at the port of Colombo and the "Airport city" development should cross benefit from each other being connected through a Port to Airport highway to be built through the "modera Bridge" across the Kelani river extending the to the Air Port Expressway. The maritime to air transport concept is commonly used when seaports and airports can benefit from each other economic and logistics powers. For example, in the Netherlands, the Port of Amsterdam, the city of Amsterdam and Schiphol Airport have a combined promotion strategy to attract business and tourism. The airport is used for export of fast and light cargoes such as flowers, vegetables, and fish. The Seaport provides for kerosene to the airport, has cruise terminals, RoRo and heavy general cargo berths. The city is the prime tourism attraction with heritage and cultural life. For Sri Lanka the Bandaranaike

International Airport (BIA) can bring cruise passengers within 40 min to the planned cruise terminal when road connections through the elevated highway have been established. The Maritime City can trade gems and garments and the hinterland provides for Tea and Rubber exports. Fresh fish (exports) and vegetables (import and export) can be transported efficiently through the airport and through the seaport. Cool storage facilities are required in logistics hubs for these trades.

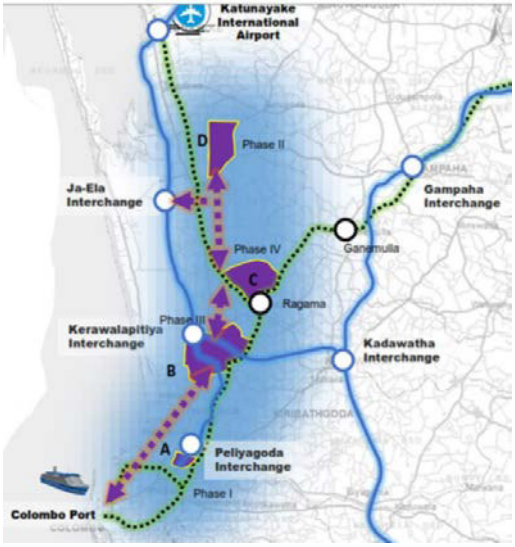
The Logistics city at a Corridor between Colombo Port – and Airport

The Western Mega Polis Masterplan outlines a concept plan for a logistics corridor. This encompasses several areas where logistical activities, warehousing, cargo distribution, value added industries, cold storage, light manufacturing, vehicle repair and other logistics activities can be developed. These developments together are mentioned as "Logistics Cities" in the masterplan. In principal these areas can be used according to the concepts described above as Dry port / FTZ and can become Logistics Hubs in future.

Table 7-3 Logistics Area

Phase	Logistics Area	In picture
I	Peliyagoda Interchange	A
II	Ja-Ela Interchange	D
III	Kerawalapitiya Interchange	B
IV	Ragama	C

Figure 7-5 Megapolis proposed Logistic Areas



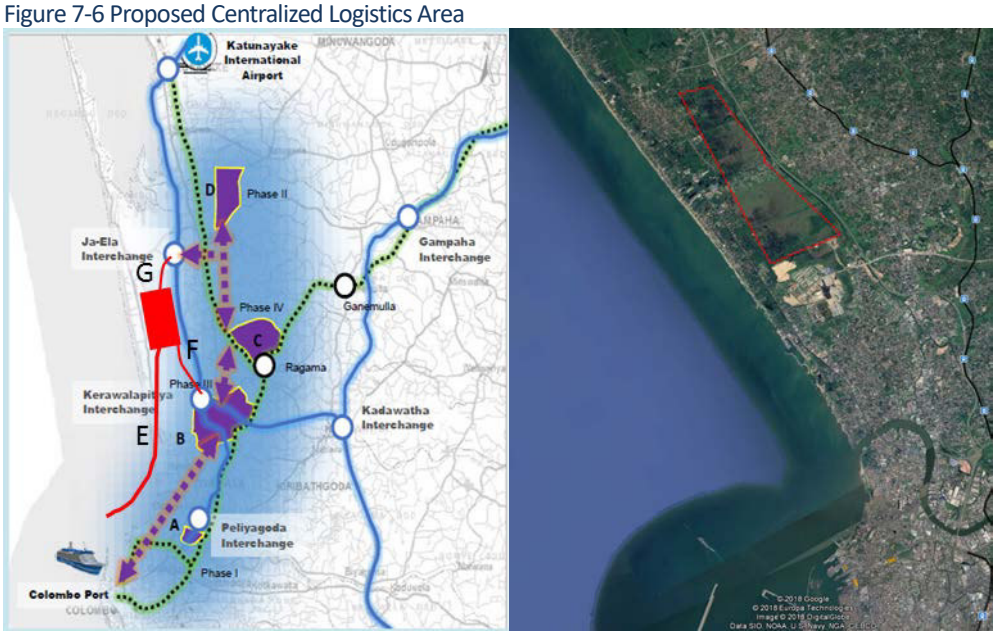
The logistics corridor concept plan will consolidate and link existing and potential logistics activities in the Western region. The four areas are to be connected through multi modal transport options such as dedicated roads, expressways and railway links for cargo and freight transportation. TheMinistry Megapolis and Western Development plans integrated residential clusters to provide housing near the employment centre in a good quality living environment.

MTBS Assessment:

The Logistics City development along road and rail makes sense for development and for the location of dry ports if sufficient land can be secured. The plan does have a major flaw that the expansion is geographically

separated over a number of areas without a clear reasoning. An alternative would be the acquirement of land north of the Muthurajawela power station, indicated red on the map below, to develop an integral Cargo Village as vast land (600 ha to 700 ha) relatively unoccupied/uninhabited and possibly available. This option ensures the accommodation of future growth on the same site, making use of economies of scale by utilising the infrastructure efficiently.

Figure 7-6 Proposed Centralized Logistics Area



Important is that the future port development "North Port" is connected with cargo corridors towards to the logistics areas. A so-called north corridor development (E in the picture) passing the Kelani River towards the Logistics area North of Kerawalapitiya interchange is required. Further the logistics area should be connected with Ja-Ela interchange (G in the picture) and Kerawalapitiya interchange (F in the picture). Future rail connection should also be planned for once Sri Lankan Railways plans cargo transportation by rail. The most logical path for the railways line would be along the road (E in the picture) and connecting to existing railway line near Ja- Ela Interchange.

7.4.2 Multi Modal study logistic hub proposal near Port of Colombo.

- **2012 Multimodal Study** - The latest 2012 Multimodal study financed and supervised by ADB and Japan Fund for Poverty Reduction identified Enderamulla as the most efficient location, but this study assumes a multimodal solution and includes a multimodal connectivity to Peliyagoda.

The main provision conclusion in 2012 was that the construction of a truncated Enderamulla ICD in 2020, together with the necessary complementary upgrades to the port railhead, the container control system and within the Peliyagoda ICD site, the project would be financially viable with a total cost for Enderamulla ICD of 403 million and a FIRR of 19%.