

REPUBLIC OF THE UNION OF MYANMAR

**MINISTRY OF TRANSPORT AND COMMUNICATIONS
DIRECTORATE OF WATER RESOURCES AND
IMPROVEMENT OF RIVER SYSTEMS (DWIR)**

**AYEYARWADY INTEGRATED RIVER BASIN
MANAGEMENT PROJECT (AIRBM)
PROJECT MANAGEMENT UNIT (PMU)**

**TERMS OF REFERENCE
FOR
THE SERVICES**

FOR

**C3.17 – FORMULATION OF THE
‘RESOURCE MANAGEMENT AND OPERATIONS
PLAN’ FOR AYEYARWADY NAVIGATION**

22 February 2019

Section 7. Terms of Reference

Terms of Reference for C3.17 – FORMULATION OF THE 'RESOURCE MANAGEMENT AND OPERATIONS PLAN' FOR AYEYARWADY NAVIGATION ('The RMOP')

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ACRONYMS

AIRBM	Ayeyarwady Integrated River Basin Management Project
ASEAN	Association of Southeast Asian Nations
AToN	Aids To Navigation
BoQ	Bills of Quantity
C3	Component 3
DG	Director General
DGPS	Dynamic Global Positioning System
DMH	Department of Meteorology and Hydrology
DWIR	Directorate of Water Resources and Improvement of River Systems
DWT	Deadweight ton
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GDP	Gross Domestic Product
GPS	Global Positioning System
IBRD	International Bank for Reconstruction and Development
IALA	International Association of Lighthouse Authorities
IMO	International Maritime Conventions
IDA	International Development Association
IWT	Inland Waterway Transport
LAD	Least Available Depth (to determine the allowable vessel draft)
LAW	Least Available Width (to determine the maximum vessel beam)
LAR	Least Available Radius in bends (to determine maximum vessel length)
MSL	Mean Sea Level
NAS	Ayeyarwady River Navigation Strategy
NGO	Non-Governmental Organization
NWRC	National Water Resources Committee
PAD	Project Assessment Document
PMU	Project Management Unit
PSC	Project Steering Committee
RAP	Resettlement Assessment Plan
RVO	Enterprise Agency Netherlands
SEA	Strategic Environmental Assessment
SWL	Safe Working Load
SWOT	Strengths, Weaknesses, Opportunities, Threats
TOR	Terms of Reference
WB	World Bank

Terms of Reference

Formulation of the Resource Management and Operations Plan for Ayeyarwady Navigation (RMOP)

1. BACKGROUND

1.1 COUNTRY AND SECTOR BACKGROUND

Myanmar is a land and water rich country. It has the world's 25th largest arable land area and 10 times the per capita water endowment of China and India. Looking forward, many of the opportunities considered most promising for Myanmar's future growth relate directly to water, i.e., enhanced production and trade in agricultural products, hydropower generation, and the expansion of national and regional green transport systems via rivers and ports. The Ayeyarwady is Myanmar's largest river basin and has been described as the heart of the nation. Today the basin accounts for about 60% of Myanmar's landmass and is home to some 70% of its population. It is a river of global proportions, with an average annual flow of over 400 billion cubic meters, equivalent to roughly 85% of the Mekong.

The Ayeyarwady River has historically been the main transport artery of the nation but the river's navigability is deteriorating. Impacts related to sedimentation are seen in increasingly braided channels and sand bars that affect the river morphology and present hazards to inland transport, particularly at night when visibility is compromised and during the low water season (i.e. November to May) when least available depth (LAD) for navigation is marginal. Besides the natural restrictions for unimpeded waterborne transportation, the operations and facilities related to aids to navigation such as buoys and beacons, surveys, charting and other means are largely insufficient, and the management of what is existing needs improvement.

A recent study¹ shows that Logistics Companies and Cargo Forwarders are convinced that IWT in Myanmar needs modernization. Containerization is unavoidable and should be started as soon as possible, especially when the new JICA terminal project in Mandalay is underway. The study also highlights that many professionals in the industry are not aware of the potentials, or lack the knowledge on other developments in the world with regards to in river navigation. As being experienced in many parts of the world with large navigable rivers, there is a risk that cargo forwarders may 'forget' about IWT, and use trucking to transport their goods, even though waterborne transport should be the most economical mode, holds large cargo capacity, relieves road congestion and maintenance, and is attractive to tourists. The European Commission has increased their efforts in switching back to IWT by providing funding schemes and incentives to the shipping companies. China and Viet Nam have fully utilised the potential of IWT in their countries. In the Mekong Delta, 80% of the goods are transported by Waterway.

¹ DWIR| ESIA and ESMP for Subproject 1, ESA for Stretch 1, and ESMP Monitoring and Reporting during Construction of Subproject 1 by ICEM Draft ESA Report - Mar 2018

Development of inland waterborne transportation along the Ayeyarwady River depends on what happens with regards to basinwide water resources development. It is therefore crucial that Sector Objectives are contemplated within a range of different development scenarios, balancing transport demand with the realistic supply of transport systems. Such Long Term Transport Scenarios also have to consider main development trends in the Basin (that may have an impact on waterborne transportation).

1.2 AIRBM PROJECT

The Ayeyarwady Integrated River Basin Management Project (AIRBM) is a US\$100 million project supported by the World Bank and implemented by the Directorate of Water Resources and Improvement of River Systems (DWIR), under the Ministry of Transport and Communication (MOTC). AIRBMP is designed as a multi-phased approach (series of Projects) to strengthen integrated, climate resilient management and development of the Ayeyarwady River Basin and national water resources. The AIRBMP was declared effective in June 2015 and has a closing date of September 2020.

The AIRBMP consist of three main components plus a contingency component to allow for rapid reallocation of funds in case of emergency (e.g. extreme weather event). The components are briefly described below:

- Component 1: Water Resource Management Institutions, Information & Capacity Building (USD 32 million)
- Component 2: Hydromet Observation and Information Systems Modernization (USD 30.15 million)
- Component 3: Ayeyarwady River Navigation Enhancements (USD 37.85 million)

AIRBMP Component 3 aims at enhancing safe navigation in the Ayeyarwady by conducting physical and non-physical improvements. Component 3 consist of the following subcomponents:

Subcomponent 3.1: Structural Improvements (USD 8.9 million): This sub-component will support navigation improvements to increase water levels during the low water season for both passenger and cargo vessels, primarily along the busiest stretches of the Ayeyarwady river.

The AIRBM project has and still is conducting river works to improve the waterway channel between Yangon and Mandalay:

- micro-projects (installation of groynes and dredging works);
- implementation of larger river regulating works (bank protections, porcupines, dredge alignments)

Subcomponent 3.2: Operational Improvements (Day and Night Navigation) (USD 23.7 million): This sub-component will support (a) the Development of the Hydrographic Atlas between Mandalay and Yangon, (b) purchase and installation of navigation, and (c) purchase dredging. This sub-component will enable DWIR to focus on modern, system

level Dynamic River Management that better accommodates the special features of the Ayeyarwady River, including its shifting landscape and navigation passages. So an operational balance between active regulating works such as dredging, upgrading of hydrographic services and charting, and day and night aids to navigation form the operational triangle of this sub-component.

The AIRBM project has and still is supplying equipment, boats and vessels such as:

- 2 new cutter suction dredgers CSD500, including work boats and pipes;
- 6 new hydrographic survey boats;
- 3 new buoy handling/logistical support vessels;
- buoys and beacons for day and night navigation along the whole stretch Yangon-Mandalay;
- full hydrographic survey and charting equipment

Subcomponent 3.3: Non-Structural Improvements (USD 1.8 million). This component will support the design and piloting of a sediment monitoring system, and this project, the Formulation of the RMOP.

Subcomponent 3.4: Institutional Strengthening and Implementation Support (USD 2.1 million).

1.3 NEED FOR A RESOURCE MANAGEMENT AND OPERATIONS PLAN FOR AYEYARWADY NAVIGATION

The arrival of new equipment, development of new facilities and training through the AIRBM has been inspiring but at the same time quite challenging. Introduction of night navigation and buoyage on the river are very new initiatives to DWIR, and to the users. On a 1,000 km long river, making this happen is not an easy exercise and the logistics to make the system sustainable are demanding. Full dedication also applies to the river regulating works, surveys and charting, and other operational actions. Everyday conditions and settings have shown that the changes induced require much more attention than initially anticipated. Modernizing the system has been confronting at times for DWIR: expectations were high but the awareness of the operational energy it all takes is only now becoming obvious. Moreover, it does not only refer to the new developments, also the existing methodologies need adjusting. There is no lack of people as DWIR has 1400 staff but a through screening will demonstrate that there is a need to have ‘the right person for the right job’, combined with additional training. Proper **Resource Management** is vital here because:

- The river is much more dynamic and complex than anticipated, requiring substantially more financial and human resources than expected;
- The river engineering tasks need better planning;
- The River Station (Waterway Stations) barely have boats, vehicles and equipment, and they should be properly equipped to do the routine works;
- The River Stations and separate departments should be authorised more operational responsibility and financial accountability;
- The budgets for capital investments and maintenance are focused on engineering works and should be increased to fit the actual requirements for the operational works, for now, and for the future;
- The capacity of the DWIR in the field (in particular the Waterway Stations) needs to

be enhanced;

- The organisational structure of the human resources needs to be assessed and revised;
- The yearly budget plans need to be improved. The budget allocation for the IWT industry does not correlate with the relevance and the big role the IWT industry plays;
- Financial sourcing (internal and external sources) of finance and sustainable funding mechanisms need to be studied and income-oriented² alternatives to be proposed. A stable long-term financing model should be secured;
- Without properly filling in the technical, human and financial resources, the AIRBM projects, and the other DWIR routine activities will not be sustainable, this risk is to be mitigated.

For many years DWIR has concentrated its functions on river engineering, namely through dredging and river works. The structural and engineering works to be done in Stretches 1 and 2 (between Mandalay and Magwe) will be studied in detail by Component 3, and this will provide a better understanding of the river geomorphology. It has nonetheless become more and more clear, and this was also one of the results of the World Bank Mid Term Review in February 2018, that attempting to obtain a static navigation channel all along the Ayeyarwady River will be complex because of the heavy sedimentation and the river's very complex geomorphological nature. A solution can, however, be found when approaching the problem through the concept of 'Dynamic Navigation'. This approach requires more operational efforts, through upgrading of hydrographic services and regular surveying activities, purchasing and installing aids to navigation, and modernizing the dredging fleet. But river engineering still needs to be studied carefully in this project. A list of limitations and prerequisites is given here, but is not exhaustive:

- The distance Yangon-Mandalay is more than 1,000 km so the logistics need better planning;
- There is a need to define sector objectives for the medium and long term for improved Ayeyarwady waterborne transportation;
- The required **Operational Routine Works** need to be inventorized, detailed, planned and organized:
 - The riverbed in certain hydro-dynamically complex areas can change several times between September and December. Frequent and swift bathymetric surveys and charting will need to become routine tasks;
 - The skippers will require charts and updates;
 - Even though low-maintenance buoys will be fully purchased for all stretches, the frequently changing river bed requires regular re-positioning of the buoys. Also this will need to become routine tasks;
 - High concentrations of debris in the river must be weekly removed from the aids to navigation, especially between July and October;
 - Dredging works and River Training, including Bank Protections, are often done on an ad hoc basis. They will need to be studied, planned, organized well in advance;
 - These Routine Works need to be studied, proposed, discussed, agreed and be part of the RMOP.
- Waterway Classification and Fleet Classification need to be reviewed and

² Toll fees for the barges are small because the waterway services provided by the Government is not in line with what should be done.

institutionalized. The waterway dimensions or requirements need to be followed by DWIR so that there is a responsibility for maintaining the LAD, and minimum channel width;

- The constraints in Ports and Logistics System³ should be studied and worked on;
- Measures to standardize and modernize the vessel fleet should be taken;
- The Planners, Dredging Department, Hydrographic Department and Navigation Department need proper coordination between them. Coordination Mechanisms need to be put in place;
- The awareness of safe and environmentally sound inland shipping practices needs to be increased;
- The lack of communication and cooperation between DWIR and the Shipping Industry reduces the IWT potentials, and undercuts the real commercial situation. Proper communication channels and procedures need to be developed;
- Many professionals in the industry are not aware of the potentials, or lack the knowledge on other developments/innovations in the world with regards to inland shipping;
- Information network and database management is to be developed and coordinated;
- Basic IWT data and information that are needed for planning and management, and need to be made accessible to the skippers, and freight forwarders;
- A solid legal framework (e.g. use of the Phan Hlaing river is claimed by the fishing fleet) is required so further development of the waterway channel is not impeded;

In view of these challenges, it is essential that the DWIR is guided and supported to plan and implement their future Operational (capital and routine) works, especially in the prioritized functions such as Hydrography, Aids to Navigation and Dredging works, and River Regulating works. AIRBM will therefore require a Consultancy Company to assist in drawing up a Resource Management and Operations Plan to materialize a safer and more effective waterborne transportation on the Ayeyarwady River system. The formulation of the RMOP is crucial at this stage to ensure that the AIRBM projects, and the other DWIR routine activities will be sustainable.

In addition, DWIR requires more than their current objectives to be guided. The current objectives, as formulated in the mandate of the Directorate, are only technical. There is a vision⁴ but direction and clear goals are missing. The Inland Water Transport Enterprise (IWT), under the same Ministry, is also working towards enhancing shipping along the river but is less active. There are however overlapping objectives in terms of navigation safety, port development, modernization of inland navigation, receiving fees for waterway

³ A supply chain is defined as the flow of resources and data to fulfil end-customer demand, starting from raw materials sourcing through the various stages of value-adding, handling, storage, and transport. Within the management of supply chains, logistics activities are concerned with transport, storage, and handling of goods at all chain levels. Inland ports play an important role in facilitating the supply chain flows through efficient logistics. Their presence is an attractive factor for (primarily manufacturing) facility location decisions. Inland ports serve as hubs of transport chains, and as a location for industry, services, and as a vital part of industry clusters.

⁴ DWIR Vision according to its mandate:

- to conserve and protect the water resources and rivers system for beneficial utilization by the public;
- to smooth and safe waterways navigation along rivers and creeks;
- to contribute to the development of State economy through improving water resources and river system;
- to protect environmental impact.

utilization, etc. That is why this project would formulate the Sector Development Objectives and Long Term Scenarios. This framework would then form a good platform to make elaborated recommendations for future projects, which in turn would also benefit the AIRBM project.

2. OBJECTIVES AND ROLES

2.1 Objectives

The main Development Objective of the project is

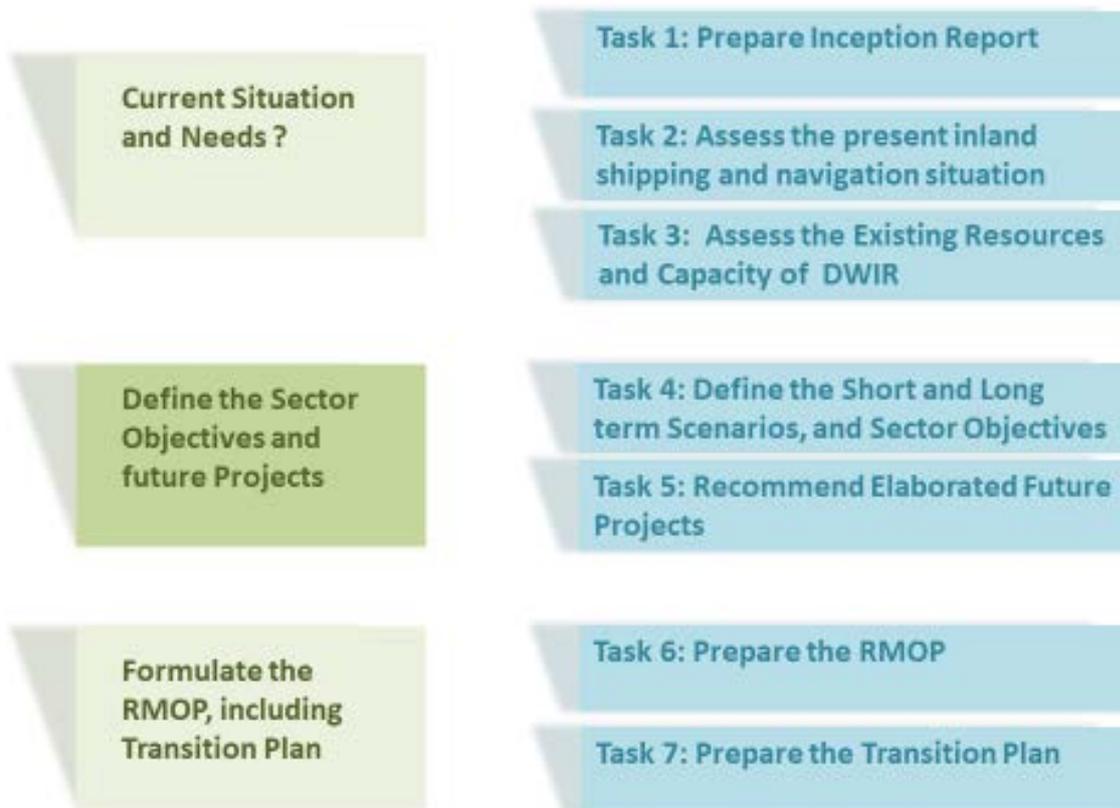
‘To portray and analyse the present situation of the waterway transport system, assess the resources and capacity under DWIR, define what the requirements are for improved Ayeyarwady Navigation, and respectively design a detailed ‘Resource Management and Operations Plan’ which implementation will directly assist the organization to improve day and night, efficient, and safe river navigation on the Ayeyarwady River.

*For the planning and implementation of the prioritized and operational functions within DWIR, the **RMOP**, which will include a Transition Plan, will shape an adapted organizational structure, describe the technical tasks, assign personnel at headquarters and in the Waterway Stations, propose an inventory of equipment, vehicles and boats, and prepare the annual and detailed budgets. Furthermore, this project will include formulation of the Sector Development Objectives and Long Term Scenarios, and elaborated recommendations for future projects.*

3. SCOPE OF SERVICES

3.1 OVERVIEW

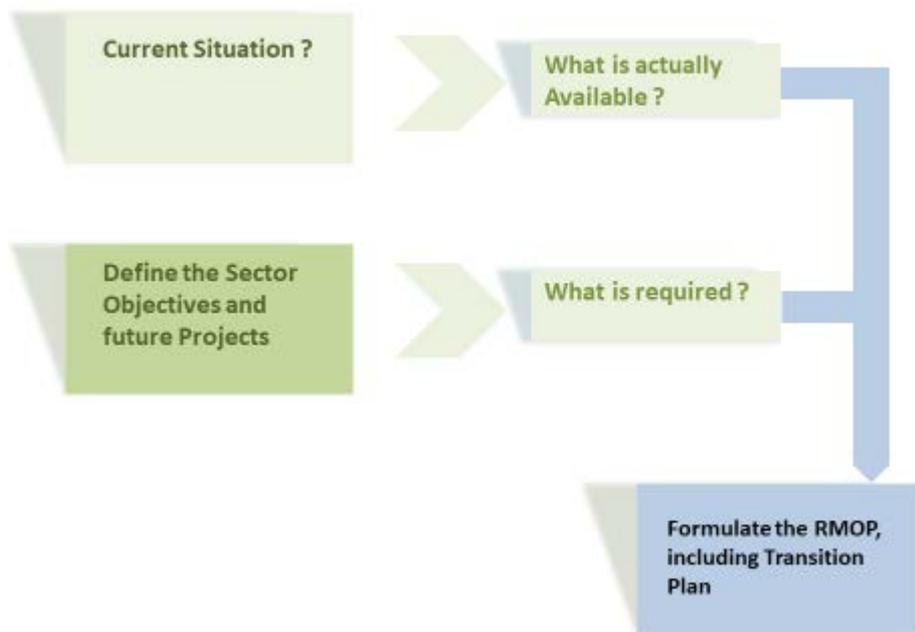
The services will consist of three main components, and seven tasks:



The duration is expected to be about 8 months:

Estimated Schedule	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Inception Phase. Assessing the Current Situation, and Needs								
Defining the Sector Objectives for Ayeyarwady River Navigation								
Recommendations for Future Projects								
Formulation of the Resource Management and Operations Plan (RMOP)								
Formulation of the Transition Plan (TP)								

In his bid the Consultant is asked to provide a detailed work plan, elaborated concept and methodology based on below diagram:



In Chapter 3.2 below, the Tasks are proposed in detail. The Bidder has the flexibility to make changes to the detailed tasks based on his experience and expertise. In the bid proposal, the Consultant should mark what changes he proposes.

3.2. TASKS IN DETAIL

3.2.1. ASSESSING THE NEEDS, AND DEFINING THE SECTOR OBJECTIVES FOR AYEYARWADY RIVER NAVIGATION

Task 1: Development of the Inception Report and Work Plan

The **Inception Report** will include *work plan, plan for workshops, public and stakeholder consultations, approach and methodology for the design of the Strategy, time line of activities and milestones*. The *timeline* shall clearly outline deliverables, and deadlines/milestones. During preparation of the Inception Report the Consultant shall liaise with the PMU and DWIR. The Consultant should also prepare the methodology for an approach to stakeholder engagement⁵.

In the first month of the project, the Consultant shall collect existing data and information, assess data and prepare a list of requirements for the additional information to fill the gap between available data and required data for the scenarios.

Upon completion of the draft Inception Report, the Consultant shall organize an **Inception Report Workshop** to present the draft work program and to further strengthen the **work plan** on joint coordination of the activities outlined in this Terms of Reference.

⁵ The Consultants shall also include how to prepare for the future Workshops. Stakeholders are from the private sector, IWT, freight forwarders, skippers, cargo owners, the public, etc.

Following the Workshop, the Inception Report shall be finalized by the Consultant through incorporating the comments and outcome of the workshop, and other written comments provided by the Client. The Consultant will also take the minutes of the workshop and agree with the Client on the minutes.

Task 2: Assessment of the present river shipping and inland navigation situation;

This Report should cover:

1. Current status of navigation and waterway characteristics and conditions;
2. Existing shipping and ports industry/sector, fleet capacity and condition, ports characteristics;
 - Market constraints. To run a profitable IWT service, a balanced traffic is required to enable shipping lines to calculate a competitive freight rate. Unbalanced cargo flows and lack of proper (day and night) services make it difficult for shipping liners to run a profitable service.
 - Inadequate inland ports and logistics system. Inland ports play an important role in facilitating supply chain flows through efficient logistics. Interfaces with other transport modes, such as roads and railways, are crucial to overcome the disadvantage of double handling.
 - Communication with the Private Sector. Operational channels among shipping lines, forwarders, and government are few. There is no institutionalized communication among the stakeholders. Many shippers are not aware of the ability and opportunities;
 - Regulatory constraints. Many government offices are involved in IWT management, but integrated and coordinated vision and transport planning to minimize logistics costs and law enforcement capability is weak.
 - Financial constraints for capital investment, and maintenance.
 - Other aspects and shortcomings to be looked at are described in Chapter 1.2 *Need for a Resource Management and Operations Plan for Ayeyarwady Navigation*.
3. Existing regulatory and legal framework, institutional setup and stakeholders;
 - This will be done in detail in *Task 3, Inventory and Full Assessment of the Existing Resources and Capacity of DWIR for Ayeyarwady River Navigation*, but a summary will be used in this report.
 - Review the IWT State Owned Enterprise mandate, and compare with DWIR
4. Brief economic appraisal⁶ of the actual and expected future activities of waterborne

⁶ The Consultant shall also review the Myanmar National Transport Master Plan including Inland Water Transportation, Inland Water Transport Economic Analysis Report produced under C3.3 - ESIA/SEA/EMP Supervision for Subproject 1 and Stretch 1, the Feasibility Study on the Improvement of the Navigability of the Ayeyarwady River in Myanmar and conduct a technical assessment making use of the outcome of the above reports, and in-situ missions.

Other plans such as the Strategic Transport Development plan, Multi-Sectoral Plans for Myanmar, and IWT port Development Project are to be studied and taken into consideration.

and multi-modal transport using the Ayeyarwady River Network, balancing transport demand with the realistic supply of transport systems;

5. Overview of the Safety, Efficiency and Environmental Protection measures, condition and regulations. Institutional arrangement and capacity to manage safety and environmental protection including emergency spill and response;

The Consultant shall study the socio-economic and industrial factories and agricultural profiles of the regions served by the Inland Waterway network, and define sectors of the economy, gathered in relation to their respective potential use of fluvial transport facilities. The profiles of each sector shall include relevant sectors of economic activity, agricultural, forestry, mining and tourism, and map accordingly, not in detail but enough to provide an overview.⁷

Task 3: Inventory and Assessment of the Existing Resources and Capacity of DWIR for Ayeyarwady River Navigation;

This Report should determine the organisational human capacity of DWIR, with focus on the Operational Units (Dredging, Hydrography⁸, Aids to Navigation). Other important aspects such as river regulating works should also be studied. Analyse and review DWIR's roles and responsibilities. Conduct a full Inventory and Needs Assessment⁹ of the existing Operational Units in DWIR in terms of:

1.1 Human Resources

- 1.1.1 Number and capacity of Existing Staff – at the main office, and in the Waterway Stations (between Mandalay and Yangon)
- 1.1.2. Assess the structure vis-à-vis DWIR objectives. Enough staff, training, transfer of knowledge ?

1.2 Operational Resources

⁷ Other practices in the world. The European Union (EU) has implemented several successful programs to promote IWT and intermodal transport, and to take freight off roads since 2003. The Marco Polo program gives grants in the crucial start-up phase of direct modal-shift or traffic avoidance projects or projects providing supporting services that enable freight to switch from road to rail and waterborne systems efficiently and profitably. Other programs include (i) the TransEuropean Network for Transport (TEN-T) that aims to help connect industrial regions and urban areas; link them to ports; and help establish an interoperable, intelligent traffic and transport system; (ii) INTERREG IV-A Upper Rhine that intends to support development of the Upper Rhine into an internationally competitive cross-border knowledge and innovation region; (iii) NAIADES that promotes inland waterway transport, focusing on five strategic areas for a comprehensive inland waterway transport policy: market, fleet, jobs and skills, image and infrastructure; and (iv) PLATINA that was designed to support implementation of the NAIADES European inland navigation program.

⁸ Important: Project *S3.3- Hydrographic Survey Services between Nyaung U and Yangon, and Upgrading of the Hydrographic Office* under AIRBM will start in March 2019 and will include a complete Assessment and Plan for Institutional Strengthening and Reorganization of the Hydrographic Office. The results will be ready by June 2019 and can be fully incorporated in the RMOP.

⁹ The assessments that are conducted in Task 6 are different and have to be seen in the light of the Operations that are supposed to be done, not vis-à-vis the existing functions. There will be overlaps but these will be complimentary during the assessments in Tasks 3 and 6

- 1.2.1 Conduct an Inventory of the movable goods at the Headquarters, and in the Waterway Stations. This must include the vehicles and boats (dredgers, buoy handling, survey and houseboats, barges), cranes, survey instruments, logistical support, etc. Determine the Quality and Value of all the goods;
- 1.2.2 Conduct an Inventory of the fixed facilities and structures at the Headquarters, and in the Waterway Stations. This must include the office buildings, jetties, etc. Determine the Quality and Value of all the goods;
- 1.2.3 Conduct a Full Inventory of the Materials (incl. aids to navigation in the Waterway Stations, and along the river. This must include the buoys, moorings and beacons. Determine the Quality and Value of all the goods;
- 1.2.4 Conduct a Full Inventory of the Database at the Headquarters, and in the Waterway Stations. This must include the charts, satellite maps, software, servers, etc. Determine the Quality and Value of all the goods;
- 1.2.5 Conduct a qualitative analysis of problems and opportunities.

1.3 Financial Resources

- 1.3.1 Conduct a Full Inventory of the current budget allowance, for the work, and for the operations. Indicate how much is being used for capital works, and how much for maintenance, at the Headquarters, and in the Waterway Stations. There is also a Regional Budget for the different regions.
- 1.3.2 Conduct a qualitative analysis of problems and opportunities.

1.4 Organisational Resources

- 1.4.1 Conduct a Full Assessment of the Decision-making and Execution processes. Is it centralized, decentralised ? Who takes responsibility ? Who is accountable ?
- 1.4.2 Conduct a qualitative analysis of problems and opportunities.

3.2.2. DEFINING THE SECTOR OBJECTIVES AND SCENARIOS FOR AYEYARWADY RIVER NAVIGATION

Task 4: Short-term and Long-term Ayeeyarwady River Navigation Scenarios, and Sector Objectives.

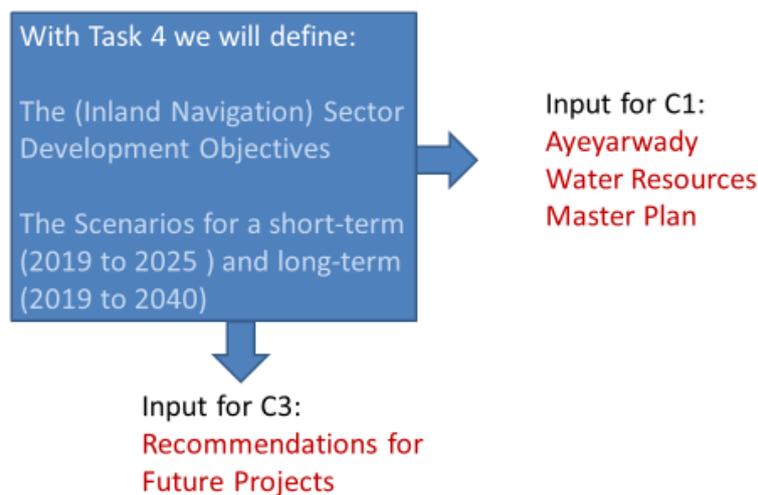
The current objectives, as formulated in the mandate of the Directorate, are only technical. There is a vision but direction and clear goals are missing. Moreover, the Inland Water Transport Enterprise (IWT) has some overlapping objectives in terms of navigation safety, modernization of inland navigation, etc.

The Consultant should identify and justify scenarios for the development of waterborne transport of cargo on the river. These scenarios must consider the river as a stand-alone waterway route and as an integrated part of the regional transportation network. On the *supply side*, include the operational, organisational and legal aspects. On the *demand side*, an analysis based on available data needs to be conducted with respect to the requirements from

the inland water transport owners. It is also important to listen carefully what the Freight Forwarders and the Logistics Industry require (from the interviews/structured survey with main public and private sector stakeholders).

Furthermore, close coordination with *Component 1 (C1) of the AIRBM¹⁰* will be required to identify the Long Term Development Objectives and Long Term Development Scenarios. Development of inland waterborne transportation depends on what happens with regards to basin-wide water resources development. On the other hand, DWIR should have a voice in the future Basin development plans. Inland navigation objectives may also influence basin development provided they are sound, environmentally strong and a good incentive for economic growth. Hence there needs to be a close coordination with Component 1 of AIRBM when defining the Sector Objectives and the Long Term Scenarios. In the cooperation with C1, the Consultant should be ready to provide advice (from a navigation perspective) to the assessment of the alternative development scenarios against a range of hydrological, environmental, social and economic indicators that are relevant to the Basin Development Objectives¹¹;

Therefore, the (Inland Navigation) Sector Development Objectives and Scenarios for a short-term (5 years, 2019 to 2025) and long-term (20 years, 2019 to 2040) are required.



3.2.3. RECOMMENDATIONS FOR FUTURE PROJECTS

Task 5: Developing Elaborated Recommendations for Future Projects

The work and framework done in Task 4 will be a good platform to make elaborated recommendations for future projects, which in turn would also benefit the AIRBM project.

¹⁰ Water Resource Management Institutions, Information & Capacity Building Component. C1 is working on a strategy and investment plan to be prepared in a participatory and multi-sectoral development process, supported by the DHI/Mott MacDonald/ICEM JV.

¹¹ The Consultant should study the water resources management plan for the Ayeyarwady Basin system (prepared by C1), in order to maximize basin environmental, social, and economic benefits, including for navigation. And finally, if required, provide advice from a navigation perspective to the preparation of guidance and processes to bring the Basin-wide Master Plan in the country's successive socio-economic and sector plans.

The assessments made earlier in the project, and the Short-term and Long-term Ayeyarwady River Navigation Scenarios, and Sector Objectives are now defined. This will be the optimal platform to derive **elaborated Recommendations for Future Projects**. The description of Each Project will be limited to a three page document including the following points:

- Title
- Background and Rationale
- Location and geography
- Objectives
- Outputs and Deliverables
- Activities¹²
- Budget
- Human Resources
- Proposed Executing/Implementing Agency
- Priority of Action (H/M/L)
- Prior Actions Required
- Follow-Up Actions Required

The Consultant shall now engage in a Workshop aiming at supporting DWIR in the decision-making process for the Assessments, the Sector Development Objectives, and the Scenarios. The Consultant shall plan and agree on the scope and schedule for **an initial internal workshop**, to present and discuss intermediate results of the studies.

The Consultant shall plan and agree with the Client on the location and dates of the Workshop(s). The Consultant will lead and facilitate the workshops with data, graphs or visualizations, and any other materials required for the Workshop. It is the responsibility of the Consultant to prepare and print all the relevant materials for decision making workshops. So organization and reporting should be done by the Consultant. This process might entail an iterative approach including internal try-out discussions with the PMU and DWIR, and other key stakeholders to be better prepared for decision making, as well as preparing and attending the workshops with key stakeholders. The Consultant shall be aware of the technical skills of the audience when they present their findings. It is recommended to make use of visualizations for presentation purposes. The Consultant will prepare the Results from the Internal Workshop.

Towards the end of the project – simultaneous with Task 6 – the proposed projects will be updated to reflect lessons learned and additional information collected during the implementation of Task 5.

3.2.4 FORMULATION OF THE RESOURCE MANAGEMENT AND OPERATIONS PLAN

Based on the results obtained up to this task, the Sector Development Objectives for Ayeyarwady River Navigation (what is required ?) can now be compared with the Existing Resources and Capacity of DWIR (what is actually available). The RMOP will describe in

¹² The level of detail of the activities here is not high, not like in the RMOP. It is a mere description of what needs to be done to give the reader a good understanding of the scope of works involved.

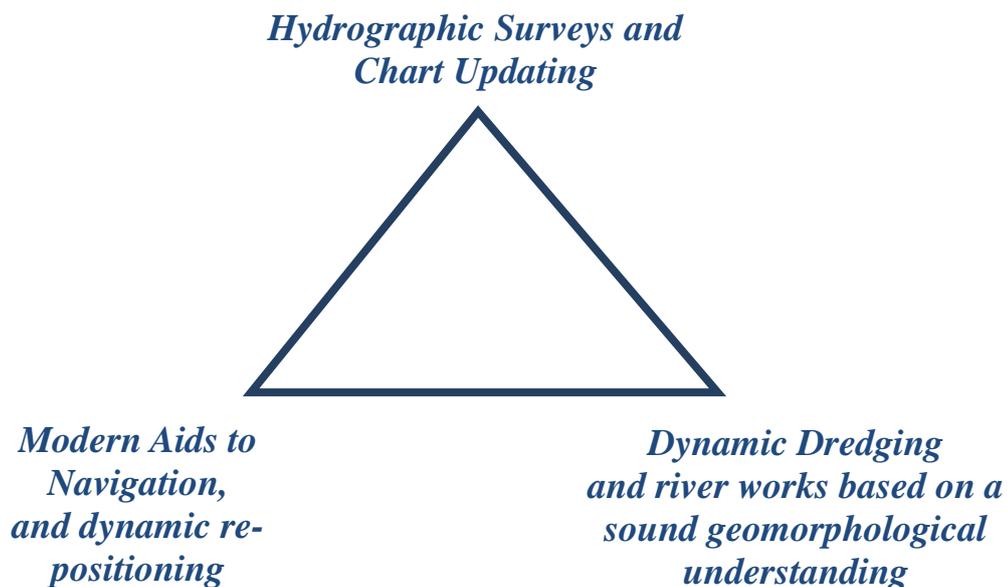
detail what is required to conduct the Operations and Tasks, and will detail how to adjust and implement the adjusted core competencies.

Task 6: Formulation of the Resources Management Plan, and Operations Plan

The RMOP will be a hands-on implementation and organisational plan that will lay out an adapted organizational structure, describe the technical tasks, assign personnel at Headquarters and in the Waterway Stations, propose an inventory of equipment, vehicles and boats, prepare the annual and detailed budgets, and will directly assist DWIR to improve day and night, efficient, and safe IWT on the Ayeyarwady River. It is important that the financial realities and responsibilities are well defined and demonstrated so as to make the process of improving navigation sustainable. The RMOP will include:

1.1 Overview of the Operations

An overview of the operational efforts that are required to be conducted every year, and often regularly throughout the year, will be described. This RMOP will not concentrate on all the functions of DWIR but will focus on the concept of ‘Dynamic Navigation’. Its operational requirements are summarized in the following Operational Triangle:



Very important here are the timelines and the coordination and interdependence between the different Operations. Also, if required other functions of DWIR will need to be studied and added to the RMOP. Important Footnote¹³.

¹³ Important: Project S3.3- Hydrographic Survey Services between Nyaung U and Yangon, and Upgrading of the Hydrographic Office under AIRBM will start in March 2019 and will include a complete Assessment and Plan for Institutional Strengthening and Reorganization of the Hydrographic Office. The results will be ready by June 2019 and can be fully incorporated in the RMOP.

1.2 Detailed Description of the Resources Management and Operations Plan

With reference to the terminology used in below text: an *Operation* is a main function of DWIR.

Examples:

- Installation of Aids to Navigation¹⁴
- Operational Maintenance of the Aids to Navigation
- Installing River Regulating works
- Conducting Bathymetric Surveys
- Preparation of the Hydrographic Charts
- Maintenance Dredging works for the improvement of access channels¹⁵
- Establishment of a Data Management Center

The *Task* is part of an Operation, and can be a routine function, or a one-time project.

Examples:

- Assembly of buoys and beacons
- Routine removal of debris from the buoys
- Re-positioning of buoys,
- Re-positioning of the shore beacons
- Installing groynes
- Hydrographic Survey Plan Preparation¹⁶
- Determination of the Chart Datum
- Installation of Bench Marks
- Alignment dredging for access channels
- Management and maintenance of the dredge vessels

To limit excess of details, and overlaps, the Operations will include the requirements for Logistical Equipment, Material, Facilities, ESMP, and Core Competencies and Personnel. All other aspects however, such as detailed activities, budgets, geographical indications, need to be done per Operational Task. The RMOP¹⁷ will include:

AT OPERATION-LEVEL

1.2.1 Name of the Operation

1.2.2 Description and Justification of the Operation

1.2.3 Objective and Deliverables of the Operation

1.2.4 Logistical Equipment required per Operation

Per equipment/vehicle the following details are to be provided:

- Number and standards required, and

¹⁴ First time assembly and deployment of buoys

¹⁵ River Works such as groynes, bunds, bank protections are not included here because they are proposed in detail in the Engineering Studies of Stretches 1 and 2

¹⁶ Project S3.3 of AIRBM will be ongoing and will include a thorough assessment of the Hydrographic Office and will propose actions for institutional strengthening, reorganization and capacity building.

¹⁷ The assessments that are conducted in Task 3 are different than those done in Task 6. The latter have to be seen in the light of the existing functions. Task 6 will be oriented towards the Operations to be done based on the new Sector Objectives. There will be overlaps but these will be complimentary during the assessments in Tasks 3 and 6.

- Technical Specifications required
- Indicate which of the current equipment can still be used, and which should be repaired, modernized or added/renewed ?
- Value (in USD)
- Distinguish the requirements per Waterway Station

1.2.4.1 Instruments (survey, etc.)

1.2.4.2 Vehicles

1.2.4.3 Boats (survey, buoy handling, speedboat, houseboats)

1.2.4.4 Dredgers, workboats, boosters and pipes

1.2.4.5 Equipment required for groynes, bank protections

1.2.4.5 Chart-making equipment

1.2.4.6 Spare Parts

1.2.5 Material required per Operation

Per item the following details are to be provided:

- Number and standards, and Technical Specifications
- Value (in USD) – budget required
- Indicate which of the current material can still be used, and which should be repaired, modernized or added/renewed ?
- Distinguish the requirements per Waterway Station

1.2.5.1 Beacons

1.2.5.2 Buoys + lanterns

1.2.5.3 ...

1.2.5.4 Spare Parts

1.2.6 Facilities required per Operation

Per item the following details are to be provided:

- Number and standards, and
- Technical Specifications
- Value (in USD) – budget required
- Indicate which of the current facilities can still be used, and which should be repaired, modernized or added/renewed ?
- Distinguish the requirements per Waterway Station

1.2.6.1 Offices

1.2.6.2 Yard, warehouses

1.2.6.3 Jetties,

1.2.6.4 Shore Crane

1.2.6.5 ...

1.2.7 Managerial structure and Institutional Strengthening required per Operation

This section will describe managerial structure and institutional strengthening required for the Operation, and especially vis-à-vis the Waterway Stations

1.2.7.1 Centralized or Decentralized ?

1.2.7.2 How to structure the organisational requirements, delegations,

responsibilities, etc. so that the sector development objectives can be achieved;

- 1.2.7.3 The Planners, Dredging Department, Hydrographic Department and Navigation Department need proper coordination between them. Coordination Mechanisms need to be put in place;
- 1.2.7.4 Coordination between DWIR and the Shipping Industry must help to reflect the real commercial situation. Proper communication channels and procedures need to be developed;
- 1.2.7.5 Are there any Legal requirements for this Operation to be put in place ?
- 1.2.7.6 Timing and Budget required for conducting changes

1.2.8 Core Competencies and Personnel required per Operation

This section will describe the core competencies required for the Operation, and especially vis-à-vis the Waterway Stations

- 1.2.8.1 An assessment file is to be designed, translated into the Myanmar language and distributed to all First line managers and Directors for staff assessment; then the other managerial and technical levels need to be interviewed, including the Waterway (River) Stations;
- 1.2.8.2 Conduct a Competencies Assessment Process. Identify the needed core competencies of the organization.
- 1.2.8.3 Define which Core Areas¹⁸ and Core Tasks. Number of staff required. Through discussions with the DWIR, and in line with the sector objectives, these core competencies are to be defined.
- 1.2.8.4 Conduct a qualitative analysis of problems and opportunities to define what needs to be done in the Operation.
- 1.2.8.5 Number of out-sourced technicians/labor required
- 1.2.8.6 Level required
- 1.2.8.7 Prepare the job descriptions
- 1.2.8.8 Prepare overall and annual work budgets

1.2.9 Training Needs Assessment, and Capacity Building required per Operation

- 1.2.9.1 DWIR staff needs to develop its competencies so that the organization aligns to its objectives
- 1.2.9.2 What training is ongoing, for each level and function ?
- 1.2.9.3 Areas of skills to be developed
- 1.2.9.4 Timing ?
- 1.2.9.5 Prepare overall and annual work budgets

1.2.10 Data Base Facilities and Management required per Operation

This section will describe what is required regarding data base structure per Operation, and how the data will be communicated and disseminated, also from the Waterway Stations. Moreover, basic IWT data and information that are needed for

¹⁸ Reference is made to the Competencies Assessment Process conducted in 2018 by the AIRBM Project for the Department of Meteorology and Hydrology

planning and management, and need to be made accessible to the skippers, and freight forwarders;

- 1.2.10.1 What kind of data and information
- 1.2.10.2 Areas of skills to be developed
- 1.2.10.3 Timing ?
- 1.2.10.4 Budget required

1.2.11 Preparation of the Environmental and Social Management Plans per Operation

This section will describe the need and description of the ESMP required for the Operation. ESMPs have been done for other Tasks under the AIRBM, examples can be obtained.

In addition, prepare an overall Matrix in excel for the Operations.

AT TASK -LEVEL

1.2.12 Name of the Task

1.2.13 Description and Justification of the Task

1.2.14 Exact Geographical location

Important here is to describe what will need to be done in each Waterway Station.

1.2.15 Objective and Deliverables

1.2.16 Activities

The level of detail of the activities must be sufficiently high. DWIR Staff should be able to conduct the Tasks based on the description of activities.

1.2.17 Timing/schedule of the Activities

1.2.18 Capital Investments per Task

Important here is to describe exactly what is required for each Waterway Station.

- 1.2.18.1 Required budget
- 1.2.18.2 Existing budget
- 1.2.18.3 Source of funds – alternative ?
- 1.2.18.4 Risks ?

1.2.19 Maintenance and Operational Budget per Task

Important here is to describe exactly what is required for each Waterway Station. This includes budgets for surveys, including consumables, and also budgets for travel and per diem for staff.

- 1.2.19.1 Required budget per year
- 1.2.19.2 Existing budget
- 1.2.19.3 Source of funds – alternative ?
- 1.2.19.4 Contingencies ?
- 1.2.19.5 Risks ?

In addition, prepare an overall Matrix in excel for the Tasks.

3.2.5 FORMULATION OF THE TRANSITION PLAN

Task 7: Formulation of the Transition Plan (TP)

An important objective of the RMOP is that the AIRBM inputs for C3 are sustainable after the World Bank project. As for any good plan to be successful, sufficient financial inputs need to be made available, especially to give the RMOP a professional start. DWIR will not be able to receive additional funds from the Government from the day the RMOP will commence. It is in the interest of the World Bank, DWIR, and the Stakeholders that the RMOP gets a professional start with sufficient resources made available.

But also, commencing an initiative like an RMOP requires the full dedication from all staff. It is not like a normal project process. If not started well during the first year, it will fail. That is why a Transition Plan is crucial.

The Consultant will therefore prepare a detailed Transition Plan (as part of the RMOP) for a period of 3 years to ensure that the intermediate financial, technical and operational resources are available to kick-start the RMOP. The TP outlines the processes to be followed during the early implementation stage of the RMOP, while the bigger plans are put in motion.

The TP is larger than an Organisational Change Management. It also includes the Management of Operations and Tasks.

Important considerations:

Transition Process actions, and Timing. List the tasks – in time - that must be accomplished during the transition process. Some tasks will be repeated for each deliverable—be sure to include each task for each deliverable. Examples of tasks:

- Coordinate transition planning meeting
- Distribute Initiation Plan
- Review deliverables against the requirements
- Review matrix of required resources/skills
- Identify activities to be completed before transition can start
- Determine timeline Transition
- Establish transition milestones
- Assign support staff to the application
- ...

Identification of Key Transition Staff, and Training Needs. For an organization to survive any planned major change, it must be supported by key members of staff at various levels. Commonly these staff members should have also played a part during the collaboration efforts that brought about the impending change, but this involvement is not necessary for success of the transition initiative. It is important that supervisors and managers that are in charge of the departments that will be impacted are brought on board at this stage to 'sell' the change that is about to occur at subordinate levels. There should also be a Transition Manager.

Based on the estimated skill levels, and some knowledge of the skill levels of the staff, estimate the training needs. List recommended knowledge transfer activities. List any courses that will be required, and include a schedule of when those courses are offered

Detailing of the Financial Resources required for the TP period. The budgets are to be calculated for all the costs, not only supportive. It is important that a 3 year package is well justified, structured and detailed.

Maintenance Planning. It is important to develop a Maintenance Plan that identifies the maintenance requirements for the outputs under the TP. For example, the service requirements of equipment, applications, infrastructure or buildings, or the system administrator and support manuals for a system. Issues that need to be resolved include determining who will be responsible for maintenance and updates, the processes that will need to be put in place to ensure that maintenance occurs on a regular basis, and records management procedures, etc.

Monitoring tools required for the TP period. It is essential that the expenditures in the process can be measured against the deliverables, and so a monitoring mechanism has to be put in place. Also who should be responsible. Performance Measurement needs to be added.

Logistics Considerations. For the RMOP to be implemented smoothly, certain elements first need to be put in place. Whether this involves new hardware, software, hiring of additional staff or contractual amendments, these issues must be addressed before attempting to start the change process.

The Transfer of Knowledge. Another key part of any transition plan is the issue of knowledge transfer. All staff that will need to use the new system must be properly trained and if the change directly impacts customers, they also need to be informed before the cut-over to the new way of doing things. This transfer of knowledge can greatly affect the way the change is perceived and, therefore, has the power to affect the success or failure of the process, so any communication plan must be handled with care.

Detailed Schedules for Implementation. Depending on the size of the project, it may not be feasible to implement it all at once. In instances where it affects the entire organization, the project can be introduced on a phased-in basis. This schedule for the use of a new system must be coordinated for minimal disruption to the company as a whole. The decisions made here will impact in which order staff are trained and the timing of communication messages.

Communication Planning. Communication is seen by many as the most important aspect of leading change. An effective communication strategy contributes to the success of a project. It is vital that a Communication Strategy be central to any planning for the management of organisational change

Identification of Risk Factors. Whenever there is change, there is the possibility of new risk factors that may not have been present before. This must be carefully considered by the transition team and all process flows must be scrutinized for exposure to various types of risk, whether it's operational risk, reputation risk or financial risk. Recommendations must be documented for all findings in the project management transition plan so the relevant parties can access and address them accordingly

4. SCOPE OF SERVICES

4.1 Role of the AIRBM, and Component 3

The activities of Component 3 are directly aligned with the World Bank Group's twin goals to reduce poverty and promote shared prosperity. The program development objective for the Series of Projects (of which the AIRBM will be the first) is to strengthen integrated, climate resilient management and development of the Ayeyarwady River Basin and national water resources. This component will help reduce poverty by safe, economical inland water transport that will provide increased opportunities for trade, market access and mobility.

Component 3 consist of the following subcomponents: (i) Structural Improvements, (ii) Operational Improvement (Navigation Aids and Hydrographic Atlas), (iii) Non-Structural Improvements and (iv) Institutional Strengthening and Implementation Support. This project falls within (iii) Non-Structural Improvements.

The DWIR, under the MOTC, is the executing agency of the AIRBMP through the AIRBM PMU. The AIRBMP Project Director is responsible for the overall management, coordination, procurement, financial management, monitoring and evaluation, and compliance with environmental and social provisions (both World Bank's and Myanmar).

DWIR will provide the overall leadership in this effort. DWIR will establish a repository for information to be provided to the Consultants. All the available reports, studies and data related to the Services will be provided to the Consultant to the extent of its availability with the Client.

The AIRBMP PMU will maintain regular contact as necessary to ensure that coordination is seamlessly, and the required information is obtained and shared between the parties in a timely manner. The PMU Component 3 Team will oversee the technical quality and scientific rigor of the consultancy, and monitor & supervise the Contract.

In Yangon the Consultant will use the Client's office as there will be a new PMU building.

For all the workshops, public consultations and stakeholder consultations the Client will be responsible to provide venue, catering and invitation of stakeholders. Planning such activities, preparation of the materials and technical explanations will be the Consultant's responsibility.

4.2 Role of the Consultant

The Consultant will work closely throughout the assignment, including but not limited to the following items: (i) definition of the project methodology during an inception phase, (ii), collect necessary data and conduct literature review, assess the actual waterborne transport activities and define the problems and opportunities, (iii) conduct the organizational assessment (iv) formulate a short-term and long-term Ayeyarwady River Navigation Scenarios, and Sector Objectives, (v) Prepare the RMOP, and finally (vi) prepare a draft Portfolio of Future Projects.

All the available reports, studies and data related to the Services will be provided to the Consultant to the extent of its availability with the Client, in printed and in digital version.

Each Report should have an Executive Summary¹⁹ for the Decision-makers. It should also be translated in Myanmar language.

The Consultant will work very closely together with the PMU and DWIR to ensure that the DWIR will feel ownership of the RMOP. Ample time for reviews of the reports and decision-making is to be reserved.

The Consultant will be responsible for accommodation and transportation of their own staff. As stated above, for the Workshops, planning, preparation of the materials and technical explanations, and results/minutes will be the Consultant's responsibility.

¹⁹ An executive summary is an important section at the beginning of a long report, plan or proposal that summarizes the document. People who read only the executive summary should get the essence of the document without fine details. The executive summary should answer the reader's questions in brief such as: What is the report about? Why is it important? What are the major findings or results? How will these findings be applied? Time lines, Costs ? What are the next steps ?

5. DELIVERABLES AND TIMELINES

The following table presents the deliverables that will be produced, and the estimated delivery time from the date of contract, review by the Client and incorporation of the comments.

Tasks	Deliverables	Estimated duration of the task (estimated)	Review Period by the Client (weeks)	Duration of Revisions after approval by the Client (final version)	Deadlines: estimated number of weeks counting from the effective date of the contract until approval by Client
Task 1	Inception Report ²⁰	3 weeks	2 weeks		
	<i>Inception Report Workshop</i>			1 week	Week nr. 6
Task 2	Full assessment of the present inland shipping and inland navigation situation	5 weeks	2 weeks	1 weeks	Week nr. 12 ²¹
Task 3	Inventory and Full Assessment of the Existing Resources and Capacity of DWIR	5 weeks	2 weeks	1 weeks	Week nr. 12
Task 4	Report on the Short-term and Long-term Scenarios, and Sector Objectives	3 weeks	2 weeks		
Task 5	Developing Elaborated Recommendations for Future Projects	3 weeks	2 weeks	1 week	Week nr. 17
	<i>Internal workshop</i>			1 week	Week nr. 15 ²²
Task 5b	The Future Projects are to be updated towards the end of the project	2 weeks	1 week	1 week	Week nr. 30
Task 6	Resources Management Plan, and Operations Plan (RMOP)	10 weeks	3 weeks	2 weeks	Week nr. 30
Task 7	Transition Plan	2 weeks	1 week	1 week	Week nr. 30
	<i>Internal workshop, and a stakeholder workshop</i>			2 weeks	Week nr. 32

		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Taks 1	Inception Report	█	█						
Task 2	Full assessment of the present inland shipping and inland navigation situation		█	█	█				
Task 3	Inventory and Full Assessment of the Existing Resources and Capacity of DWIR		█	█	█				
Task 4	Report on the Short-term and Long-term Scenarios, and Sector Objectives				█				
Task 5	Developing Elaborated Recommendations for Future Projects				█	█	█	█	█
Task 6	Resources Management Plan, and Operations Plan (RMOP)					█	█	█	█
Task 7	Transition Plan							█	█
	Workshop and finalization								█

²⁰ Should include a report on Existing Data, studies and Literature, and on Additional Information Needs. And should include the results of the Public / Private Stakeholder Consultations

²¹ Tasks 2 and 3 can be done simultaneously, and already start 1 week after the Inception Workshop

²² Task 4 can already start just after Tasks 2 and 3

6. EXPERTISE REQUIRED

6.1 Personnel

The Consultant shall provide and make available for the execution of the Programme at least the following key experts. The Consultant is requested to come up with the best Team Composition and will require additional key experts

1. Team Leader/Strategic Planner
2. Transport Economist, inland shipping Specialty
3. Inland Shipping Operations Expert
4. Institutional and Capacity Building Expert
5. Environmental and Social Expert

The qualification and experience requirements for key staff is as follows:

1) Team Leader/Strategic Planner

Responsible for overall management and acts as main expert in Asset management and Strategic Planning, and responsible for the overall strategic and operational planning and navigation specific aspects covering all aspects on Inland Shipping dealing with Fleet, Safety, River Engineering, Waterways

- (a) Transport Planner, Master Mariner, Master degree in Nautical Sciences, or River Engineering, or Maritime Planning, or Strategic Planning with good knowledge of Inland Shipping
- (b) Minimum 10 years specific experience in transport planning, shipping, management of waterway and port projects
- (c) Documented knowledge in topics such as River Hydrography, Charting and Communication Systems, Aids to Navigation
- (d) Expertise in Asset Management
- (e) Fluent oral and written English.

2) Transport Economist, Inland Shipping Specialty (key expert)

Responsible for the transport economic aspects, economic analysis and forecasts

- (a) Master Degree in Transport Economics
- (b) Minimum 5 years solid experience in transport forecasting and managing feasibility studies for similar projects on inland waterways economics and planning
- (c) Documented knowledge and experience in identifying costing and pricing
- (d) Documented knowledge and experience in shipping and IWT, or have participated as T.E. in at least 3 projects dealing with shipping and IWT,
- (e) Fluent oral and written English.

3) Inland Shipping Operations Expert (key expert)

Responsible for all aspects related to navigation, dredging, river engineering, waterways, rules and regulations

- (a) Civil Engineer with focus on IWT Operations/River Engineering, or Master Degree in Nautical Sciences
- (b) Documented knowledge and experience in dredging, IWT Operations
- (c) Documented knowledge and expertise in the Hydrography, Aids to Navigation, dredging operations, and HR management in dredging operations
- (d) Expertise in Port Planning, Port Locating is preferable,
- (e) Expertise in Asset Management,
- (f) Fluent oral and written English.

4) Institutional and Capacity Building Expert (key expert)

Responsible for all aspects related to Institutional Strengthening, Training, IWT Promotion and Marketing

- (a) At least 5 years international experience in maritime/inland transport Institutional aspects and Organization
- (b) High experience with Asset Management
- (c) High experience with IWT Capacity Building
- (d) Fluent oral and written English.

5) Environmental and Social Expert (key expert)

Responsible for all aspects related to Social and Environmental aspects

- (a) Degree in Socio-Environmental Science, focus on marine environments or nautical transport related
- (b) At least 5 years international experience strategic environmental and social planning
- (c) High experience ESMP formulation for IWT projects
- (d) High experience in Safety, Efficiency and Environmental Protection measures
- (e) Preferably on river projects
- (f) Fluent oral and written English.

Above listed positions are only the critical key positions, and the Consultants shall estimate and propose the number non-key professional staff (e.g National IWT Operations Specialist, National Navigation Specialist, National Shipping Specialist, Administrator/Coordinator and support staff that are necessary for the execution of the Services.

ANNEX 1: COORDINATION BETWEEN THE OPERATIONS

A comparison between the Hydrographic Survey Cycle and the Maintenance Dredging Cycle will learn that both cycles have the same number of steps. For example, in the Hydrographic Survey Cycle an outgoing red arrow at Step No. 6, indicating that before the entire survey execution is completed all preliminary results will be provided to the Dredging Dept. In the cycle of the Dredging Dept. there is an incoming red arrow at Step No. 2 to reflect that the preliminary survey data will be provided to the Dredging Department before the end of December. This is allowing the staff of the Dredging Dept. to immediately start drafting the Maintenance Dredging Plan 2018. In the below table this preliminary survey data transfer is explained by similar red arrows.

STEP	Hydrographic Survey Cycle	STEP	Maintenance Dredging Cycle
1	Responsible Authority DWIR instructs Survey Dept. to prepare Stretch 1 Survey Plan.	1	Responsible Authority DWIR instructs Dredging Dept. to prepare Stretch 1 Dredging Plan.
2	Survey Dept. prepares Stretch 1 Survey Plan.	2	Dredging Dept. prepares Stretch 1 Dredging Plan.
3	Survey Dept. issues Survey plan to Responsible Authority DWIR for approval.		Preliminary Survey Data made available by Survey Dept.
4	Responsible Authority accepts the plan	3	Dredging Dept. issues Dredging Plan to Responsible Authority DWIR for approval.
5	Responsible Authority DWIR instructs the Survey Dept. to execute the Survey Plan.	4	Responsible Authority accepts the Plan.
6	Survey Dept. executes Stretch 1 Survey Plan.	5	Responsible Authority DWIR instructs the Dredging Dept. to execute the Dredging Plan.
	Survey Dept. completes surveys and provides preliminary results to Dredging Dept.	6	Dredging Dept. executes Stretch 1 Dredging Plan.
7	Survey Dept. issues Completion Report of Execution to Responsible Authority DWIR for approval.	7	Dredging Dept. issues Completion Report of Execution to Responsible Authority DWIR for approval.
8	Responsible Authority accepts the plan and send Completion Report to Dredging Dept.	8	Responsible Authority accepts the plan and send Completion Report to relevant Depts.
9	Responsible Authority requests Evaluation Report of Survey Plan and Execution of Survey Plan; Evaluation Report is circulated to management level and relevant technical staff.	9	Responsible Authority requests Evaluation Report of Plan and Execution of Dredging; Evaluation Report is shared with relevant management levels and relevant technical staff.