

DEPARTMENT OF HYDROLOGY AND METEOROLOGY BARMAHAL, KATHMANDU

3 Terms of Reference for Integrator

3.1 Background

Nepal is a small land-locked country in the heart of the Himalayas, bordered by India and China. The country is about 850 km along its east-west axis and about 200 km north to south. Nepal is divided into three geographical regions that run like horizontal strips from west to east, the high mountains (35% of the total area), the middle hills (42% of the total area), the lower altitude Tarai (23% of total area). Each region has distinct altitude and climatic characteristics, varying from alpine to sub-tropical conditions. Altitudes range from over 8800 meters in the north at the peak of Mount Everest, to just 60 meters above sea level in the southern plains.

The Himalayan region is the most glaciated area in the world outside of the Polar Regions, and is often referred to as the “Third Pole.” It is the source of major rivers that flow as far west as Iran, and east to the China Sea. All of Nepal’s rivers flow into the Ganges, a river of great cultural and religious significance and the most populous river basin in the world. Some 650 million people live in the Ganges basin, shared by Bangladesh, China, India and Nepal. Over 40% of Ganges waters rise in Nepal making the country’s climate and hydrology significant for the region as a whole.

In 2011, Nepal was ranked the 4th most climate vulnerable country in the world. Nepal’s extremely varied and challenging geography, its poor, resource dependent population, and its weak institutional capacity all combine to create this vulnerability. Climate projections for the country predict increases in temperature and precipitation and increases in the frequency of extreme events. A climate risk assessment carried out at the sector, district and community levels identified the following critical risks: (a) water quantity and quality, (b) food security (c) eco-system, (d) animal and human health, (e) vulnerable groups, and (f) economic growth and sustainability.

The greatest influence on Nepal's climate is the South Asian monsoon. The monsoon enters Nepal from the southeast, with precipitation beginning as it reaches the lower hills of the Churia range, which act as the first monsoon barrier. The high mountains of the Himalayan range act as a final barrier to the monsoon, creating a rain shadow to the north in the Himalayan Plateau. Average annual rainfall is approximately 1800 mm. The Himalayan glaciers are another prominent feature of Nepal’s climate. In addition to the effect of the high mountain range on the monsoon, the snow and ice of the glaciers act as natural water storage. Glacier melt is an important contributor to base flows in the Himalayan rivers and changes in the snow line and glacier melt dynamics could have serious effects on high altitude ecosystems and mountain communities. The melting of glaciers has also led to growth of numerous glacial lakes in Nepal. Glacial lakes form when glaciers melt and water is captured behind the glacier’s terminal moraine (a natural dam of rubble and ice that forms at the tongue of a glacier.) As the pressure of the growing glacial lake increases, these natural dams can become unstable causing Glacial Lake Outburst Floods (GLOFs).

Nepal has a dense network of 6000 rivers. Together with groundwater, these substantial water resources underpin key growth sectors including agriculture, industry and hydropower, as

well as providing essential water supplies for domestic use. But 80% of rainfall is concentrated during the summer monsoons between the months of June and September, bringing devastating floods and mudslides. During the remaining eight months there is very little precipitation and the country often suffers drought.

Climate change is expected to affect agricultural productivity through three primary channels: (i) rising temperatures, (ii) climate variability and related changes in the timing, intensity, and volume of rainfall, and (iii) rising carbon dioxide levels. The magnitude and consequences of these changes on agriculture is currently highly uncertain because of the extreme complexities of downscaling global climate models and in particular for projecting changes at high elevations and in monsoonal climates. Nevertheless, evidence suggests that the observed changes in temperatures and soil moisture are negatively affecting agriculture in many parts of Nepal.

The need for a well functioning early warning system was identified as a key priority in the GoN's National Strategy for Disaster Risk Management. Key elements of a well functioning modern hydro-meteorological system include efficient data collection, transmission, storage, processing, use and dissemination to the public, government agencies and targeted user groups. In Nepal, the Department of Hydrology and Meteorology (under the Ministry of Environment) is mandated to collect, process and disseminate hydrological, meteorological and climate information to a range of users. Much of Nepal's hydrological and meteorological system relies on manual data collection with infrequent and unreliable reporting. There is real time access to some data and a limited automated hydrological and meteorological networks. Transmission of data from the existing observation networks is also irregular and mainly relies on mobile telephones with information redistributed through the internet. From a service delivery standpoint, there is no system in Nepal for issuing authoritative warnings for weather and weather extremes to government authorities and key user groups, nor a system for issuing timely and targeted warnings to communities at high risk. For local communities, the implications of a weak early warning system have extraordinary costs in terms of the likely impact on their lives, livelihoods and management of assets.

Agro-meteorological information is another urgent priority to manage and mitigate climate risk in Nepal's large and highly vulnerable agriculture sector, and to underpin the country's food security efforts. A science-based agriculture information system is needed to deliver information and climate risk management tools that will provide the agricultural sector with a decision support information system to mitigate climate-related agricultural production risks. Seasonal climate predictions are currently not available in Nepal, but could be developed. Other climate change adaptation information tools could include an agro-weather and agro-climate advisory system that might provide (i) an agricultural drought reference index to inform farming communities whether the amount of water in a root zone is sufficient or not to meet the needs of a crop at a particular time, (ii) pesticide application advisories on how, when and when not to apply pesticides as part of Integrated Pest Management strategies; (iii) crop planting advisories that can deliver timely information about when to plant in order to achieve higher outputs; (iv) pest and disease information to provide farmers and agricultural extension workers with targeted and timely information on the likely risks of specific pests and plant diseases; and (v) data required for developing an agriculture insurance scheme(s).

Transformation of Nepal's hydro-meteorological services into a modern, service oriented system will build resilience today as well as adaptive capacity for the future. Nepal today is hard pressed to cope with the current extremes of weather and climate variability. A transformation of the system is needed to prepare for the consequences of climate change.

Terms of Reference for General Consultant / Integrator

Strong capacity to monitor and forecast climate variability and to deliver this information in timely and usable ways is essential to improving climate resilience in water and weather dependent sectors and in vulnerable communities. Given its unique geographic position, modernization of the hydro-meteorological system in Nepal will also generate water, weather and climate information that can be of substantial regional and global value.

3.2 Project Description

The objective of the Nepal PPCR Project Building Resilience to Climate-Related Hazards (BRCH) are to enhance the capacity of the DHM to meet Nepal's need for timely and accurate weather, climate and water related information and warning services and to enhance agricultural productivity and reduce food insecurity to increase society's resilience to climate change. The project comprises four components briefly described below. A more detailed description is in Annex A to this Terms of Reference.

Component A: Institutional strengthening, capacity building and implementation support of DHM (US\$5.10 million)

This component aims to strengthen DHM legal and regulatory framework, improve its institutional performance as main provider of weather, climate and hydrological information for the nation, built capacity of its personnel and management, ensure operability of the future networks and support project implementation. There are three sub-components in the regional component:

- Sub-Component A.1 – Institutional Strengthening and Development of Legal and Regulatory Framework - which includes (1.1) DHM institutional development and strategic planning; (1.2) development of a legal and regulatory framework for DHM operations including development of Standard Operating Procedures (SOPs), assessment of new business models and enhancing public private partnerships; and (1.3) twinning support of advanced NMSs and WMO.
- Sub-Component A.2 – Capacity Building and Training - which includes (2.1) Developing and implementing a DHM capacity building and training program (i) DHM personnel training and retraining; professional orientation of DHM senior staff; (ii) education at universities; training at WMO regional centers; and (2.2) Implementing training activities (workshops, round tables, etc.)for major users (DRM, agriculture, water resources, energy, health, civil aviation).
- Sub-Component A.3 – Systems Design and integration, project management and monitoring - which includes (3.1) detailed design of DHM systems, procurement and implementation support (General Consultant/Integrator); (3.2) project management, monitoring, reporting and evaluation;(3.3) development of needs assessment and design of air, water quality and sediment monitoring networks; (3.4)development design documents for reconstruction/refurbishment of DHM HQs and regional offices; (3.5) support for environmental protection/due diligence.

Component B: Modernization of the observation networks and forecasting (US\$16.45 million)

Terms of Reference for General Consultant / Integrator

This component focuses on the information system that is at the center of the meteorological and hydrological analysis and forecasting system. It aims to modernize DHM observation networks, communication and ICT system, improve hydro-meteorological numerical prediction system and refurbish DHM offices and facilities. This component has the following four sub-components:

- Sub-Component B.1 – Technical modernization of observation networks - - which includes (1.1) rehabilitation and re-equipping of hydrological network; (1.2) improvement of the environment of the hydrological stations (bank stabilization, improvement of flow conditions, engineering works, etc.); (1.3) special equipment for hydrological stations (current meters, ADCPs, sediment samplers, tracer laboratory equip., training , staff gauges, boats); (1.4) delivery and installation of weather radar for detection of heavy precipitation and other meteorological phenomena; (1.5) renewal of temperature-wind soundings; (1.6) upgrade and expansion of automated surface observing system (ASOS) for aviation safety; (1.7) surface meteorological and lightning detection networks; (1.8) glacier and snow monitoring (equipment and pilot surveys); (1.8) establishment of DHM calibration laboratories; and (1.9) vehicles to support DHM field operations, maintenance and inspections.
- Sub-Component B.2 –Modernization of DHM communication and ICT system. This sub-component will (2.1) include communication equipment (DHM networks);(2.2)archiving, data base development and inspections; and (2.3) remote sensing and GIS laboratory.
- Sub-Component B.3 – Improvement of numerical hydro-meteorological prediction system. This sub-component includes (3.1) computers for numerical weather prediction to be installed at the National Center for Information Technology.
- Sub-Component B.4– Design and pilot operation of environmental monitoring system. This sub-component will include (4.1) Pilot operation of air, water quality and sediment monitoring networks.
- Sub-Component B.5 – Reconstruction and refurbishment of DHM offices and facilities. This sub-component includes (5.1) reconstruction/refurbishment of DHM offices and facilities.

Component C: Enhancement of the Service Delivery System of DHM (US\$3.45 million)

The objective of this component is to enhance the service delivery system by creating public weather service, developing new information products for vulnerable communities and main weather dependent sectors of economy. Main sub-components are:

- Sub-Component C.1 – Introduction of Public Weather Service (DRM, agriculture, media, civil aviation, health, energy, water resources). This sub-component includes (1.1) forecaster workstations; (1.2) specialized communication instruments including TV studio, all hazards radio, websites; (1.3) development and operationalization of forecast accuracy verification system and survey of forecast utility.
- Sub-Component C.2 –Support of DRM operations including piloting of an end-to-end early warning system pilot in two river basins in western and eastern parts of Nepal.

Terms of Reference for General Consultant / Integrator

This sub-component includes (2.1) development of SOPs, warning protocols and signals agreed with all basin stakeholders including communities; (2.2) support to DRM forecasting (workstations), upgrading communication systems, software and DRM data bases;(2.3) development of digital elevation map for Tarai region; and (2.4) operational training and drills with government stakeholders and communities.

- Sub-Component C.3– Improvement of service delivery to communities including introduction of mobile applications). This includes the development of applications for both basic mobile phones and smart phones. The SMS system should be able to target specific groups and geographical locations. Smart phone applications should be developed in coordination with WMO since there are several WMO Members with the capacity and interest to assist DHM.
- Sub-Component C.4 – Creation of National Climate Service. This sub-component includes (4.1) computer systems to access climate information from WMO and other regional centers; (4.2) support for the development of National Framework for Climate Services through engagement of all climate-sensitive sectors and linked to the Global Framework for Climate Services and support to sectorial working groups; (4.3) development of a digital library of all climate-relevant information from all sectors for Nepal, software development to downscale climate forecasts; and (4.4) Operational support and information exchange between water resources, public health and climate data bases.

Component D: Pilot DHM climate and weather information for users in agriculture – Agriculture Management Information System (US\$6.0 million)

The objective of this component is to enhance the information provided to farmers to increase productivity and reduce losses from meteorological and hydrological hazards. The main sub-components are:

- Sub-Component D.1 – Agricultural Management Information System – Portal, hardware and software. This sub-component includes (1.1) Detailed design of AMIS-Portal and assess information requirements; (1.2) Central facility (e.g., software, data and web server, computer, monitor, printer digital color scanner, plotter); (1.3) Retrofit GIS office space for AMIS operation; (1.4) Vehicle for farm community outreach, data collection, motor bike; (1.5) District and extension service facility; and (1.6) AMIS infrastructure at NARC (software and hardware) Central.
- Sub-Component D.2 – Information Products. This sub-component includes (2.1) Agriculture data digitizing, archive; (2.2) Development of agriculture monitoring products and decision tools; (2.3) Exploratory research to develop agricultural insurance..
- Sub-component D.3 – Information Dissemination. This sub-component includes (3.1) Introducing mobile in AMIS; (2) Advertisements – mass media (FM radio, TV channels); (3.3) Publications; and (3.4) Feasibility study for AMIS-Portal product dissemination via different means (e.g., mobile, TV, etc.)
- Sub-Component D.4 – Capacity building. This sub-component includes (4.1) Data analysis professional raining (short courses and advanced degree); (4.2) Training

Terms of Reference for General Consultant / Integrator

stakeholders (Regional, district and community level); (4.3) Farmers' groups partnership (simple rain gauge and thermometer); and (4.4) Agro-climate workshop at different level (regional, district).

- Sub-Component D.5 – Project management, monitoring and evaluation of Component D.

The proposed consultancy assignment is a critical element of the project design, which will ensure that all systems are fully connected and that common procedures create interoperable system, networks and services.

3.3 Objectives, Scope and Description of Consultant's Services

The main objective of Consulting Services under these Terms of Reference is the development of technical documentation for the implementation of each of the project components (including detailed technical design of the modernized systems, technical specifications and/or tender documents for equipment and service) and effective technical support for Project activities in order to achieve the project goals and provide timely quality services.

The priority activity of the Consultant is to ensure the integration of various Project components and activities into a unified observing, forecasting and delivery system and to providing capacity for effective functioning of this system. In addition, the Consultant's activities must ensure functional compatibility of the modernized meteorological and hydrological systems with the global/regional systems as recommended by WMO.

The work of the Consultant will consist of two Phases.

Phase I covers the detailed technical preparation for project implementation and involves activities, indicated in Section 3.3.1, including the development of sets of detailed technical documents on composition and contents of project activities to elaborate the Procurement and Implementation Plans and preparation of first priority bid documents. This phase should be completed within 6 months after signing of the contract.

Phase II involves the procurement and implementation support, monitoring of the execution of the Project Implementation Plan and includes activities, indicated in Section 3.3.2. The Consultant will also support DHM in implementation of activities, which would improve the Project performance.

It is expected that the Consultant will continue to provide assistance to DHM until full completion of all of the activities specified in the Project. The actual length of the assignment will depend on the performance period of the integral components of BRCH to be monitored by the Consultant.

Consultant may propose additional activities, aimed at effective execution of all BRCH activities.

Within a month, after the contract signing, the Consultant will prepare detailed Project Work Schedule, listing the tasks and relevant schedule of task performance information. This Schedule should be included in the Introductory Report.

3.3.1 Phase I –DHM's Systems assessment and development of a detailed project design

In the first Phase, the objective of the Consultant is to analyze the current situation based on own assessment and existing project documents, and develop detailed technical documents on

Terms of Reference for General Consultant / Integrator

the integrated modernization of DHM networks and system of services provision to main economic sectors and public. The Consultant will contribute to further elaboration of DHM services provision system throughout the whole Project implementation period.

The main requirements for project design are:

- (i) Integrating of existing and modernized sub-systems of DHM and their interrelated sustainable functioning including the possibility of further development/upgrading of all sub-systems;
- (ii) Ensuring the good functioning of modernized sub-systems by providing appropriate input to supervision of implementation of relevant tasks;
- (iii) Assisting DHM in the preparation and launching of planned activities on institutional strengthening and capacity building for effective implementation of Project activities and, eventually, improving quality of meteorological and hydrological services.

Total duration of Phase I is six (6) months and involves the following tasks:

Task 1: Analysis of the current situation in DHM including the following sub-tasks:

- Sub-task 1.1 Analysis of DHM legal, regulatory and institutional framework;
- Sub-task 1.2 Evaluation of capacity of staff;
- Sub-task 1.3 Analysis of all observation networks including meteorological and hydrological observations, data collection and quality assurance/quality control system;
- Sub-task 1.4 Analysis of capacity of ICT systems, hydro-meteorological data processing and storage, forecasting;
- Sub-task 1.5 Assessment of data and information requirements of main users and assessment of quality of DHM services provided to main users;

Task 2: Develop in consultation with DHM and MoAD a detailed Project Implementation Plan which includes:

Sub-task 2.1 Development recommendations for institutional strengthening and development of hydro-met services, which take into account needs of major information users and possible options of DHM business models and financing;

Sub-task 2.2 Development recommendations for DHM's staff professional development, including (i) basic education, technical training, retraining and professional development of hydro-met specialists and (ii) joint training of staff and main customers to increase DHM's professional development in providing customer-oriented services;

Sub-task 2.3 Modernization of the DHM observation networks and technological systems;

Sub-task 2.4 Improvement of hydro-met monitoring and forecasting system to provide timely warning of dangerous hydro-meteorological events;

Terms of Reference for General Consultant / Integrator

Sub-task 2.5 Improvement of service provision taking into account current and potential requirements in weather, climate and hydrological information, products and services.

Sub-task 2.6 Recommendations for AMIS development in light with integration with DHM data collection and communication systems

Sub-task 2.6 Development of Implementation Plans for each of the four components with detailed list of activities for the first year of the Project implementation.

Task 3. Development Technical documentation and additional materials for DHM consideration, which include:

- Sub-task 3.1 Development of the set of documents on the Technical design for the retrofitting of the observation networks and technological systems of the national meteorological and hydrological services.
- Sub-task 3.2 Development of preliminary estimates of operating and maintenance costs which will be necessary for sustainable operation of modernized DHM system.
- Sub-task 3.3 Preparation of proposals on sustaining the modernization program based on various budgets and costs alternatives.
- Sub-task 3.4 Development of technical specifications and tender documentation (bidding documents) for priority procurement packages, which are planned to be launched in the first 18 months of project implementation.

3.3.2 Phase II - Procurement and implementation support

Since the implementing capacity of DHM needs improvement, the Consultant will assist DHM in implementation and performance monitoring of BRCH activities throughout the project until its completion. Phase II includes the following tasks:

Task 1 – Assistance in development of tender (bidding) documents

- Sub-task 1.1 Develop technical requirements and technical specifications in accordance with WB requirements for bidding procedures under the Procurement Plan;
- Sub-task 1.2 Develop bidding documentation packages according to the Procurement Plan;
- Sub-task 1.3 Assist in the obtaining of the WB ‘no objection’ forbidding documentation;
- Sub-task 1.4 Assist in implementation of the bidding process (participation in pre-tender conferences, answering questions of participants and so on).

Task 2 – Tender Evaluation and Contract Negotiations

- Sub-task 2.1 Participate in evaluation, including expert assessment of proposed technical solutions for conformity with the technical project and bidding documentation, providing assistance in preparation of Evaluation Reports;
- Sub-task 2.2 Assist in conducting contract negotiations with proposed bid winners.

Task 3 – Contract Performance Monitoring

- Sub-task 3.1 Provide support to the supervision of contract implementation (compliance and quality assurance);

Terms of Reference for General Consultant / Integrator

- Sub-task 3.2 Set out a supervision plan for the contracts, overview of work performance under contracts and verify the need and compliance to the contract conditions of the offered changes to the list and scope of goods and services;
- Sub-task 3.3 Provide assistance in managing contractors' activities, performing separate tasks as agreed with DHM.

Task 4 – Operational Acceptance

- Sub-task 4.1 Provide technical supervision and timely coordination of work and activities on equipment installation, commissioning, acceptance of individual components of systems under modernization and installation;
- Sub-task 4.2 Provide technical supervision of commissioning of developed system and start-up operations;
- Sub-task 4.3 Assist DHM in checking the consistency and compatibility of plans and work of subcontractors to ensure interoperability of all system's components;
- Sub-task 4.4 Provide periodic analysis of contracts performance and preparation of reports on overall BRCH implementation progress.

Task 5 - Assistance in improving the effectiveness of Program implementation

- Sub-task 5.1 In consultation with DHM develop and provide Program evaluation methods (standards) to ensure quality and reliability during project implementation;
- Sub-task 5.2 Provide support to monitoring BRCH's Project Development Objective (PDO) Indicators and Intermediate Results Indicators (Annex 1 on the Project Appraisal Document);
- Sub-task 5.3 Provide assistance to DHM in analyzing BRCH implementation progress;
- Sub-task 5.4 Assist DHM in developing proposals and justification for introduction of changes to the Procurement Plan and BRCH Implementation Plan.
- Sub-task 5.5 Updating estimates of operating and maintenance costs necessary for sustainable operation of modernized DHM system.
- Sub-Task 5.6 –Provide assistance to MoAD and DHM on streaming data for AMIS, and linking AMIS to World Agro-Meteorological Information Services (WAMIS) to ensure seamless integration between hydro-met and agriculture sector.

3.4 Expected Results / Outputs

3.4.1 Expected results / outputs under Phase I will include:

- Analytical documents for DHM which should include the following:
 - Review of DHM legal, regulatory and institutional framework, operational processes and procedures; including analysis of organization structure and regulatory support of DHM activities and proposals for the development concept and program of institutional strengthening and reorganization of national hydro-meteorological services.

Terms of Reference for General Consultant / Integrator

- Evaluation of meteorological, hydrological, agro-meteorological and other observation networks and meteorological and hydrological data collection system, including the status of DHM ICT and proposals on improving observation and data collection systems;
- Review of DHM information and technological base, including technologies of reception, processing and storage of meteorological and hydrological data, generation of meteorological and hydrological products and delivery of information products to consumers, such as storm warnings, weather forecasts, impact forecasts and climate assessments and proposals on development of information technologies considering current and potential needs of consumers in meteorological and hydrological information, information products and services. Proposals on development of information technologies should be based on developed strategy, aimed at improving effectiveness and quality of services for the economy and society in order to prevent and reduce damage from natural disasters, including problems of planning and preparedness for emergency situations;
- Evaluation of service delivery system for existing and potential consumers of meteorological and hydrological information and information products and proposals on strengthening of the system;
- Review of DHM technological and methodical base and staffing capacity and the system of training, retraining and professional development of personnel in meteorology, hydrology and climate and proposals on strengthening the technical base and staffing capacity, including activities on development of the system of training, retraining and professional development of personnel;
- Assessment of DHM operating expenses needed to support the sustainable functioning of the modernized DHM systems following completion of the Project;
- Sets of technical documents to retrofit observation networks and technological systems of meteorological and hydrological services (Technical design).
- Technical specifications and bidding documentation for priority procurement packages (up to 18 months from the beginning of the Project implementation).
- Proposals on composition and contents of Program activities (updating the Procurement Plan).
- Program Implementation Plan.
- Program and proposed training Schedule for DHM as related to Project implementation schedule.

3.4.2 Expected results under Phase 2 will include:

- Bidding documentation packages, approved by WB.
- Execution by DHM of full cycle of tender procedures in accordance with WB requirements and Procurement Plan.
- Evaluation reports on the bids and contracts with the winning bids.
- Supervision plan for the implementation of contracts under BRCH.

Terms of Reference for General Consultant / Integrator

- Report on the supervision of contracts performance under the BRCH and satisfactorily resolution of outstanding issues that impede the implementation of the project.
- Contribution to monitoring of achievement of PDO and Intermediate Results Indicators.
- Claims administration procedure for DHM in case of complaints for equipment installed in the course of implementation of Project contracts.
- Proposals to upgrade the procurement plan.

3.5 Institutional Management Structure and Coordination

The GoN is establishing a Climate Change Coordination Committee, chaired by the Honorable Minister for Environment and the NPC member responsible for Environment, to provide oversight and guidance for all climate related projects in the country. In addition, for this Project specifically:

Overall coordination for this project and the other four PPCR projects will be provided by the Ministry of Science, Technology and Environment (MoSTE) as the focal Ministry for the PPCR.

An inter-Ministerial Project Steering Committee has been established, chaired by the Secretary, MoSTE, and including representatives from MOF, National Planning Commission (NPC), Department of Hydrology and Meteorology (DHM), Ministry of Agriculture Development (MoAD) and other key stakeholders, to provide policy guidance and ensure coordination across Components A, B, C and D.

Two Technical Committees has been established, one chaired by DHM focusing on Components A, B and C, and the other chaired by MoAD focusing on Component D. The Technical Committees will be chaired by Joint Secretaries/Directors General and include relevant technical experts to strengthen project implementation. The two committees will coordinate as needed to support effective implementation of the project.

Project Management Units (PMUs) will be established in each of the two implementing agencies (DHM and MoAD) and will include technical, financial, procurement, environment and social specialists as needed. The PMUs will report to their respective Technical Committees, and the Technical Committees will liaise with the Mainstreaming Climate Change Risk Management in Development Project of the Nepal PPCR to ensure knowledge management across the five SPCR Program Components.

The Consultant will assume the role of General Consultant – System Integrator to support the work of DHM, MoAD and PMUs. The General Consultant - Systems Integrator will perform the functions in accordance with the Contract for provision of consulting services agreed with the DHM and PMU.

3.6 Client's Commitments (Inputs)

The General Consultant – Systems Integrator's main support of BRCH implementation will be through consultation with the personnel of DHM on strategic issues and project related

Terms of Reference for General Consultant / Integrator

activities. Such support will help transfer of knowledge and experience, and strengthen the institutional capacity of DHM and MoAD to lead the implementation of their respective Project components, including integration of the new systems into current institutional structures.

Staff of the PMUs and DHM will provide basic organizational support to the General Consultant.

At the request of the Consultant, the DHM (and MoAD) should present the following documents:

- Information and data for all Project objectives, including the information on status of observation networks, measuring tools, communication and computing resources, data processing tools and other;
- Project Appraisal Report (PAD), results of missions and other World Bank materials, related to preparation and implementation of the Project;
- Description of current organizational structure and finances system of DHM, legal and regulatory documents in support of activities.

Authorized personnel of DHM (and MoAD) (Technical Coordinators) will also be responsible for the initial coordination and for setting individual goals for each of the systems under modernization and management of activities on upgrading of the entire system.

In addition, DHM (and MoAD) should organize access to their working facilities, stations and posts and assist Consultant in visits and organization of meetings with personnel of ministries, institutions and organizations of BRCH participants, which are interested in Project implementation.

Consultant's staff may work in central offices of DHM and, if necessary, in any other location, depending on active tasks.

When preparing Technical Proposal, Consultant must include a brief description of logistics support base it plans to establish in Kathmandu. This information should, in particular, describe office premises, transportation, office equipment, service personnel, such as secretaries, assistants, translators, legal assistants and others.

In the Technical Proposal, the Consultant should provide a comprehensive and clear description regarding the assistance (which may be required) from DHM (and MoAD).

3.7 General Requirements of the Consultant

The Consultant is expected to have at least 5 years of working experience in the hydro-met sector both in developed and developing countries. Firms with less than 5 years of working experience will not be considered for this assignment. The Consultant is expected to have experience with the design and implementation of large scale hydro-met modernization projects including the development of hydro-meteorological observation systems and the relevant capacity development needs. The Consultant should also have extensive experience with hydro-met service delivery to key economic sectors including DRM and agriculture.

The staffing requirements of key personnel for this assignment include at least the following:

- Project Management (e.g. project manager, technical specialist)

Terms of Reference for General Consultant / Integrator

- Observation networks, ICT and Forecasting Systems Support (eg. Hydro-met systems design expert, radar expert, observing system expert, hydrological and meteorological forecasting expert, ICT expert)
- Methodological Support (e.g. agro-meteorology and climate specialist, legal expert, technical experts, capacity building and communications specialist, hydro-met service provision expert)

3.8 Reporting Requirements

After implementation scope of works describes in these Terms of Reference, the Consultant shall provide the following reporting documents:

- Introductory Report.
- Interim (Progress) Reports of Phase I (3 month after signing of Contract),
- Report on Performance Results of Phase I,
- Interim Reports of Phase II
- Report on Performance Results of Phase II,
- Final Report on Program performance results (as related to execution of current Terms of Reference).

Introductory Report should contain Consultant's Work Plan, assignment of functions for Consultant's Project personnel, including any changes or additions, attained during negotiations on signing of the Contract and the Procedure of interaction of Project's General Consultant - Systems Integrator with DHM (and MoAD) and PMUs. This Report must also clearly specify all risks and issues, which may negatively affect Project deadlines and effective execution of all works.

Interim report should be provided in hard copies and in electronic format.

Interim Report of Phase I should include:

- Detailed description of work performed;
- Analytical Reports (contents in accordance with Section 3.4.1);
- Technical specifications and bidding documents for the following packages:

Report should be provided in 3 months after Contract with the Consultant enters into force.

Interim Report of Phase I should be provided in hard copies and in electronic format. Technical requirements (specifications) and bidding documents should be provided in hard copies and in electronic format. All documents should be provided in English language.

Report on implementation results of Phase I should be prepared on the basis of reporting documents, developed during Phase I (see Section 3.4 – expected results/outputs), and, in addition, summary of results achieved during implementation of Phase I and technical requirements for procurement packages for the first year of Project implementation regarding all Project components.

Terms of Reference for General Consultant / Integrator

Report on implementation results of Phase I, including sets of technical documentation and technical specifications for the procurement packages for the 18-month of Project implementation shall be presented in hard copies and in electronic format.

Interim Reports of Phase II should include:

- Description of Project progress in general, problems and measures to solve them;
- Detailed description of Consultant's executed work;
- Recommendations on organization of work for the next reporting period.

Interim reports of Phase II shall be provided in hard copies and in electronic format.

Phase II performance results Report should be prepared on the basis of reporting documents, developed during the implementation of Phase II (see Section 3.4, Expected results / outputs) and will contain the description of results, achieved during the implementation of Phase II.

Report on implementation results of Phase II, technical specifications for the procurement packages shall be presented in hard copies and in electronic format.

Final Report on performance results of the BRCH should be prepared on the basis of previous reports, with analysis of execution and interrelation of individual Project components under implementation. This report must contain recommendations and substantiation of composition and contents of activities for further development of DHM (and MoAD) including:

- General description of all executed work;
- Detailed description of Consultant's work performed during the Project implementation;
- Analysis of performed modernization and recommendations for future activities to ensure operational effectiveness and potential development of systems.
- Analytical Reports for DHM (and MoAD) (for each of the Project components), in accordance with Section 4 "Expected results of services".
- Technical Design and the set of technical documents for integrated retrofitting of observation networks and technological systems of DHM
- Technical specifications and bidding documents for each BRCH component.
- Proposals on composition and contents of BRCH activities (including modification of the Procurement Plan).
- Program Implementation Plan for each of the components.
- Program and proposed training Schedule for personnel of DHM (and MoAD), as related to the Project Implementation Plan.
- Claims administration procedure for DHM (and MoAD) in case of complaints for equipment installed in the course of implementation of Project contracts.

All reports, draft reports and documentation, related to execution of bidding procedures in accordance with WB requirements (technical requirements, technical specifications, bidding documentation packages, evaluation and other reports – as stated above (Section 3.7, Reporting Requirements)), should be prepared in English.

Final report should be prepared by Consultant in English language in hard copies (the number of copies to be decided) and in electronic format.

3.9 Endorsement and Approval of Reporting Documents and Final Reports

Endorsement and approval of Reporting documents, as indicated in Section 3.7, is performed according to the following procedure:

Endorsement of Reporting documents is performed by the DHM Director General within 2 weeks from submission of Reporting documents to DHM.

Approval of Final Reports, indicated in Section 3.7, is performed by the DHM Director General within 2 weeks from the submission of Final reports to DHM.

Terms of Reference for General Consultant / Integrator

3.10 Schedule of Services

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
4	Phase I			
1	<p>Analysis of the current situation in DHM, which includes:</p> <p>Sub-task 1.2. Assessment of staff capacity</p> <p>Sub-task 1.3. Analysis of the status of observation networks, including meteorological support of observations and system of observations results collection</p> <p>Sub-task 1.4. Analysis of ICT reception, hydro-met data processing and storage, generation of hydro-met products</p> <p>Sub-task 1.5. Assessment of demands in information by the main consumers and quality of services provided.</p>	<p>3 months from the date of Systems Integration Contract's entry into force</p>	<p>Analytical Report on DHM (contents in accordance with requirements in Section 3.4.1).</p>	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
4	Phase I			
2	<p>Develop in consultation with DHM a detailed Project Implementation Plan which includes:</p> <p>Sub-task 2.1 Institutional strengthening and development of hydro-met services, which take into account needs of major information users and possible options of DHM business models and financing;</p> <p>Sub-task 2.2 Development recommendations for DHM's staff professional development, including (i) basic education, technical training, retraining and professional development of hydro-met specialists and (ii) joint training of staff and main customers to increase DHM's professional development in providing customer-oriented services</p> <p>Sub-task 2.3 Improvement of hydro-met monitoring and forecasting system to provide timely warning of dangerous hydro-meteorological events;</p> <p>Sub-task 2.4 Improvement of service provision taking into account current and potential requirements in weather, climate and hydrological information, products and services.</p> <p>Sub-task 2.5 Development of Implementation</p>		Analytical Report on DHM (contents in accordance with requirements in Section 3.4.1).	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
4	Phase I			
	Plans for each of the four components with detailed list of activities for the first year of the Project implementation.			
3	<p>Development Technical documentation and additional materials for DHM consideration, which include:</p> <p>Sub-task 3.1 Development of the set of documents on the Technical design for the retrofitting of the observation networks and technological systems of the national meteorological and hydrological services</p> <p>Sub-task 3.2 Development of estimates of operating and maintenance costs which will be necessary for sustainable operation of modernized DHM system.</p> <p>Sub-task 3.3 Preparation of proposals on sustaining the modernization program based on various budgets and costs alternatives.</p> <p>Sub-task 3.4 Development of technical</p>		<p>Analytical Report on DHM (contents in accordance with requirements in Section 3.4.1).</p> <p>4.1.1</p>	<p>Coordination: Project Technical Committees</p> <p>4.1.2</p> <p>Approval: DHM</p> <p>4.1.3</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
4	Phase I			
	specifications and tender documentation (bidding documents) for priority procurement packages, which are planned to be launched in the 18 months of project implementation.			

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
5	Phase II			
1	<p>Assistance with procurement process and project implementation</p> <p>Sub-task 1.1 Develop technical requirements and technical specifications in accordance with WB requirements for bidding procedures under the Procurement Plan;</p> <p>Sub-task 1.2 Develop bidding documentation packages according to the Procurement Plan;</p> <p>Sub-task 1.3 Assist in the obtaining of the WB ‘no objection’ forbidding documentation;</p> <p>Sub-task 1.4 Assist in preparation and conduction of activities for the bids (participation in pre-tender conferences, answering questions of participants and so on)</p>	<p>In accordance with approved Procurement Plans and Project Implementation Plans by DHM/PMU for Components A, B and C and MoAD/PMU for component D</p>	<p>Technical requirements and technical specifications, packages of bidding documentation.</p> <p>Incorporated into Interim Reports of Phase II</p>	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p> <p>5.1.1</p>
2	<p>Tender Evaluation and Contract Negotiations</p> <p>Sub-task 2.1 Participate in evaluation, including expert assessment of proposed technical solutions for conformity with the technical project and bidding documentation, preparation of Evaluation Reports;</p> <p>Sub-task 2.2 Assist in conducting contract</p>	<p>In accordance with approved Procurement Plans and Project Implementation Plans by DHM/PMU for Components A,</p>	<p>As part of Interim Reports of Phase II:</p> <p>(1) Correspondence with tender participants, responses to WB comments, protocols of pre-tender conferences, evaluation reports, contracts, additional information for tender documentation and contracts, protocols of contract negotiations.</p>	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p> <p>5.1.2</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
5	Phase II			
	negotiations with bid winners;	B and C; and MoAD/PMU for component D		
3	<p>Contract Performance Monitoring</p> <p>Sub-task 3.1 Provide support to the supervision of contract implementation (compliance and quality assurance),</p> <p>Sub-task 3.2 Set out a supervision plan for the contracts, overview of work performance under contracts and verify the need and compliance to the contract conditions of the offered changes to the list and scope of goods and services;</p> <p>Sub-task 3.3 Participate in managing contractors' activities, performing separate tasks</p>	<p>The reports are submitted once every six months during the first 3 years of BRCH implementation. After that, once every quarter of the year until the completion of all activities.</p>	<p>As part of Interim Reports of Phase II:</p> <p>Reports on contracts monitoring results.</p> <p>Reports on contracts performance results.</p>	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p>
4	<p>Operational Acceptance</p> <p>Sub-task 4.1 Provide technical supervision and</p>	<p>The reports are submitted once every six months</p>	<p>As part of Interim report of Phase II</p> <p>Analysis of performed modernization and recommendations for future activities to ensure</p>	<p>Coordination: Project Technical Committees</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
5	Phase II			
	<p>timely coordination of work and activities on equipment installation, commissioning, acceptance of individual components of systems under modernization and installation;</p> <p>Sub-task 4.2 Provide technical supervision of commissioning of developed system and start-up operations;</p> <p>Sub-task 4.3 Assist DHM in checking the consistency and compatibility of plans and work of subcontractors to ensure interoperability of all system's components;</p> <p>Sub-task 4.4 Provide periodic analysis of contracts performance and preparation of reports on overall BRCH implementation progress.</p>	<p>during the first 3 years of BRCH implementation. After that, once every quarter of the year until the completion of all activities.</p>	<p>operational effectiveness and potential development of systems.</p>	<p>Approval: DHM</p>
5	<p>Assistance in implementation of activities on improving the effectiveness of Program implementation</p> <p>Sub-task 5.1 Develop and provide Program evaluation methods (standards) to ensure quality and reliability during project</p>	<p>The reports are submitted once every six months during the first 3 years of BRCH implementation. After that, once every quarter of</p>	<p>As part of interim report of Phase II</p> <p>Design of official evaluation methods (standards) of quality and reliability.</p> <p>Analytical material on monitoring of targeted indicators of the Project.</p> <p>Analytical materials on BRCH implementation.</p>	<p>Coordination: Project Technical Committees</p> <p>Approval: DHM</p>

Terms of Reference for General Consultant / Integrator

Task №.	Description of Service	Due Date	Reporting	Coordination and Approval Procedure
5	Phase II			
	implementation; Sub-task 5.2 Provide support to monitoring BRCH's results indicators; Sub-task 5.3 Analyze BRCH implementation progress; Sub-task 5.4 Assist DHM in developing proposals and justification for introduction of changes to the Procurement Plan and BRCH Implementation Plan.	the year until the completion of all activities.	Claims administration procedure for DHM/PMU in case of complaints for equipment installed in the course of implementation of Project contracts. Proposals and justifications on introduction of changes in the Procurement Plan. Renewed versions of the Procurement Plan Proposals, justifications and renewed versions of Procurement Plan are developed once a year (or as necessary).	

5.2 Consultant's Responsibility

Consultant uses accepted financial, administrative (legal) and management practice and is accountable to the DHM/PMU in accordance with terms of tender and contract.

For the purpose of commitment and proper interaction of all individual components of the system with General Consultant, the following official statement must be issued for all requests for proposals and invitation documents:

“All activities of selected subcontractor under the current tender are subject to monitoring, control and audit by the DHM/PMU. The General Consultant-Systems Integrator will be assisting the DHM/PMU in execution of this assignment. Accordingly, the supplier/subcontractor must comply with the Project monitoring and audit procedures to be determined by the DHM/PMU and General Consultant”.

The above-listed aspects should ensure necessary actions on execution of integration of the entire system. The subcontractor, in particular, is subject to periodic check of work performed, reports, procured goods and services for their conformity with system requirements and specifications”.