

Terms of Reference

Updating of the Feasibility Study of the Ilocos Norte Irrigation Project, Stage 2 (INIP-2)

1. BACKGROUND/RATIONALE

1.1 Contracting Authority

The General Appropriations Act (GAA) for FY 2014 has allocated the amount of PhP400,000,000.00 for the conduct of feasibility studies (F/S) to be administered by the National Economic and Development Authority (NEDA). Thus, the Department of Agriculture - National Irrigation Administration ((DA-NIA) submitted the Updating of the F/S of the Ilocos Norte Irrigation Project, Stage 2 (INIP2) to NEDA for consideration under said Fund.

For this Terms of Reference (TOR), NEDA shall be the Executing Agency and Contracting Party while DA-NIA shall be the Implementing Agency (IA). The proposed Project is consistent with DA's major programs/projects/activities (PPAs).

1.2 Relevant Country/Sector Context

INIP2 is supportive of the thrusts of the 2011-2016 Updated Philippine Development Plan (PDP) under Chapter 4 (Competitive and Sustainable Agriculture and Fisheries Sector), particularly with the Government's goal of improving food security and increasing rural income by enhancing farm productivity. Moreover, the Project's focus on rice production is also expected to complement DA's Food Staples Self-Sufficiency Program (FSSP).

The Project is also in line with the sector outcomes under Chapter 10 (Accelerating Infrastructure Development) of the PDP by enhancing the performance of the irrigation sector and enabling development in the energy sector.

1.3 Current State of the Irrigation and Power Generation Sectors

Agriculture is one of the major sectors of the economy, which provides jobs and contributes to the gross domestic product (GDP). One of the primary objectives of the Government is to increase self-sufficiency rate in rice. In order to attain a higher self-sufficiency rate, we have to increase rice production. Therefore, the expansion of irrigated areas to be supplied by the Project will help increase rice production, which, in turn, will increase the self-sufficiency rate in rice.

The power generation component of the Project will also help in meeting the demand in the Luzon power grid where a total of 10,450 megawatts (MW) additional capacity is seen to be needed in the planning period 2012-2030 to meet the electricity demand and the required reserve margin of the grid. The grid, which, at present, barely meets the demand, does not have the capacity to produce

the required reserve margin. The power generation component of the Project, the feasibility of which is to be confirmed in this F/S updating, is envisaged to work towards diminishing said supply gap.

1.4 Related Project/Programs and Other Donor Activities

To enable implementation of INIP2, *updating and validating the F/S of the Project undertaken in 1980* needs to be conducted. The Project does not have any physical or fiscal activities programmed for CY 2014 aside from the F/S updating under the NEDA-administered F/S Fund.

2. OBJECTIVE AND EXPECTED OUTPUTS

2.1 Overall Objective of the Study

The objective of the proposal under this TOR is to *update and validate the previously conducted F/S of INIP2*. The F/S updating and validation shall cover the technical, economic and financial aspects of the proposed irrigation and multipurpose project, including environmental study, vulnerability assessment, preparation of sustainability plans, and analysis of alternative financing schemes, among others.

Additionally, the F/S updating and validation shall ensure that value engineering/value analysis (VE/VA)¹ is undertaken with regard to the selection of the best possible implementation / project options/configurations for the Project (may include new available technology which can be used to deliver the Project or component/s of the Project), to ensure that the best scheme for providing the Project's intended outputs will be selected, which would yield the highest value-for-money (VfM), as articulated in *Section 3 (Scope of Works)* of this TOR.

The development/construction of the hydropower component of the Project may be suitable for Public-Private Partnership (PPP). If found viable under this TOR for private sector implementation, the feasibility of undertaking a specific PPP modality to implement the hydropower component, including the preparation of the PPP transaction, shall be undertaken under a separate study given that the F/S Fund only covers non-PPP projects. *However, the technical, environmental, social, market, demand, and other aspects of the hydropower component shall already form part of this Study, e.g., a business case study.*

2.2 Expected Output of the Study

By the end of the contract period under this TOR, the Consulting Firm is expected to produce a comprehensive F/S based on updated information, with a definite implementation plan of the recommended scheme based on the alternatives/configurations/technologies considered, among others, including the preliminary engineering designs and the most appropriate financing scheme.

¹ For reference, the *Value Analysis Handbook for NEDA (2009)* may be downloaded from: <<http://www.neda.gov.ph/wp-content/uploads/2014/01/Value-Analysis-Handbook.pdf>>.

3. SCOPE OF THE WORKS

3.1 General Scope of Works

The scope of works of the Consulting Firm under this TOR shall include, but *not* necessarily be limited to, the following:

3.1.1 Undertake macro-level assessment of existing situation in the project area/basin, including the following, *among others*:

3.1.1.1 Assessment of the socio-economic conditions, and performance of the agriculture sector in the project area/basin and the whole province where the Project will be located over the past ten (10) years, with focus on the past five (5) years, including description of the contribution of INIP2 to the economy of the province of Ilocos Norte and the whole of Region 1. The assessment shall include: source of income and employment, production patterns and trends, access to markets, crops production and demand, and equity.

3.1.1.2 Identification of problems and known causes and effects on agriculture performance, strengths, weaknesses, opportunities, and threats to the development of the project area/basin. Causes of problems may include, among others, policy issues (e.g., incentive structures), institutional issues (e.g., structures and capacity), health and governance issues, and investment issues (e.g., low or poor quality) that affect agriculture production and productivity. Key performance indicators and trends such as incomes, productivity, and other social indicators shall also be identified.

3.1.2 Undertake necessary feasibility level studies, institutional analysis, environmental assessment, right-of-way (ROW) and resettlement considerations, design and monitoring framework, VE/VA study, vulnerability assessment, identification and assessment of borrow/quarry areas, and preliminary engineering designs necessary in conjunction with beneficiaries and other stakeholders to establish the economic, financial, technical, etc. viability of investment.

The proposed F/S shall look at *alternative options, including the associated costs, benefits and risks* involved, in delivering the Project or components of the Project (may include new available technology which can be used to deliver the Project or component/s of the Project), and selecting the best possible implementation / project options/configurations/technology involved, for the: (i) entire irrigation and hydropower system (*for example, either high dam, series of cascading small dams, combination of high dam and small cascading dams, high dam with penstock for implementation of the hydropower generation component at a later date as a separate project, or small water impounding reservoirs within the service area, among others*), either as an

integrated system, or considering the irrigation system separately (in case the hydropower component is not found feasible); and (ii) individual components of the irrigation system (*e.g., alternatives to the traditional open canal design may be considered such as piped systems similar to the drip irrigation technology but on a larger scale*) or of the integrated irrigation and multipurpose system. This would ensure that the best scheme for delivering the Project's intended outputs will be selected, which would yield the highest VfM, *e.g., lowest lifecycle/whole-of-life costs, taking into account all alternative ways of delivering the desired outputs and enhancing the primary outputs by considering other incidental benefits* (*e.g., provision of water supply source and flood management in the overall scheme*).

The VE/VA Study shall also include an *analysis of alternative financing schemes, e.g., whether full National Government (NG) funding, Official Development Assistance (ODA), PPP, or hybrid arrangement, including an analysis of financing risks.*

The analysis of alternative financing schemes shall be undertaken for the various implementation options, e.g., irrigation component implemented separately from the hydropower component (if hydropower is not found viable to implement), integrated irrigation and power generation component (if feasible), irrigation component with penstock implemented first and hydropower component to be implemented as a separate project, etc.

- 3.1.3 Prepare feasibility level outputs documenting the viability of the project works, including the hydropower component with cost of transmission and distribution lines including ROW, while adequately addressing hazards and risks, environmental issues, and resettlement issues, outlining in detail the implementation arrangements. The technical, environmental, institutional, social, market, demand, and other aspects of the hydropower component (*e.g., a business case study*) shall also be included as previously mentioned.

Further, the existing institutional arrangements regarding the development, construction, operation and management of the hydropower component shall be investigated by the Consulting Firm, including the institutional linkages between NIA and other relevant agencies on development and implementation of the hydropower component.

- 3.1.4 Conduct, during the contract period, coordination meetings with NIA and NEDA to: (a) discuss the progress of the work and preliminary output; (b) give the Government the opportunity to make comments and suggestions on a timely basis; and (c) resolve problems and issues that may be encountered. Government may assign counterpart personnel to the Study for purposes of transfer of technology and capacity building. The Consultant shall provide the required office space for the Government counterparts.

3.2 Key Experts and Activities

Following are the key experts required and the corresponding major activities, which they will undertake, *among others*:

3.2.1 Water Resources Development Planning Specialist / Team Leader (1)

- 3.2.1.1 Provide overall direction to all specialists making up the Consulting Team;
- 3.2.1.2 Manage relationships with concerned departments/units of NIA and NEDA at the central and regional offices, local government units (LGUs), as well as with other stakeholders including farmers, non-government organizations, and project-affected families;
- 3.2.1.3 Prepare detailed, time-bound work plans for the preparation of the VE/VA Study and detailed F/S, assigning various team members to each key task;
- 3.2.1.4 Provide technical support and guidance in all aspects of the consulting services;
- 3.2.1.5 Organize and take the lead in the conduct of regular site visits to the dam site and irrigation service areas for the technical supervision in undertaking the required survey and mapping, and the carrying-out of geological and geotechnical confirmatory tests;
- 3.2.1.6 Monitor the progress of all planning and design work ensuring that deadlines relating to delivery dates are met;
- 3.2.1.7 Take the lead and assign/delegate other tasks/activities to the members of the Consultancy Team and support staffs as may be required during the conduct of the Study, including, but not limited to: (1) *undertaking of the VE/VA Study and vulnerability assessment for the proposed Project*; and (2) *review and investigation of the existing institutional arrangements for the hydropower component*, among others;
- 3.2.1.8 Ensure the timely delivery and quality control of all required outputs; in particular, the Inception Report, VE/VA Report, Monthly Progress Reports, Interim Report, Draft F/S Report, and Final F/S Report; and
- 3.2.1.9 Ensure that NIA/NEDA is furnished the prints and electronic copy of the abovementioned deliverables/reports, including *all* necessary tables and figures to facilitate and expedite *complete* review of the submissions.

3.2.2 Planning Engineer / Dam Engineer / Deputy Team Leader (1)

- 3.2.2.1 Provide assistance to the Team Leader in the overall supervision of the various assessment study activities;
- 3.2.2.2 In the absence of the Team Leader, assume full responsibility, including leadership of the Consulting Team;
- 3.2.2.3 Undertake the review/updating of design and cost parameters considered in previous studies, if any, in coordination with the other key experts;
- 3.2.2.4 In collaboration with other experts/specialists, select the most appropriate scheme for the objective of the Project (e.g., type of dam to be adopted if the recommended solution to the objective is construction of a high dam), based on comparison of alternative schemes of development. Recommend the definitive viable, acceptable and doable plan for implementation;
- 3.2.2.5 Check and review prepared topographic map of the reservoir area and dam site. Locate and layout the propose dam axis and appurtenant structures;
- 3.2.2.6 Conduct site inspection/field investigation to determine the extent of topographic and mapping necessary for feasibility design. Classify the type of terrain, meandering of the river, and water ways;
- 3.2.2.7 Given the data from borehole tests and after identifying probable location of faults, evaluate the proposed dam axis and alignments of appurtenant structures;
- 3.2.2.8 Using data gathered from the *Hydrologist*, perform hydraulic analysis for discharge (e.g., flood routing, afflux analysis) depending on the scheme to be implemented. This also involves sizing of diversion conduit, spillway, sluice gate/s, ogee weir and other related structures;
- 3.2.2.9 Provide a risk assessment that would determine whether the dam option is a referable dam, if there is a danger of the dam failing (dam-break analysis), and which action is necessary to prevent or minimize the impact of the failure. Perform seepage analysis for filter drain sizing and slope stability analysis involving different conditions;
- 3.2.2.10 Prepare cost comparison for the different schemes under consideration and use this as input in the determination of the appropriate project development;

- 3.2.2.11 Prepare necessary data needed by the electro-mechanical experts for carrying out feasibility design of mechanical and electrical works;
 - 3.2.2.12 Prepare necessary data needed by the Economist to carry out the economic and financial analyses, which may include options for hydropower development;
 - 3.2.2.13 Prepare the feasibility grade drawings & plans of dam, and appurtenant structures/facilities. Provide electronic copies of plans, layouts and other drawings. Submit/provide hydraulic/design computations;
 - 3.2.2.14 Review the hydraulics and structural aspects for the power components;
 - 3.2.2.15 Take the lead in preparing the drafts of the Inception Report, VE/VA Report, Monthly Progress Reports, Interim Report, Draft F/S Report and Final F/S Report;
 - 3.2.2.16 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.
- 3.2.3 Hydrologist (1)**
- 3.2.3.1 Undertake the review/updating of hydrologic parameters considered in previous studies, if any;
 - 3.2.3.2 Collect/update and validate hydro-meteorological data within the basin/hydrological region with the last year of available record preferably not older than one (1) year;
 - 3.2.3.3 Estimate the streamflow at the identified/proposed dams and perform flow duration curves. In the use of stochastic or deterministic method of runoff estimation, calibrate the derived runoff with the base runoff of the base station. Present and discuss the conceptual models used;
 - 3.2.3.4 Estimate the water requirement using a ten (10)-day rainfall derived from daily rainfall at various cropping calendar to determine the least water requirement. Include the climate change scenario for ready reference;
 - 3.2.3.5 In case there are several water users/water permit grantees or irrigation systems drawing water from the same source, perform systems/basin water balance;
 - 3.2.3.6 Perform hydrologic analysis for various schemes/alternative sites, taking into account also a case where hydropower generation is

included, if necessary. In case of a reservoir type of dam, perform the detailed reservoir operation studies at multiple water levels using single crops or multi-crops (diversified crops as recommended by the *Agronomist*) as an input for wider range of economic evaluation, financial evaluation, VE/VA, etc.;

- 3.2.3.7 Estimate proposed irrigable areas per dam site based on available/dependable water supply;
 - 3.2.3.8 Gather water samples on several floodways, proposed dam sites, and groundwater wells for water quality testing and mapping of polluted/sea water-intruded areas;
 - 3.2.3.9 Carry-out sediment transport analysis for several floodways and each dam site for the determination of sediment-discharge relationship;
 - 3.2.3.10 Conduct flood studies for different return periods. In estimating the unit hydrograph, preference is given to the use of actual peak discharge data from different flood events in the water source or nearby rivers rather than the empirical SCS dimensionless unit hydrograph method. In the event that SCS method is employed, comparison to other methods is required;
 - 3.2.3.11 Compute the design flood hydrographs for the following return periods: 2, 5, 10, 15, 20, 25, 50, 100, 200, 500, 1000, and 10000; and
 - 3.2.3.12 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.
- 3.2.4 **Geologist (1)**
- 3.2.4.1 Undertake the review/updating of geologic parameters and tests considered in previous studies, if any;
 - 3.2.4.2 Conduct the required geotechnical mapping and tests, the specific details on frequency, location, methodology, etc. of the said activities shall form part of the Consultant's *Inception Report* and *Work Plan* which shall be subject to consultation with and approval of NIA;
 - 3.2.4.3 Conduct surface geological mapping with the following output:
 - 3.2.4.3.1 Geological map of dam site at scale of 1:1,000;
 - 3.2.4.3.2 Geological map of reservoir area at scale of 1:10,000; and

- 3.2.4.3.3 Geological cross-sections of the dam axis and appurtenant structures;
 - 3.2.4.4 Conduct/Supervise sub-surface geological investigation, which includes:
 - 3.2.4.4.1 Core drilling;
 - 3.2.4.4.2 Water pressure testing; and
 - 3.2.4.4.3 Test pitting (soil and aggregate pits) for construction materials;
 - 3.2.4.5 Conduct seismic analysis on dam site;
 - 3.2.4.6 Conduct slope stability analysis on dam site's abutments;
 - 3.2.4.7 Provide recommendations on the safety and stability of the foundation; and
 - 3.2.4.8 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.
- 3.2.5 Geodetic Engineer (1)**
- 3.2.5.1 Review available maps and survey data for the project area, if any;
 - 3.2.5.2 Prepare a Base Map showing the delineated proposed service area, drainage area, and the location of the dam axis drawn/marked thereon. The latitude and longitude recorded thereon must use PRS 92 as Reference Datum;
 - 3.2.5.3 Prepare write-up/scheme of work of canal line and other surveys from which the Scheme of Development of the Project shall be based;
 - 3.2.5.4 Monitor the conduct of survey works such as topographic survey of main canal alignment and the establishment of horizontal and vertical control based on the National Mapping and Resource Information Authority (NAMRIA) reference point (PRS 92);
 - 3.2.5.5 Prepare the topographic maps, profiles, and cross-sections consistent with the standards required by NIA; and
 - 3.2.5.6 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.6 Cost Engineer (1)

- 3.2.6.1 Undertake the review/updating of cost estimates considered in previous studies, including cost estimates for the hydropower component, if any;
- 3.2.6.2 Gather unit costs of construction materials or construction costs in the project area;
- 3.2.6.3 Prepare unit price analysis of various construction pay items of works specific to the project area;
- 3.2.6.4 Prepare the quantity and cost estimate of civil works and other components of the Project during the master planning and feasibility stage; and
- 3.2.6.5 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.7 Electro-Mechanical Engineer (1)

- 3.2.7.1 Undertake the review/updating of design and cost parameters considered in previous studies, in coordination with other key experts, if any;
- 3.2.7.2 Prepare the design, specifications and cost estimates of the mechanical portion of the dam and other alternatives being considered, and their appurtenant structures; and
- 3.2.7.3 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.8 Irrigation and Drainage Engineer (1)

- 3.2.8.1 Undertake the review/updating of design and cost parameters considered in previous studies, in coordination with other key experts, if any;
- 3.2.8.2 Provide a location map showing the name, location and the general description of the Project;
- 3.2.8.3 Assess drainage system and improvement needs in the project area;
- 3.2.8.4 Based on both current and future cropping patterns, determine the water requirements for crops to be grown in the service area and, based on conveyance and farm level efficiencies, determine irrigation water requirement;

- 3.2.8.5 Prepare feasibility level design of irrigation canals and associated control structures and measurement facilities as well as other required supporting infrastructure and farm level facilities, drainage channels, and drainage structures;
- 3.2.8.6 Show the cost of the annual operation and maintenance (O&M) of irrigation facilities (including those of alternatives); and
- 3.2.8.7 Adopt and recommend innovations/other available alternatives or technology into the design of canal and drainage systems improvement that will improve farming operation throughout the service area (e.g., consider the possible use of coconut coir with vetiver grass for slopes and canals instead of concrete); and
- 3.2.8.8 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, such as that articulated under Section 3.2.1.7 of this TOR.

3.2.9 Soil and Land Classification Specialist (1)

- 3.2.9.1 Undertake the review/updating of soil and land classification data/analysis considered in previous studies, if any;
- 3.2.9.2 Collect, update, review and validate any soil and land classification report, publication and other reference such as F/S reports related to the Project;
- 3.2.9.3 Collate and study the existing available soil and land resources data;
- 3.2.9.4 Perform slope quantification for the determination and delineation of the various slope class based on topographic maps;
- 3.2.9.5 Perform semi-detailed soil and land classification survey using topographic maps and satellite imagery printouts and determine possible locations of boreholes and master pits in the potential service area;
- 3.2.9.6 Conduct soil profiling and collect soil samples that shall be subjected to physical and chemical analysis in order to facilitate the fertilizer recommendation for the different crops to be grown in the area;
- 3.2.9.7 Carry out land use mapping, soil characterization, and land class correlation based on the inherent and morphological characteristics of the soil such as physical and chemical properties, topography, drainage and parent materials, and design into appropriate mapping units for the report; and

- 3.2.9.8 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.10 Agriculturist (1)

- 3.2.10.1 Undertake the review/updating of agronomic analysis considered in previous studies, if any;
- 3.2.10.2 Identify the major constraints faced by the farming communities in the service area, which affect agricultural productivity;
- 3.2.10.3 Conduct farm management survey through interview of farmers in all the municipalities/barangay covered by the proposed Project. The interview should cover at least 10 percent of the total number of farmers in the proposed service area;
- 3.2.10.4 List down all the possible farmer beneficiaries in the proposed service area and determine their family size, farm holding status, farm size, individual land use and the cropping condition (irrigated or rain fed);
- 3.2.10.5 Request barangay officials data such as demographic profile, inventory of farm machines and post-harvest facilities, number of farm animals (especially draft animals being used in farming), and farmers' cooperatives;
- 3.2.10.6 Collect secondary agricultural data to support the agronomic analysis (e.g., data that can be collected will include the updated agricultural profile and comprehensive land use plan of the municipalities covered by the proposed Project, among others);
- 3.2.10.7 In the case that an existing irrigation system is present and will be covered by the Project, collect the necessary data needed such as the latest O&M report, which may include data on the firmed-up service area (FUSA), actual irrigated area during wet and dry season and production performance (average yield);
- 3.2.10.8 Collaborate with the *Soil Specialist* to determine the extent of area planted to specific crop and the classification of soil in the area to identify possible crops to be planted in the future with project condition and with the *Hydrologist* to determine the appropriate crops that can be planted to the area, and ultimately develop a future cropping pattern; and
- 3.2.10.9 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.11 Economist (1)

- 3.2.11.1 Undertake the review/updating of financial and socio-economic parameters considered in previous studies;
- 3.2.11.2 Use inputs from various specialists on the Team to develop detailed feasibility level cost and benefit estimates;
- 3.2.11.3 Identify the various financing alternatives as well as corresponding risks for the identified options being considered during the conduct of the VE/VA study. Further, preliminary economic and financial analyses for the identified alternatives shall be undertaken, including the schemes/options with hydropower generation. These shall also serve as input in coming up with final recommendations to respond to the objectives of the Project;
- 3.2.11.4 Based on the results of the VE/VA study, undertake detailed economic and financial analyses for the selected option/alternative;
- 3.2.11.5 Present the derivation of the following (in the “without” and “with” project conditions), including a case with hydropower generation:
 - 3.2.11.5.1 Price structure;
 - 3.2.11.5.2 Physical inputs;
 - 3.2.11.5.3 Cost of production;
 - 3.2.11.5.4 Economic cost of farm labor;
 - 3.2.11.5.5 Net value of production;
 - 3.2.11.5.6 Economic analysis of net value of production;
 - 3.2.11.5.7 Crop budgets;
 - 3.2.11.5.8 Farm budget;
 - 3.2.11.5.9 Project cost (investment, O&M, replacement, etc.);
 - 3.2.11.5.10 Benefits (irrigation, power, fishery, etc.);
 - 3.2.11.5.11 Financial Internal Rate of Return (IRR), Economic IRR, Economic Net Present Value (NPV), Financial NPV, and Economic and Financial Benefit/Cost (B/C) ratio; and
 - 3.2.11.5.12 Sensitivity analysis.
- 3.2.11.6 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.12 Environmental and Social Assessment Specialist (1)

- 3.2.12.1 Undertake the review/updating of environmental and social assessment parameters considered in previous studies, if any;

- 3.2.12.2 Prepare the Environmental and Social Assessment (ESA) Report of the Project inclusive of all its components and consistent with the requirements of NIA and the prescribed guidelines of the Department of Environment and Natural Resources (DENR) Administrative Order (AO) No. 2003-30 and its Revised Procedural Manual;
- 3.2.12.3 Prepare the specific details on the conduct and deliverable requirements of the ESA, as part of the Consultant's Inception Report and Work Plan, which shall be subject to *consultation with* and *approval* of NIA;
- 3.2.12.4 Respond as necessary to all additional information required and representation in behalf of NIA; and
- 3.2.12.5 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, as articulated under Section 3.2.1.7 of this TOR.

3.2.13 Hydropower Specialist (1)

- 3.2.13.1 Undertake the review/updating of design and cost parameters considered in previous studies, in coordination with other key experts, and determine the viability of a hydropower component, as necessary;
- 3.2.13.2 Conduct preliminary site investigations in relation to the hydropower component, including hydrological, topographical, geological and geotechnical studies;
- 3.2.13.3 Review sedimentation study carried out by the Hydrologist to identify the least-cost solution with minimum environmental impacts, and prepare any disaster risk management plan including a flood control and early warning system with the *Hydrologist*;
- 3.2.13.4 Design the required hydraulic turbine/pump, penstock, gate valves, generator and their control as well as identify the location of the turbine/pump, transmission lines, powerhouse and other components;
- 3.2.13.5 Select the main hydropower characteristics such as installed capacity, energy production, capacity factor, etc. to produce the appropriate power generation scheme for the Project;
- 3.2.13.6 Develop preliminary layouts of hydraulic structures, electro-mechanical and electrical equipment;
- 3.2.13.7 Develop preliminary cost estimates based on major quantities and cost items (e.g., turbine/pump, powerhouse, penstock, generator,

gate vales, transmission lines and distribution lines, including ROW);

- 3.2.13.8 Identify potential social and environmental impacts, and proposed solutions;
- 3.2.13.9 Highlight the main risks facing the project hydropower component, and possible mitigation measures;
- 3.2.13.10 Prepare the necessary data needed by the Economist and the other experts to carry out indicative assessments of the hydropower component from various aspects (e.g., economic viability, financial viability, technical viability, environmental and social viability); and
- 3.2.13.11 Undertake other tasks/activities assigned/delegated by the Team Leader as may be required during the conduct of the Study, including inputs to the conduct of VE/VA, etc., and as needed by the other experts, as articulated in Item (g) of Section 3.2.1 of this TOR.

The Team Leader shall take the lead in undertaking the VE/VA Study and vulnerability assessment, among others, as previously articulated under Section 3.2.1.7 of this TOR. The members of the Consulting Team shall be required to provide data/information as needed by the other experts and/or by the Team Leader related to the conduct of VE/VA.

In addition to the above, each of the members of the Consultant's Team shall prepare inputs to the Inception Report, VE/VA Report, Monthly Progress Reports, Draft Interim Report, Draft F/S Report, Final F/S Report, and other reports specific to their assigned tasks. Prints and electronic copies of the reports specific to the members' assigned tasks, including tables and figures, shall be required to be submitted to NIA/NEDA to facilitate review.

Aside from the specified scope of works mentioned above, the Consulting Firm may propose additional works to enhance the Study, provided it shall bear no additional cost to Government. The scope of any additional proposed works by the Consulting Firm shall be established within the first three (3) months of the Study, subject to the approval of NIA/NEDA.

The Consulting Firm may propose additional experts other than those listed herein, as it deems necessary, as long as such proposal is consistent with its proposed approach and methodology and without additional cost to Government. Moreover, the Consulting Firm may propose an expert to undertake more than one (1) activity/expertise, provided that: (i) all the necessary expertise required in delivering the desired output/s are present in the Team; (ii) the activities proposed to be undertaken by each expert should be consistent with the proposed approach and methodology; and (iii) the merging of expertise shall not prejudice the outputs.

The Consulting Firm shall also accommodate *at least* two (2) counterpart personnel from Government (i.e., personnel from NEDA and NIA), who shall be detailed to the Project for the purpose of capacity-building and technology transfer. (The Consulting Firm is not required to pay remuneration to the Government counterpart staff, but will shoulder all expenses attendant to their assigned tasks such as travel, accommodation, etc.)

4 EXPERTISE REQUIREMENTS AND QUALIFICATIONS

The conduct of the F/S updating shall be undertaken by a Consulting Firm composed of the following key experts, whose minimum qualifications are stated herein.

4.1 Water Resources Development Planning Specialist / Team Leader (1)

4.1.1 The Water Resources Development Specialist / Team Leader must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least eight (8) years of professional experience in the field of water resources planning, F/S costing and evaluation of multipurpose irrigation projects with high dams, who has handled at least three (3) projects of similar nature as a team leader.

4.1.2 In addition, *the Team Leader must be knowledgeable on VE/VA and have at least three (3) projects of work experience related thereto.*

4.2 Planning Engineer / Dam Engineer / Deputy Team Leader (1)

The Planning Engineer / Dam Engineer / Deputy Team Leader must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least eight (8) years of professional experience in the field of water resources planning, F/S costing and design of multipurpose irrigation projects with high dams; who has handled at least three (3) projects of similar nature as a team leader or deputy team leader.

4.3 Hydrologist (1)

The Hydrologist must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects in the field of water resources planning, river basin study and F/S of large scale / multipurpose irrigation projects.

4.4 Geologist (1)

The Geologist must have at least a Bachelor's degree in Geology or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects involving geological investigation of large-scale / multipurpose irrigation projects with high dams, hydropower, and/or water supply.

4.5 Geodetic Engineer (1)

The Geodetic Engineer must have at least a Bachelor's degree in Geodetic Engineering or equivalent, with at least four (4) years of professional experience, who has handled at least four (4) projects involving the conduct of field survey of irrigation projects.

4.6 Cost Engineer (1)

The Cost Engineer must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least four (4) years of professional experience, who handled at least four (4) projects involving the preparation of quantity and cost estimates of civil works in irrigation projects.

4.7 Electro-Mechanical Engineer (1)

The Electro-Mechanical Engineer must have at least a Bachelor's degree in Mechanical or Electrical Engineering or equivalent, with at least four (4) years of professional experience, who has handled at least four (4) projects involving the design of mechanical and electrical systems of dams and appurtenant structures.

4.8 Irrigation and Drainage Engineer (1)

The Irrigation and Drainage Engineer must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects (preferably 10 projects) involving planning and design of large-scale / multipurpose irrigation systems.

4.9 Soil and Land Classification Specialist (1)

The Soil and Land Classification Specialist must have at least a Bachelor's degree in Agriculture with a major in Soil Science or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects in the field of land resource planning and conduct of soil and land classification activities in conjunction with F/S of irrigation projects.

4.10 Agriculturist (1)

The Agriculturist must have at least a Bachelor's degree in Agricultural Engineering, or Agriculture with a major in Crop Science, or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects involving the planning of irrigated agriculture developments.

4.11 Economist (1)

The Economist must have at least a Bachelor's degree in Agricultural Economics or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects involving costing and evaluating irrigation projects with high dams, hydropower and/or water supply.

4.12 Environmental and Social Assessment Specialist (1)

The Environmental Specialist must have at least a Bachelor's degree in Environmental Science or equivalent, with at least seven (7) years of professional experience, who has handled at least four (4) projects involving the conduct of environmental and social screening / assessment of large-scale irrigation projects and must be familiar with Environmental Management Bureau (EMB) environmental guidelines.

4.13 Hydropower Specialist (1)

The Hydropower Specialist must have at least a Bachelor's degree in Civil Engineering or equivalent, with at least four (4) years of professional experience, who has handled at least four (4) projects in the fields of feasibility studies or operational studies or actual experience in the planning, design and installation of hydropower plants in multipurpose projects with high dams.

5. TIMELINES AND DELIVERABLES

5.1 Commencement Date and Period of Implementation

The Study shall be completed within a period of **ten (10) months**, commencing from the date of receipt of the Notice to Proceed (NTP). Refer to **Annex A** for an illustration of the indicative implementation timelines for the Study.

5.2 Table of Deliverables

A detailed Work and Financial Plan (WFP) shall be submitted by the Consulting Firm to NIA for review (copy furnished NEDA for monitoring purposes and payment processing) within seven (7) calendar days from the date of commencement as indicated in NTP.

The deliverables for the subject as enumerated below shall be submitted by the Consulting Firm in four (4) hard copies to NIA for review and two (2) hard copies to NEDA for monitoring purposes and payment processing. An electronic/soft copy shall also be submitted to NIA/NEDA.

Deliverable	Timeline
Draft Inception Report including WFP	One (1) month from receipt of NTP
Final Inception Report including WFP	Half (0.5) month after receiving comments from NIA/NEDA
Draft VE/VA Report	Two (2) months from receipt of NTP
Final VE/VA Report	Half (0.5) month after receiving comments from NIA/NEDA

Monthly Progress Reports	Monthly, within seven (7) calendar days from end of agreed month-period
Interim Report	Six (6) months from the receipt of NTP
Draft F/S Report	Eight-and-a-half (8.5) months from receipt of NTP
Final F/S Report	One (1) month after receipt from NIA/NEDA of the evaluation/comments but not more than ten (10) months from receipt of NTP

NIA/NEDA shall provide comments on the *Draft Inception Report* within *ten (10) calendar days* from submission.

- 5.2.1 The *Inception Report and WFP*, which shall be submitted to NIA for approval, shall include the detailed work program for the scope of work of the Study, and a detailed schedule for all work, including field work related to applicable tasks. It shall also include the fulfilment of the Study conditions listed in this TOR as well as approaches and methodologies to be utilized in the development of the Study.
- 5.2.2 The *Monthly Progress Reports* shall include updates on the physical and financial accomplishments of each of the activities under the Work and Financial Plan, including the difficulties encountered and measures taken to overcome them.
- 5.2.3 The *Interim Report* shall include, among others, the status of implementation of the Study in relation to the scope of work, as well as preliminary results of the Study.
- 5.2.4 The *Feasibility Study Report* shall be submitted within 30 calendar days after receipt from NIA/NEDA of the evaluation/comments on the “Draft F/S Report”. The F/S will contain the details related to the Project, including, *among others*:
 - 5.2.4.1 F/S requirements and activities performed;
 - 5.2.4.2 Project description in terms of rationale, objectives, scope and limitations;
 - 5.2.4.3 Finalized project costs and financing plans;
 - 5.2.4.4 Project implementation including implementation arrangements, schedule and contract documents/procurements packages;
 - 5.2.4.5 Project justification including economic and financial analyses, analysis of environmental impact and social dimensions, and potential risks; and
 - 5.2.4.6 Results of the VE/VA Study.
- 5.2.5 A “Recommendation for Release of Final Payment” shall be issued by NIA to NEDA (copy-furnished the Consulting Firm for information)

within 14 calendar days upon receipt of the “Final F/S Report” and satisfactory review thereof.

6. CRITERIA FOR SELECTION

The Consulting Firm shall be selected using *the Quality-Cost Based Selection* procedure under Republic Act (RA) No. 9184, or the Government Procurement Reform Act (GPRA), and its Revised Implementing Rules and Regulations (IRR) and based on the following criteria:

Technical Proposal : 80%
Financial Proposal : 20%

7. SOURCE OF FUNDS

Funds for the conduct of the F/S updating shall be sourced from NEDA-administered F/S Fund.

8. INSTITUTIONAL SET-UP / RESPONSIBILITIES

8.1 NEDA

- 8.1.1 Shall be the Executing Agency (i.e., representative of the Government in the Contract Agreement with the Consulting Firm);
- 8.1.2 Shall, through its NEDA Bids and Awards Committee (NBAC), be responsible for facilitating the bidding and tendering of the consulting services in compliance with RA 9184 and its Revised IRR with the Implementing Agency (IA) as End-User;
- 8.1.3 Shall be responsible for the disbursement of the fund for the conduct of the F/S once the contract becomes executed;
- 8.1.4 Shall be responsible for the preparation and submission of financial reports as required by the Department of Budget and Management (DBM) and other reportorial requirements regarding the F/S Fund administration;
- 8.1.5 Shall evaluate, in coordination with NIA, all request for payments/billings and determine the acceptability/correctness of the same;
- 8.1.6 Shall have the option to detail at least one (1) counterpart technical personnel to the Project for the purpose of on-the-job capacity building/technology transfer; and
- 8.1.7 Shall provide, upon the request of the Consulting Firm, available information/data and also, if available, copies of previous related studies subject to the execution of the Non-Disclosure Agreement, if necessary.

8.2 IA / NIA

- 8.2.1 Shall be the beneficiary/End-User of the consulting services;
- 8.2.2 Shall be responsible for contract implementation and management, including ensuring the quality of outputs. Further, NIA, in coordination with NEDA, shall be responsible for the monitoring and evaluation of the progress of the Study and approval of reports to ensure delivery of outputs as specified in Sections 2, 3 and 5 of this TOR;
- 8.2.3 Shall provide assistance in the coordination with other agencies related to the Study;
- 8.2.4 Shall warrant to the extent possible, with assistance from NEDA, that the Consulting Firm shall have free and unimpeded access to all lands and properties required for the effective execution of the services. Likewise, NIA shall be jointly responsible with NEDA for any damage to such land or any property thereon resulting from such access (unless such damage is caused by the wilful default or negligence of the Consulting Firm or its Staff);
- 8.2.5 Shall provide, upon the request of the Consulting Firm, available information/data and also, if available, copies of previous related studies subject to the execution of the Non-Disclosure Agreement, if necessary;
- 8.2.6 Shall report to NEDA the physical progress of the Study on a quarterly basis; and
- 8.2.7 Shall have the option to detail at least one (1) counterpart technical personnel to the Project for the purpose of on-the-job capacity building/technology transfer.

8.3 Consulting Firm

- 8.3.1 Shall be responsible for the conduct of the Study and the timely delivery of results/outputs as indicated under Sections 2, 3 and 5 of this TOR;
- 8.3.2 Shall be responsible for the provision of necessary office space, which shall be within close proximity to NEDA, for their project staff as well as the Government's detailed personnel, including the necessary office equipment (i.e., computer, printers, office supplies, etc.) for the conduct of the Study. All equipment procured for the development of the Project shall be transferred to the Government by the end of the Project;
- 8.3.3 Shall shoulder all expenses required in the conduct of the Study, including travel costs and lodging of detailed Government personnel during field visits, except for their salaries;
- 8.3.4 Shall: (a) carry out the services with sound engineering theories and practices to ensure that the final works will provide the most economical

and feasible development for the Study; (b) accept full responsibility for the consulting services to be performed under this TOR for which the Consulting Firm is liable to NEDA/NIA; (c) perform the work in an efficient and diligent manner and shall use its best effort to keep reimbursable costs down to the possible minimum without impairing the quality of services rendered; and (d) comply with, and strictly observe any laws regarding workmen's health and safety, workmen's welfare, compensation for injuries, minimum wage, hours of labor and other labor laws;

- 8.3.5 Shall: (a) keep accurate and systematic records and accounts in respect of the services in such form and detail as is customary and sufficient to establish accurately that the costs and expenditures under this TOR have been duly incurred; and (b) permit the duly authorized representatives of the Government from time to time to inspect its records and accounts as well as to audit the same;
- 8.3.6 Shall not assign nor sub-contract any part of the professional engineering services under this TOR to any person or firm, except with prior written consent of NEDA/NIA. The approval by the Government to the assignment of any part of said services or to the engagement by the Consulting Firm of sub-contractors to perform any part of the same shall not relieve the Consulting Firm of any obligations under this TOR;
- 8.3.7 Shall, during or after the conclusion or termination of the Study, limit its role under the Project to the provision of the services and hereby disqualifies itself and any other contractor, consulting engineer or manufacturer with which it is associated or affiliated, from the provision of goods and services other than the services herein, except as NEDA/NIA may otherwise agree;
- 8.3.8 Shall prohibit full-time foreign staff during his assignment under this TOR to engage, directly or indirectly, either in his name, or through the Consulting Firm, in any business or professional activities in the Philippines other than the performance of his duties or assignment under this TOR;
- 8.3.9 Shall not at any time communicate to any person or entity any information disclosed to them for the purpose of this services, nor shall the Consulting Firm make public any information as to the recommendations formulated in the course of or as a result of the services, except with prior consent of NEDA/NIA;
- 8.3.10 Shall agree that nothing contained herein shall be construed as establishing or creating between the Government and the Consulting Firm, the relationship of employer and employee or principal and agent, it being understood that the position of the Consulting Firm and anyone else performing the services is that of an independent contractor;

- 8.3.11 Shall hold the Government free from any and all liabilities, suits, actions, demands, or damages arising from death or injuries to persons or properties, or any loss resulting from or caused by said personnel incident to or in connection with the services under this TOR. The Consulting Firm shall agree to indemnify, protect and defend at its own expense the Government and its agents from and against all actions, claims and liabilities arising out of acts done by the Consulting Firm or its staff in the performance of the services, including the use of, or violation of any copyrighted materials, patented invention, article or appliance;
- 8.3.12 Shall provide on-the-job capacity building/technology transfer to the Government's personnel detailed to the Project.

9. APPROVED BUDGET FOR CONTRACT (ABC)

- 9.1 The ABC for the proposed Study is **THIRTY-SEVEN MILLION ONE HUNDRED SIXTEEN THOUSAND AND FOUR HUNDRED TEN AND 00/100 PESOS (PhP37,116,410.00)**, inclusive of all applicable government taxes and charges, professional fees, and other incidental and administrative costs which shall be paid on a reimbursement basis (e.g., travel expenses, communication expenses, office supplies, office space, and other expenses deemed necessary for the Project as certified by the Executing Agency). Attached, as **Annex B**, is the breakdown of the ABC.
- 9.2 Please note that this consulting contract shall be a *fixed price contract*. Any extension of contract time shall not involve any additional cost to the Government.
- 9.3 All equipment, materials, etc., acquired for the Study shall be turned over to NEDA at the conclusion of the Study.

10 PAYMENT SCHEME/SCHEDULE

- 10.3 Billing for *reimbursable items* may be requested not more than once a month based on the *actual expenses incurred* and supported by *official receipts/documents*, including the monthly progress reports.

In the absence of *official receipts/documents* when claiming for *reimbursable costs*, the Consulting Firm may also be allowed to submit a *certification of actual disbursements made under oath*.

- 10.4 Billing for *non-reimbursable items, including professional fees*, shall be in accordance with the following delivery schedule and subject to the usual Government accounting and auditing requirements:

Description	Payment
Upon acceptance of the Inception Report	20%
Upon acceptance of the Interim Report	30%

Description	Payment
Upon acceptance of the Draft Final Report	25%
Upon acceptance of the Final Report	25%

- 10.5 The Consulting Firm may also be allowed to submit its own payment schemes for the remuneration component only subject to compliance with existing regulations/laws.
- 10.6 An advance payment shall be made to cover mobilization costs, but shall not exceed 15 percent of the contract amount, subject to the posting of an irrevocable standby letter of credit issued by an entity acceptable to NEDA and of an equal amount to the advance payment. The advance payment shall be repaid by the Consulting Firm by deducting from his subsequent billings/payments such sum as agreed upon during contract negotiations until fully liquidated within the duration of the contract.
- 10.7 Since all of these payments shall be subject to the usual government accounting and auditing requirements. The Consulting Firm is expected to be familiar with the Government Accounting and Auditing Manual (GAAM).

11 RETENTION PAYMENT

- 11.1 A retention payment of ten (10) percent shall be withheld. It shall be based on the total amount due to the Consulting Firm prior to any deduction and shall be retained from every progress payment until 50 percent of the value of Study, as determined by NEDA, is completed. If, after 50 percent completion, the Study is satisfactorily done and on schedule, no additional retention shall be made; otherwise, the ten (10) percent retention shall be imposed.
- 11.2 The total "retention money" shall be due for release upon approval of the Final Report. The Consulting Firm may, however, request the substitution of the retention money for each progress billing with irrevocable standby letters of credit from a commercial bank, bank guarantees, or surety bonds callable on demand, of amounts equivalent to the retention money substituted for and acceptable to NEDA, provided that the project is on schedule and is satisfactorily undertaken. Otherwise, the ten (10) percent retention shall be made. Said irrevocable standby letters of credit, bank guarantees and/or surety bonds, to be posted in favor of NEDA shall be valid for the duration of the contract.

12 LIQUIDATED DAMAGES

- 12.1 Where the Consulting Firm refuses or fails to satisfactorily complete the work within the specified contract time, plus any time extension duly granted and is hereby in default under the contract, the Consulting Firm shall pay NEDA for liquidated damages, and not by way of penalty, an amount, as provided in the conditions of contract, equal to at least one tenth (1/10) of one (1) percent of the cost of the unperformed portion of the works for every day of delay. Should the amount of liquidated damages reaches 15 percent of the contract amount, NEDA shall at its own discretion terminate the contract without prejudice to any further

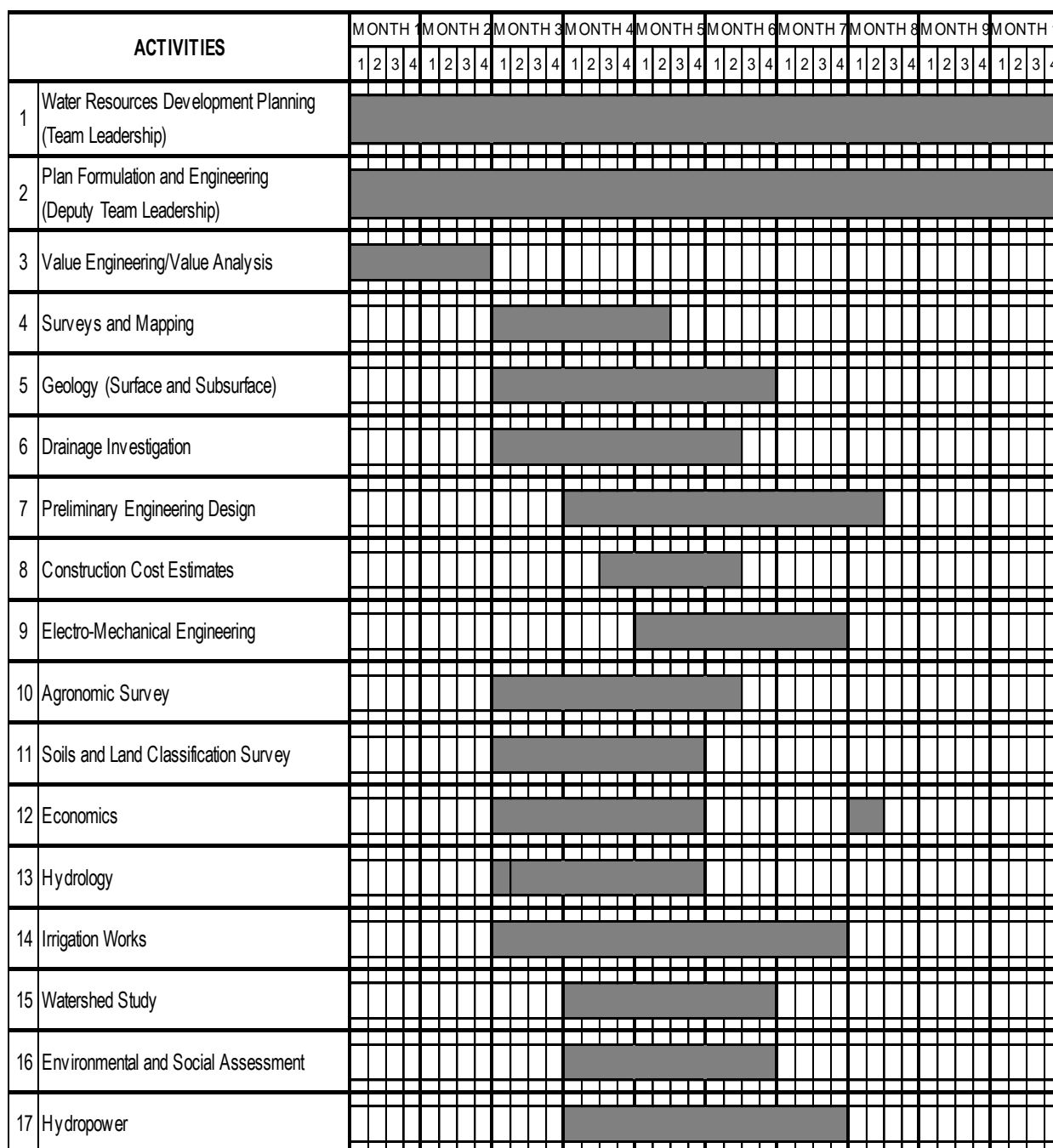
action it may take to recover whatever losses incurred due to non-performance of the Consulting Firm.

- 12.2 To be entitled to such liquidated damages, NEDA does not have to prove that it has incurred actual damages. Such amount shall be deducted from any money due or which may become due the Consulting Firm under the contract and/or collect such liquidated damages from the retention money or other securities posted by the Consulting Firm whichever is convenient to NEDA.

ANNEX A

GANTT CHART OF ACTIVITIES

UPDATING OF THE F/S OF THE ILOCOS NORTE IRRIGATION PROJECT, STAGE 2 (INIP2)



Note: The above chart is indicative only and does not preclude the shortlisted Consulting Firms from submitting their own Work Plan and Gantt Chart of Activities as part of their Technical Proposal.

ANNEX B

BREAKDOWN OF THE APPROVED BUDGET FOR THE CONTRACT (ABC)

<p style="text-align: center;">CONDUCT of FEASIBILITY STUDY for the ILOCOS NORTE IRRIGATION PROJECT (Stage 2) (INIP-2)</p> <p style="text-align: center;">APPROVED BUDGET FOR CONTRACT (ABC)</p> <p style="text-align: center;">SUMMARY</p>	
PARTICULARS	AMOUNT (PhP)
A. RENUMERATION	17,981,000.00
B. REIMBURSABLE EXPENSES	19,135,410.00
B-1 Field Per Diems	(room costs, subsistence allowance and othe similar field expenses)
B-2 Field Travel Expenses	(airplane fare, vehicle rental, airport fees and taxi fare)
B-3 Other Cost	(office equipment and furniture, office running cost such as office supplies, sundries/communication, reproduction of documents, meetings, office space and utilities)
B-4 Topographic Survey	
B-5 Survey to Subsurface Exploration	
B-6 Agro-Economic Survey	
B-7 Soil and Land Use Survey	
B-8 Environmental Investigation	
B-9 Contingencies	
GRAND TOTAL	37,116,410.00

Note: Grand Total is inclusive of Contingency (5% of B)