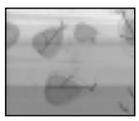
Noticias FAD/FEV

Convocatoria de concurso para elaborar el Estudio de Viabilidad «Nuevas fuentes de agua potable en el área metropolitana de Vigan» (República de Filipinas)

El Gobierno de la provincia de ILOCOS SUR de Filipinas convoca a las empresas españolas a un concurso para elaborar el Estudio de Viabilidad sobre «Nuevas fuentes de agua potable en el área metropolitana de Vigan».

Este Estudio de Viabilidad, aprobado en la Comisión del FEV de 21 de octubre de 2004, tiene un coste aproximado de **hasta 300.000 Euros** y será financiado con cargo a la Línea de Financiación de Estudios de Viabilidad (FEV Modalidad Pública), cuyos recursos provienen del Fondo de Ayuda al Desarrollo.

Las empresas españolas interesadas en la realización del estudio deberán presentar sus ofertas, en las direcciones que se detallan más abajo, según la documentación contenida en los Términos de Referencia **no más tarde de las 12:00 horas del día 20 de septiembre de 2005 y en cada uno de los destinos señalados en esta convocatoria**.



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El Gobierno de la provincia de Ilocos Sur, bajo la supervisión de la Administración española, evaluará las ofertas presentadas de acuerdo con los baremos recogidos en los Términos de Referencia.

Se presentarán, dentro del plazo previsto y en las direcciones que se indican, los siguientes ejemplares:

Dos ejemplares en inglés, que se entregarán al Gobierno de la provincia de Ilocos Sur, en Filipinas

Un ejemplar en español, que se entregará a la Administración española (Subdirección General de Fomento Financiero de la Internacionalización) en Madrid.

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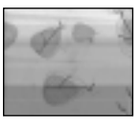
Terms of reference

BACKGROUND OF THE PROPOSED STUDY



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The project for Metro Vigan is the result of a detailed analysis regarding the situation of the water needs in the area and the impacts of the lack of services in items of quality of life for the population (health problems, etc.) as well as the serious restrictions to harmonic socio-economic development of the region. The natural resource exists and is available, but there is not efficient infrastructure to collect and administrate it in the optimal way. A set of technical, organizational and financial constraints are delaying the construction of the adequate infrastructure for the optimal use of the natural resources, instead of it, local inefficient systems are running reaching limited success in terms of served population and quality of service. Strong investment and lack of budget limit the improvement and enlargement of the systems and make practically impossible the development of efficient solutions at regional level.

The present project comes from the Vigan Master Plan proposals for water supply and meets the development framework defined for the water supply strategy in Ilocos Sur in other previous working issued by this Planning Department of the Provincial Government. The Master Plan is addressed to Vigan City, bur some of the solutions proposed are looking at a wider area. This is because the optimal solution needs a certain size and location requirements far from the real strict Vigan needs. In other words, efficient water systems require a minimum size and the scope of the proposal must be regional in order to maximize the benefits of the system and extend them to a maximum number of people. This also fits with the present situation with one area operator. The Metro Vigan Water District (MVWD). (Although Sto. Domingo and San Ildefonso are not now in the MVWD).

The Master Plan is just providing a strategy. It means that the proposed solutions must be developed in other detailed studies before implementation.

In the case of water systems in the area the problems and impacts are well known. Basically the problems are:

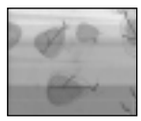
- Lack of networks. Existing ones are not adequate (pipe material, losses, etc.)
- Chlorination systems are not always well controlled, therefore quality of water is not stable.
- Total water production is not enough to meet the demand. Big lack of service.
- Present infrastructure and equipment is insufficient and not fully operational.
- These problems lead to the following identified impacts.
  - — Health problems
  - — Lack of «water culture» in the population
  - — Constraints for future development

This means two types of actions have to be taken: First, to plan and implement new municipal networks for both Population and Rural Barangays, which can be developed at local level for easy supply and maintenance, and, second, to look for new water sources complying with a set of criteria (defined below and fully consistent with the strategy) in order to ensure the most reliable solution. This usually means a supra-municipal approach, as we propose here.

Following the above mentioned Master Plan approach, the City of Vigan is enlarging and improving its distribution network, expecting to complete a full one in about one year from now. this means to cover all Rural Barangays, the Poblacion (already served) and a new transmission line from Brgy. Raois to Mira Hills reservoir to allow enough capacity for the rising demand. This means that Vigan will demand a huge amount of water in a near future, which cannot possibly be covered with the present production. Therefore, the works to find new water sources is an urgent requirement.

This development has an important social impact in terms of quality of life and new water culture from people who is expecting a lot from the system. This social demand must be satisfied feeding the new pipes with enough water for everybody. it is important to remind that most of MVWD water production is located in Vigan (Raois wells) and people will ask for some priority in the water share. The water source appears, again, as the crucial point to be solved to ensure a reliable regional supply, since this regional scope is identified also from the social point of view.

The present study shall be divided into two phases.



PHASE I: EVALUATION OF ALTERNATIVES

1. Methodology

1.1. General approach

The project will start from an User Needs Analysis (UNA) to define the users needs in terms of water requirements as basic technical input for sizing and designing.

From the UNA the consultant will provide the Functional Specifications (FS) for the system taking into account the social, economic and financial framework (working framework) coming from the specific studies carried out in each field.

Once the functional specifications of the system are defined, the initially feasible alternatives (complying with such technical specifications and the restrictions or constraints defined by the working framework) will be conceptually defined.

Then, the defined alternatives validated by all of the involved agents, will be analyzed technically by means of all the required technical tests (to be defined by the consultants in the proposals).

Criteria evaluation will be decided by a specific method proposed also by the consultant, but it will take into account the point of view of all of the involved parts, mainly the Public Authorities involved and the users.

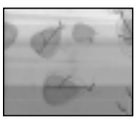
Finally the alternatives will be evaluated via a multicriteria evaluation procedure and the best one will be selected (via a consensus process among all of the involved agents) for a detailed analysis, linking this phase I of the study with the phase II.

During all process the following points will be taken into account by the consultant. The coordination with other studies with possible interference with the proposed water system (Banaoang Irrigation project, the existing LWUA study for new wells in the area, etc.); the protection of the watershed and the environmental impacts of the project as well as the social acceptance aspects.

1.2. Technical study

1.2.1. Basic Information

A great number of factors must be taken in consideration for the solution definition, which can be grouped into two big groups, those of physical character and those of socio-economic character.



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Between those of physical character we can find the ones relating to geology, morphology, geomorphology, lithology, weather, edaphology, vegetation, hydrographical basins and river hydrology.

Between those of socio-economic character we find the infrastructure, demography, industrial activities, residential and service ones.

The following parameters must be shown or obtained:

— Diary average temperatures
— Diary maxims rainfall
— Monthly average rainfall
— Sun average annual hours

— Topographic data

Next information must be shown or obtained:

- Zone topography scales 1/25.000, 1/5,000, 1/500 and detailed ones for the possible solutions

— Geological and geotechnical

Next information must be shown or elaborated:

- General studio area geological planes
- Zone lithology
- Land edaphology
- Infiltration and storage land capacity.

— Hydrological Data

Next information must be shown or elaborated

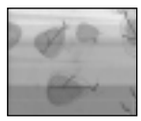
- Extreme Flows
- Real and potential evapotranspiration
- Runoff ratios and existent vegetation data
- Monthly average superficial flows runoff
- Annual average underground runoff

— Water quality

Water quality can be defined in a functional way as the intrinsic capacity that water has to afford different answers to different inputs or uses, as well as those conditions that water can be demanded in order to maintain an equilibrated ecosystem and in order to achieve some quality standards.

Water quality is a fundamental hydrical variable that can be modified bynatural causes or artificial ones (pollution). Underground water quality is the result of the interaction of infiltration water and the different material water can pass through water cycle. Carbonates formation water give water of the utmost quality. In detritic formations, the atrophic development produces frequent contamination episodes. Production and dispersion pollution mechanisms are complex, and diverse contamination types can be found, saline intrusion, etc. For this reason the next information must be shown or captured:

- Surface and underground water quality
- Underground quality variation related to exploitation volumes
- Discharges
- Landfill and solid waste treatments placements
- Possible discharges and pollution focus information.



— Exploitation Data in Operating systems

Exploitation data from at the moment operating systems are of great interest in many aspects such as:

- Phreatic level variation for different operating schemas
- Satisfied average and maximal water quote
- Type, power, capacity and working hours of the well pumps
- Operating costs
- Water quality and its variation in time

— Social and economic data

Urban water demand is characterized by its great heterogeneity related to the use of it; private domestic uses, municipal, collective, industrial, and commercial uses. That makes it difficult to define an a priority demand rate.

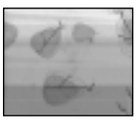
It is for that reason that the following information must be shown or obtained:

- Population evolution and short term predictions
- Urban demand distribution among domestic consumption, small industry, public services and other consumption.

- Demography, Population density
- Population variation ratios
- Population evolution and its impact on several sectors activity indexes
- Population territorial distribution and industrial activity
- Hydro electrical production evolution.
- Evolution and predictions of:
  - — Tourists and hotel bed places
  - — Tourism Income
  - — Secondary home living
  - — Golf courses
  - — Tourism seasonality

The former data would permit to make a search on actual and future demands relating to population and industries, extrapolating future predictions. Future scenarios could be established on a basis of 10 and 20 years.

On the other hand, it is of the up most interest to get as much knowledge as possible related to social conditions and reality about the project. By the knowledge of the very special circumstances of water use, whatever water supply, related work implies two or more interlocutors to solve the problem. In order to prevent possible problem that could interfere with the project development, an specific task is addressed to know about what is the opinion of the part of the population that obtains benefits and those who do not.



— Affected expropriations

A complete research must be done about the affected properties by anyone of the contemplated solution.

A sheet must be fulfilled containing the following information, one for each plot:

- Owner name and address
- Plot cadastral number
- Renting name and address
- Plot surface
- Use of plot of land

Plot valuation must be done according to type of and use classification. Also an affected services analysis must be done, studying and defining the reposition values.

1.2.2. Working framework & system specifications

The working framework will be described according to:

- The social preparation study
- The economic situation in the area
- The consultation with the involved agents
- The existing or planned projects from different agencies

The framework will be defined for each of the above mentioned features in terms of boundaries of acceptance, defining a sort of pre-feasibility area where the alternatives must be fitted.

The UNA and FS steps will lead to basic conditions for the design. The resulting system must comply, in addition to the above mentioned basic design conditions, at least, with the following aspects:

- Total population must be enough for present and future uses and increased consumption rates, as well as for population estimated growth. (a)
- The final resultant flow must be as constant as possible. (b)
- The quality must be good and as constant as possible. (c)
- The source must be stable at long term and easy to control. (d)
- The supply must not be energy-dependent, if possible. (e)
- The environmental impact must be acceptable in a social cost/benefit or multi criteria approach. (f)
- The system must be economically efficient, the water price must be realistic but «social», thinking in the users (all population) and their possibilities.(g)
- The system must be as simple as possible in design and equipment to make easy the maintenance works. (h)
- The system must be centralized in order to contribute to the previous criteria and also to ensure uniform quality equal for all users. (i)

1.2.3. Definition and evaluation of alternatives

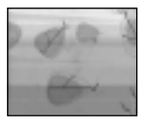
The definition of the alternatives will be proposed by the consultant to the Administration in charge and must take into account the ones included in this TOR as a basic reference.

To define the alternatives with enough precision to be evaluated according to the criteria and indicators. It is important to take into account a minimum level of technical information concerning such alternatives, which is defined in this section, jointly with the basic alternatives to be considered.

All possible solutions must be taken into account (at least the consultant should analyze the following options):

- Small dam for regulation
- Deep wells
- Direct collection from the river
- Desalination plants

All the solutions must evaluate its correspondent principal and secondary conductions. Unitary and altogether solutions must be taken into account as a result of a summary of unitary solutions. Also a waste water treatment plant must be taken into consideration.



1.2.4. Solution Analysis

1.2.4.1. Small Dam or regulation basins

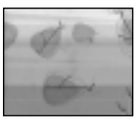
In order to analyze the execution of different alternatives of regulation dams it is necessary to make a hydrological study of the extreme flows, to know the basic conditions of waterproof stability and material availability as well as a valuation of the technical and economical alternative viability.

Small dams or regulations basins works must contain at this level the following detailed information:

- Topographic zone reports
  - — 1:10.000 Map (1:5.000 if it is necessary) with equidistance of 1 mcovering dams and closing hill as well as possible material borrow pits

— 1:2.000 Map with 2m equidistance covering flooded areas in case of collapsing that will serve to elaborate the classification proposal according to the potential risk and the flooded areas.
— 1:500 (250) Map with 0.5 m equidistance covering the closing hill area.
— 1:500 (250) Map with 0.5 m equidistance covering the water supply pipe trace with a minimum width of 2.5m.

- Geological geotechnical studies and material availability
  — General zone geology
  — Waterproof conditions evaluations of the vase and structure
  — Study of underground water hydrodynamic under actual circumstances and future ones once the dam is operating
  — Study of the stress land capacity of the foundation and those that define its compressibility.
  — Hillside stability
  — Possible geological accidents: faults, land flows, contacts etc.
  — Suitable material for dam construction
  — Dam typology
  — Earthquake related studies
- Floods and regulation studies
  — Pluviometry
    – Contrast analysis and data correction by statistic methods such as correlation double accumulation interpolation and adjust by suitable software and precipitation definitive series
    – Isoyets maps or Thiessen polygons, depending on what is better considerated as well as the isomaxim related to return periods of 10, 25, 50, 100, 500, 1,000, and 10,000 years
    – Concentration rule settings by storm rainfalls and project storm rainfall definition
  — Contributions
    – Contrast analysis with annual rainfall data
    – Contrast type analysis with the gages of the basin and surrounding ones
  — Regulation
    – Demand (taking into account all proposed uses) supply balance must be analyzed for flow regulation as well as ecological flows.
  — Floods
    – Floods hydrograms will be determinated with return periods of 10, 25, 50, 100, 1000, 10,000 years and the P.M.F. flood.
  — Environmental analysis
    – The existing interactions between the project actions and thephysical environmental factors for each one of the possible alternatives
    – To evaluate the produced impacts and select the appropriate correction measures in each case.
    – Evaluate the global impact for each emplacement by its characteristics
    – Compare the results obtained to select the alternative or alternatives more suitable in an environmental point of view.
- Proposal definition and valuation of possible alternatives
- Proposal of solution



1.2.4.2. Direct bed river intake

Some part of the information developed to evaluate the small dam solution will serve in the direct bed river intake studies. The basic ones will be developed with the same methodology of that done with the small dam solution.

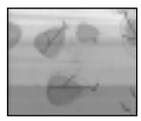
In a first phase the location of feasible alternatives will be analyzed using the existing cartography, while evaluating the significant incidences that could affect the solutions.

Works related to the definition of the intake should contain the following items:

- Basic studies
  - — Topography
    - – 1:500 (250) scale drawing with 0.5 m equidistance covering the intake structure emplacement.
    - – 1:500 (250) scale drawing with .5 m covering regulating reservoirs areas and the water supply conduction line with a minimum width of 25 meters
- Geological, Geotechnical and material availability studies
  - — General geology of the zone
  - — Study of the stress land capacity of the foundation and those that define its compressibility
  - — More suitable materials for the intake construction
- Pluviometry, contributions, regulations and floods.

The mentioned studies only will be done in case that the basins are different of those analyzed for the small dam solution.

- Environmental analysis
- Evaluate the global impact produced by each emplacement according to its characteristics
- Proposal definition and valuation of possible alternatives.



1.2.4.3. Wells

In a first phase those alternatives will be developed, evaluating in place the significant incidences that could affect the solutions.

Works related to the well definition should contain the following items

- Basic studies
  - — Topography
  - — 1:500 (250) scale drawing with 0.5 m equidistance covering the well structure emplacement
  - — 1:500 (250) scale drawing with 0.5 m covering regulating reservoirs areas and the supply wells with a minimum width of 25 meters
- Geological Geotechnical and material availability studies
  - — General Geology of the zone
  - — Hydrodynamic underground water studies in present conditions and in the future conditions with the dam construction
  - — Possible geological accidents: faults, land flows, contacts, etc.
- Water availability and quality
- Environmental analysis
  - — Existing interactions among project actions and the physical environmental factors for each of the possible alternatives.

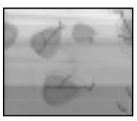
— Evaluate the impacts and choose the suitable corrector measures
— Evaluate the global impact.
— Proposal definition and valuation of possible alternatives

1.2.4.4. Desalination

Desalination constitute part of the hydrological cycle. Desalination is a treatment process that eliminates water sea salts or water with high concentration of salts. This treatment requires high ratios or energy consumption. Coming from salt water two flows are obtained water product and refuse water or brine water.

The basic processes of desalination can be classified in:

- Thermic or distillation ones
  - — Multi-stage flash distillation (MSF)
  - — Multiple effect distillation (MED)
  - — Vapeur compression distillation (VC)
- Membranes
  - — Electrodyalisis (ED)
  - — Electrodyalisis reversal process (EDR)
  - — Reverse Osmosis (RO)
- Others
  - — Freezing (F)
  - — Membrane distillation (MD)
  - — Solar humidification (SH)
  - — Others eolic, hybrid, etc.



In the thermic processes salted water is healed producing steam that condenses producing drinking water. The ebullition point control is obtained adjusting the pressure and descending temperature and pressure series recipients are used. In order to avoid incrustation problem at high temperatures the temperature and the ebullition point is maintained under critical levels.

Electrodyalisis based processes are based on the positive pole (anionic) or negative (cationic) of salted water. Those ions are attached by the electrodes with opposite charge and the used membranes permit the selective pass of anions and cations. Alternate anionic and cationic membranes are placed separated by a spacer through which water flows. Anions and cations are attracted and displaced to correspondent electrodes. Anions could go through anionic membrane but not through the cationic one and three flows of different salt concentration are produced. Some pre-treatment is required in order to reduce the aggressivity to membranes and the possibility of incrustations.

Reverse Osmosis process is being commercialized since the seventies. Brute pressured water goes through the membrane (between 20 and 70% of the total) and the rest goes out without trespassing (brine). The pre-treatment is more exigent and pumping works at high pressure (17-18 atmospheres). A little quantity of salt goes through the membrane due to imperfections. The main membrane types are: spiral turnover and bold (*) fibre. Some energy recovery is being done with turbopumps.

There is no ideal method to desalinize water. Distillation and reverse osmosis is more suitable for sea water and electrodyalisis and the reverse osmosis are the optimums for salted water.

The ideal system depends not only on economic factors but in what allows you to get

the flow you want with the quality you want. It is for that reason that you must take in consideration the liability and the shortage possibility.

Invest and operating expenses have been decreasing recently in spite of the increasing cost of energy. The final price depends on type and capacity of the plant, emplacement, rough water characteristics, human job force energy, financing, reverse water elimination, etc.

For a similar plant the cost of sea water is 3 to 5 times the one of salted water, and this is the reason why in some particular and punctual conditions desalination of salted water is an alternative to conduction.

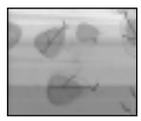
Desalination studies must contain at this level the following detailed information:

- Geological geotechnical studies
  - — General zone geology
  - — Study of the place where the desalinization plant is going to be built
  - — Study of the stress land capacity of the foundation and those that define its compressibility
  - — Possible geological accidents faults, land flows, contacts etc.
  - — Suitable material for construction
  - — Earthquake related studies
  - — Environmental analysis
- Proposal definition and valuation of possible alternatives

For all the alternatives defined once the detailed analysis is done, one of them will be developed as an individual solution proposal that will contain a summarized memory.

The minimum content of this summary should be:

- Project goals
- Environmental description and situation
- Main project characteristics
- Singular works and water supply characteristics
- A priori principal expected affections.



1.2.4.5. Conductions

Cost and alternative comparison should be defined to calculate the effect of the basic conductions elements (civil work and tubs with its piping installation) plus the possible costs of affected services replacement and expropriations. The following items should be defined:

- Pipe material and characteristic
- Trace, Trench and special parts
- Next maps are to be shown:
  - — 1:1000 general plant drawing with the trace of the conduction andspecial work indications

Concerning the treatment plant, the consultant will define in each alternative how to manage the treatment problem. The treatment plant could be centralized or associated to regulation reservoirs depending on the solution adopted. The analysis of the treatment plant will include:

- Technology
- Specifications for the plant

- Cost (investment and maintenance)
- Range of operation taking into account the quality of the water incoming

The level of details for the treatment plant analysis will be enough for the comparison of alternative solutions as well for the precise evaluation of the cost itself, for the selected option, in order to approach the total cost of the proposed solution.

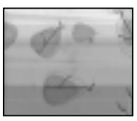
As an output of such process the consultant will provide in its technical report specific section for each of the alternatives analyzed including all the technical information defined in its TOR as well as the calculus of the indicators for each criterion. Finally a summary of the evaluation will be provided with the cross table of criteria and alternatives. A priority list will be elaborated after the consensus process with all involved agents.

The results of the complementary social and economic studies will be included in such analysis.

1.3. Social preparation study

The objective of such process, in this phase I, is to contribute to define the social framework in terms of potential support or refuse of end users to the new alternatives.

This chapter presents specific component activities considered crucial for eliciting social acceptability of the project. It is by no means a complete description of a fault-proof approach but nevertheless provide a framework for social preparation activities that are predetermined as both practical and essential for promoting awareness among the greatest number of stakeholders of the strategy. It also takes into account the Terms of Reference informally culled from exploratory discussions with representatives of various agencies, i.e. local government units and sectors of civil society wherein issues of salutary benefits derivable from the project vis-à-vis perceivable risks were tackled, albeit partially.



The intermediate objective of the strategy as described in the following pages is primarily to encourage discourse among all concerned on the wisdom of proactively identifying viable options for addressing the Region's critical requirement of an efficient and effective water distribution infrastructure that could match a foreseeable demand brought about by rising in-migration/population growth, industrialization and rapid urbanization.

The limited water source thus far developed by the Metro Vigan Water District is inferably a grave concern that touches directly the health and welfare of the greater majority of people of Metro Vigan. However, the attendant expansion in supply coverage of the MVWD deep wells should carry the assurance and their output yields are supplemented by sources other than more dug-wells, as this might seriously affect the limited capacities of underground aquifers and precipitate an adverse saline invasion of the area's ground water reservoir.

1.3.1. The Strategy's Social Acceptability Component Activities

To ensure the realization of this basic objective of analyzing social acceptability to the project, we propose the following component activities among the local communities, concerned government offices and agencies, non-government organizations/people's organizations and other stakeholders:

a) Project presentation and orientation

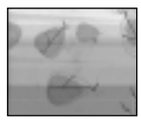
A uniform presentation of the project will be carried out by the project team among the stakeholders. Invariably, it shall deal with the earmark social benefits likely to result from the project and/or the impetus for progress. It will create among the local communities particularly in Metro Vigan and generally in the Ilocos Region. Concomitantly, potential risks, hazards and vulnerabilities will have to be mapped out and pinpointed in order that appropriate prevention and mitigation measures can be proactively established, thus allaying the doubts and fears of the skeptics and those who may be against hosting the project.

In the project orientation aspect, emphasis shall be laid upon the following facts-

- Current status of water sources prevalent in the Ilocos Region and how do they fare with respect to required usages of water, e.g. drinking, household use, irrigation, etc.
- Projected population growth vis-à-vis potential demands:
- Value-added features that may be derived, e.g., mini-hydro-electric power plant, tourism potential, alternative road network (access and egress), industrial expansions, improved health conditions, etc.

b) Community Survey and Analysis

A close look into realities obtaining in the area prior to project full implementation shall be done through community survey. Data obtained shall be analyzed and made to serve as take-off points for informal dialogues or discussions with the residents during a community assembly or meeting. The confirmed results shall then serve as benchmarks upon which the project shall determine opportunities and avenues for improvements, greater productivity and progress. It will also serve as the project's social marketing tool as it will provide the residents that will be affected or the host communities with basis to relate with the project.



A prepared survey questionnaire will inquire into current as well as projected demographic profiles, livelihood and economic sources community resources and assets, e.g., lifeline facilities and skills availability/non-availability, agro-industrial establishments, future development plants, hazards' profiles and community disaster history and real property ownerships, among others.

c) Return Presentation to Communities of Results of Community Survey and Analysis

This activity will be critical to mirror to the community residents their present conditions (where they are), and the potential for progress ahead should the project push through (where they can be). Furthermore, this will pave the way for their sharing of ownership of identifiable initiatives that are supportive to the project objectives. Tridimensional area maps of the settlements likely to be affected shall be produced for reference purposes.

1.4. Economic & financial study

Since this Phase I is an alternative evaluation study, the economic & financial part will be developed only as a support study. It means a specific cost/benefit analysis for each alternative for comparative purposes and as a primary indicator of the cost and the possible associate financial implications only. The cost benefit indicator will be included in the multi-criteria evaluation as one of the criteria for the analysis.

In such study the consultant will pay special attention to the costs to be supported

directly for the end users (water cost) in order to make sure that they fit with the working framework referred above in the economic part.

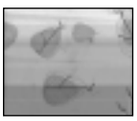
On the other hand, it is important to remark the interaction between the technical part and the economic one in terms of accuracy and uncertainty of the figures given for the cost of each alternative.

The financial analysis will just cover the opportunities of finance for each alternative taking into account the particular features of them. The consultant will include in the analysis this aspect, since, for instance, the inclusion of specific services could make the project more attractive for a private investors making possible PFI schemes. In the same way the constraints from the major project finance agencies (foreign ones or multilateral; both supporting countries is a development way) concerning the project characteristics will be taken into account in the study.

The structure of such will be defined by the consultant in the proposal and must take into account the above mentioned issues. For the comparative analysis the consultant will provide, for each alternative, as a minimum the following data:

— Detailed cost breakdown, including investment cost (land cost and construction cost); operational cost (fees for the water rights, exploitation and maintenance cost, etc.); environmental cost (evaluation of the impacts); social cost (if applicable); equipment cost; financial cost, other cost (taxes, etc.)
— Detailed benefits, including the rates charged for the service, social benefits etc.
— Profitability indicators like internal revenue ration, payback, present aggregate value, etc.

Finally the consultant will carry out a risk assessment, just for comparative purposes, among the alternatives.



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1.5. Expected results

1.5.1. Results to be obtained

The result of the study will be a decision support tool to be provided to decision makers to help them in the selection of the best alternative. This tool will be based on a multicriteria evaluation method, taking into account all of the above mentioned criteria and constraints.

On the other hand the detailed technical economic, financial and social feasibility of the proposed alternative solutions must be proved, as well as its suitability in terms of environmental impacts, according to the Philippine standards and regulations.

The consultant will propose a specific solution as optimal and will give also other alternatives, as a priority list, providing one group among the best rated alternatives as recommended ones.

Finally a set of recommendations for the development of the selected option during phase II will also be provided as part of the results of the study.

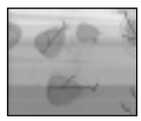
1.5.2. Tentative contents for the study report

a. Introduction
b. Executive summary

c. Methodology
d. Analysis of existing information and other studies
e. Work Plan and field tests proposed
f. Definition of the working framework (pre-acceptability of the alternatives)
g. Results of the UNA and FS
h. Definition of the alternatives (This includes the pre-feasible solutions)
i. Definition and weights for the criteria
j. Detailed analysis of each alternative (this will include all of the technical information like plans, cartography, geology, hydraulics, environmental studies, etc.)
k. Results of the social preparation study
l. Results of the economic and financial study
m. Multicriteria evaluation of the alternatives
n. Conclusions and recommendations for the best option.

The objectives of this phase are:

— To analyze all the technical aspects of the solution from Phase I, givinga precise definition of these elements.
— To evaluate all the costs and benefits for the solution implementation (project feasibility in technical, economic, financial, environmental, social operational and legal terms)
— To analyze the financial aspects, reaching a feasible financial solution for the project
— To prepare the documents for project implementation to any internal or external agent for dissemination or technical purposes.



PHASE II: EVALUATION AND SELECTION OF THE OPTIONS

2. Methodology

2.1. General approach

The starting point of the is the selected solution of phase I. From this solution the consultant will analyze in detail the following aspects in order to be sure that the solution is feasible:

— Technical, validating the previous approach of phase I, and defining the conditions for the technical feasibility in terms of design, integration inthe environment, exploitation, side works and other accompanying actions, etc.
— Economic, validating, from the technical inputs, that the evaluation carried out during phase I is correct focusing on the financial possibilities.
— Financial, that effectively there is a financial solution able to be implemented among the different opportunities, looking for schemes with minimum impact for the Public Administration.
— Legal, that the proposed project is legally acceptable and there are no barriers for the implementation, taking into account the possible financial solutions.
— Social, ensuring that the project is accepted by the community and especially for the directly affected people.

— Operational, making sure that the project is viable in a reasonably terms (time, administrative requirements, etc.) looking at the finance scheme and the social impacts.
— Environmentally acceptable, according to the Philippine regulations, making sure that the environmental impact study is accepted by the competent body.

To do that the first step is to develop a technical study, under the minimum conditions defined in the following chapter of the present TOR.

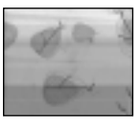
Once the technical solution is completely defined, the detailed economic cost calculus can be done obtaining the total cost of the project and all of the internal economic data to prepare a financial proposal and analyze in detail the financial alternatives.

In parallel the output of the technical study will also feed the social study with the basic input which is the definition of the project and the affections which could produce punctual social impact.

The environmental study goes in parallel with the technical one and it becomes part of the working material for the social preparation team, as a support tool concerning the objective impacts assessed.

2.2. Technical study

2.2.1. Basic Information



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Complementary to studies done in the first phase, next intakes will be done for each specific solution. The consultant could propose other intakes in his offer for the new solutions that could have been included in phase 1 but not contained in TOR. As far as the possibility of mixed solutions or complex ones that include more than one of the proposed alternatives is contemplated, like the obliged analysis in phase 1, here the complementary information necessities, is being offered in a discriminate manner. In the same way it is necessary for the solution or for the chosen ones to go deeply into the information detail, with enough intensity to guarantee the study goals. It is for that reason that the specific conditions of the phase 1 data obtaining, are considered as an integrant part of this TOR for the solutions to be developed.

2.2.1.1. Small dam or regulation basins

- Geological Geotechnical and material availability studies
  — Face foundation and sane rock deepness or suitable for foundation
  — Evaluation of the small dam body deformations during construction and operation time
  — Spillway emplacement
  — Posterior land campaigns planning
- Inputs
  — Obtaining monthly series of inputs in those points of interest by extrapolation or computer simulation
  — Simulation and creation of synthetic series by the Montecarlo method.
  — Distribution patterns of extreme and media values.
- Floods
  — Floods hygrograms will be determined with return time of 10, 25, 50, 100, 500, 1000, and 10,000 years and the P.M.F. flood

2.2.1.2. Direct river bed intake

- Basic Studies

The information will be that of phase 1 of the present TOR.

2.2.1.3. Wells

- Basic Studies

The information will be that of phase 1 TOR

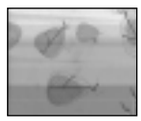
2.2.1.4. Desalination plant

- Basic Studies

The information will be that of phase 1 TOR, with the suitable depth and detail.

2.2.2. Project Analysis

Technical solution definition for each possible selected alternative is next shown. Consultant should develop in his proposal, according with the chosen solution or combination of solutions, the parts that become of application, meaning as minimum standards those of TOR. If other non contemplated solutions in TOR exist, the consultant must define in his offer the aspects to be developed in order to achieve a complete definition of its solutions.



2.2.2.1. Regulation basins

Environmental analysis

- They will be done accordingly with the environmental philippine regulations

Solution proposal

- Environment description and situation
- Dam and lagoon principal characteristics
- Water supply layout and singular works characteristics
- A priori principal foreseeable affections.
- Emplacement, dam, and conduction layout plans at a convenient scale for the information purposes

Chosen solution design

- Dam, spillway and auxiliary works design
- Stability small dam calculation
- Small dam basin and face hillside stability estimation
- Mechanic calculations
- Hydraulic calculations
- Electrical calculations
- Specific studies
- Auscultation small dam project

- Foundation treatment
- River detour study analysis
- Flood areas and emergency situations studies
- Water quality study
- Expropriations and affected services replacement

2.2.2.2. River bed direct intake

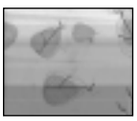
Environmental analysis

- They will be done accordingly with the environmental philippine regulations

Chosen solution design

- Diversion dam with intake design or direct intake design
- Mechanical calculation
- Hydraulic calculation
- Electric calculation
- Specific studies
- Water quality study
- Expropriation and affected services replacement

2.2.2.3. Wells



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Environmental analysis

- They will be done accordingly with the environmental philippine regulations

Chosen solution design

- Conductions and well design
- Mechanical calculation
- Hydraulic calculation
- Electric Calculation
- Specific studies
- Water quality study
- Expropriation and affected services replacement

2.2.2.4. Desalination Plant

Solution proposal

- Environment description and situation
- Desalination plant and singular works characteristics
- A priori principal foreseeable affections

Environmental analysis

- They will be done accordingly with the environmental philippine regulations

Chosen solution design

- Desalination plant design
- Mechanic calculations

- Hydraulic calculations
- Electrical calculations

2.2.2.5. Piping

For the selected solution it will be necessary to do basic pipes for its working. The supply pipe layout will be defined in such a way that it can reach optimal functional characteristics such as a reachable emplacement near the rods and accessible to maintenance vehicles and all of that a low expropriation and affection cost, it is also considered to use existing pipes. Next items should be completely defined.

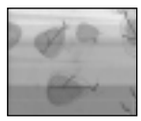
- Pipe characteristics and material.
- Layout, trench and special parts
- Next maps are at least required:
  - 1:1,000 general Plant map with pipe layout and special works annotations.
  - 1:1,000 horizontal and 1:100 vertical longitudinal layouts.
  - Racquets, air valves and spillways
  - Railways, roads and river intersections.
  - Type sections of roads and trenches.
  - Treatment plants maps, details.

Project Memory and annexes will include:

- Flow calculation
- Hydraulic calculation.
- Layout calculation
- Affected owners list.
- Definitive layout geology.
- Electromechanical equipment definition
- Regulation reservoirs when necessary.

Besides the technical work defined above, the consultant must take into account the following aspects in the technical analysis:

- The proposed solution must be defined at the maximum level of detail for a fine economic evaluation, with enough precision to be presented to the possible financial institutions. it will be a level of «previous study» or «pre-project». The level will also be sufficient to develop a complete engineering technical construction project without further major support technical works.
- The FS will demonstrate that the solution is fully integrated with other projects in the same area, and there is not any negative interference with them
- The technical part will be coordinated with the other aspects of the project like the social or financial ones in a continuous feedback process. The consultant will define how to organize this process in the proposal
- The treatment plant will be an essential part of the system and must be included as one component more in the analysis as well as the pipe network if it is necessary. This pipe network is not a distribution network (which already exists), just the internal network for the water sources system work.
- The environmental impact study is part of the technical study and must comply with the Filipino regulations in this matter and follow the recommendations from the competent agency.



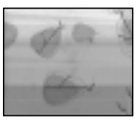
2.3. Economic & financial study

A social and economical profitability study will be done for the final solution in its basic solution or a mix of two or more basic solutions. It is about an objective valuation of the benefits that this works could cause as a justification of its future realization. The profitability study will contain the following items:

- Project economic life
- Profit chronological flow
- Indirect revenues
- Chronological cost flow
- Project execution costs
- Exploitation and maintenance costs
- Actual value of benefit and costs flow with different discount interest taxes
- Cost-benefit relation for the whole plan
- Net actual values
- Revenue intern tax of the plan

The study will include two clear parts in the analysis of results. The so called «financial evaluation» and the «social evaluation». The first will only take into account the monetary flows to assess the project. The second will include the social impacts as «non monetary» inputs for the analysis. A cost/benefit and/or multicriteria approach can be followed by the consultant to carry out the social part of the analysis.

A risk assessment will also be provided in the analysis.



2.3.1. Financial study

The financial study will be developed by the consultant with the aim to find a firm source of finance for the project.

The solution, once accepted by the administration, will be proposed to real financial institutions in order to check the real possibilities to get the financial support for the project (in what conditions it is possible).

The main financial solutions to be explored are:

- The use of soft loans and grants from international institutions, like the european investment bank, asian bank, world bank, etc.
- The use of soft loans for the equipment export from other countries which could help in one part of the project.
- The use of a private finance initiative (pfi) to build the project.
- The use of soft loans for launching joint ventures, according to the specifications of the project (profitability), to be combined with pf).
- The use of a full concession on the service to a private operator.
- The consultant could propose other alternatives in the proposal.

2.4. Expected results

2.4.1. Results to reach

The results to be obtained are:

- A complete justification about the feasibility of the project.

- A complete description of the project in technical terms (*)
- A firm source of finance identified
- An implementation plan for the project
- A document for project presentation and dissemination
- A detailed economic and cost/benefit analysis including the social approach
- An environmental impact report

(*) We offer below an indication of the general technical contents of the study (which must be adapted to the solution finally to be implemented)

2.4.2. Technical study draft contents

- **Draft budget**

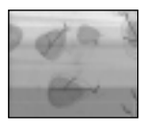
This includes the economic cost of all of the elements of the water system, like the primary network, the treatment plant and the possible hydro-electric plant.

- **Draft construction plan and works supervision**

This will provide estimates for the construction works organization andtime schedule as well as other implementation relevant aspects.

- **Draft terms of reference for the construction**

In this chapter the critical points of the construction will be highlighted, like materials, construction procedures, quality tests, etc.



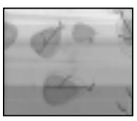
- **Draft technical studies**
  - — Background
  - — Project profile (sizing, location, primary network, power plant, etc.)
  - — Cartography and topography
  - — Hydrologic study
  - — Geologic and geotechnical study
  - — Access roads
  - — Calculus Hydraulic and mechanics
  - — Structural definition and calculus for the system
  - — River deviation (if needed)
  - — Monitoring of system behaviour (if needed)

- **Draft maps and plans**
  - — Situation map
  - — System area map (1:2000 and 1:500)
  - — General plant
  - — Excavation plant
  - — Frontal and lateral views
  - — Geometric definition and horizontal cross sections
  - — Geometric definition of structural elements linking the system to the terrain
  - — Vertical cross sections
  - — Tunnels, plant and reference points for re-setting works (if needed)
  - — Front views and cross sections
  - — Spillway. Crest (for small reservoir)

— Bottom Outlet. Longitudinal section, cross sections and details (for small reservoir)
— Mechanic elements area and buildings. Geometric definition and steel reinforcement.
— River deviation (if needed)
— Drainage and grouting. Front view and plant. Details and cross sections.
— Control system definition. Measurement and control equipment
— Access road to the places. Approximate alignment.
— Buildings for control and laboratory
— Electric installations
— Lighting, General plant and external lighting system
— Lighting for tunnels and internal water network (if needed)
— Other constructions needed.

• **Draft environmental and risk analysis**

This is considered as crucial document including the environmental and risk assessment. It will provide qualitative approach (and always if it is possible also quantitative) to the positive and negative impacts of the proposed project. Environmental issues as well as social impact (people to be moved, if needed) will be carefully taken into account in the analysis. The seismic and other risks will be evaluated according to the international standards and recommendations, providing clear references for a decision.



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2.4.3. Tentative contents for the study report

o. Introduction
p. Executive summary
q. Data analysis. Tests results
r. Technical feasibility
s. Social feasibility
t. Economic feasibility
u. Legal and operational feasibility
v. Environmental feasibility
w. Financial feasibility
x. Implementation plan
y. Conclusions
z. Technical annexes
aa. Presentation document for dissemination

3. Work plan & time schedule

3.1. Work organization in work packages

The work will be organized in 9 work packages

WP1 «**Project management**»; including the role of team coordination, client relations and strategic approach to the work as well as the leading of consensus processes among parts for the work progress.

WP2 «**Data collection and analysis**»; This include the information collection and

the design of the tests to be carried out to complete the existing data.

WP3 « **Field tests**»; This includes the tests for the analysis of each particular alternative like conductivity test for aquifers or geo-mechanic tests for possible small water reservoir, etc. They are part of the technical feasibility of the alternatives.

WP4 «**Technical analysis**», including all the technical works to ensure the technical feasibility and defining all the elements with the adequate level of detail.

WP5 «**Validation of the solution**», meaning all the works leading to ensure that the project is feasible in the legal aspects, operational aspects, social aspects, etc.

WP6 «**Financial initiatives**», including the negotiation with different financial institutions to make sure that the proposed scheme is supported by a real finance group.

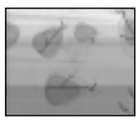
WP7 «**Environmental studies**», This part concerns to the evaluation of the solution using the indicators proposed by the consultant, including all the detailed technical works required to calculate the indicators for each alternative.

WP8 «**Economic and financial study**», according to the specification of the TOR given above.

WP9 «**Social preparation study**», according to the specification of the TOR given above.

4. Information to be submitted in the tender

The companies interested in the tender must present their offers according to the conditions established by these Terms of Reference. Three copies will be presented, as follows two copies in English for the Planning Office of Provincial Government of Ilocos Sur and one copy in Spanish for the State Secretariat for Tourism and Trade. The copies will be forwarded to the following address:



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PROVINCIAL GOVERNMENT OF ILOCOS SUR
Person in charge: Enrie A. Mendoza
Address: Provincial Capitol, Vigan City, Philippines
Fax: (+ 63 77) 722 2740
E-mail: ppdo-is@mozcom.com enriemndz@yahoo.com
Telephone: (+63 77) 722 2746/722 2776

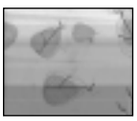
SECRETARIA DE ESTADO DE TURISMO Y COMERCIO
Direccion General de Comercio e Inversiones
Person in charge: Ana M. Oviedo Munoz
Address: Paseo de la Castellana, 162 - Planta 9 - 28046 Madrid
Telephone: 91-583 52 89
Fax: 91 349 35 12
E-mail: aoviedo@mcx.es

The offer must include both technical and economic proposals. The technical proposal will include; the description of the proposed objectives and works, the strategy and the method of realization of the works, the activity schedule (working schedule) and a breakdown of the hours each expert will work on the project by task. The economic proposal must include the cost of all items needed for the realization of the project and it will be presented in detail, clearly indicating the units, the cost of each unit and the total

cost for each item. The cost of each expert of the working team, the experts' schedule and the expenses for the study elaboration (travels, per diem and other expenses) will be presented in detail.

The offer must emphasize the company experience in the field of hydraulic projects and water supply. The company must prove its experience in similar projects in this field. The projects carried out in the beneficiary country (Philippines), and third world countries will also be taken into account. In particular, the company must submit the following information:

- Financial records from the last year available (balance sheet and audited accounts).
- General information on the company:
  - — Share ownership
  - — Date of incorporation
  - — Turnover data for the last 5 years
  - — Number of employees. Full time and part time employees
  - — Employees with a high education diploma
  - — Detailed information about the most important projects carried out, indicating clearly: client name, contract value, start and finishing dates for the projects, working team and description of the project. Studies similar in technical content and objectives with the one intended to be contracted through this technical assistance should be particularly emphasized. References from the beneficiaries will also be presented.
  - — Detailed information on the structure and experience of the proposed working team and the resumes (3 pages maximum) of the proposed staff will be presented, including at least the following data:
    - – name
    - – place and date of birth
    - – nationality
    - – proposed position within the project
    - – Degrees and diplomas
    - – languages (English is a requirement)
    - – experience in similar projects (indicating the responsibilities within)
    - – other (academic experience, publications etc).
- General requirements for key experts:
  - — studies in the field
  - — very good level of English
  - — relevant experience (list of projects)
- Specific requirements and qualifications for the technical team:
  «Overall project coordinator»: Civil engineer with Msc. Degree. A post graduate business degree (MBA) will be appreciated; experience in project management in international projects of at least 5 years.
  «Technical Director»: Civil engineer with Msc. Degree in hydraulics, with at least 5 years experience working in such area in an international framework, preferable with references in Asia and/or third world countries.
  «Economic & financial analyst»: Highest University degree in Economics or Engineer with MBA, with 5 years experience in economic and financial evaluation of investments, preferable with experience in international finance environment.
  «Social training expert»: Highest University degree, preferable in social sciences



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or similar profile, with large experience (10 years at least) in social training and direct work with communities in Asia and/or third world countries.

«Legal advisor»: Attorney at Law registered in the Philippines, with at least 15 years experience working in the province of Ilocos Sur.

«Local project manager»: Civil engineer Bsc. or higher, with at least 10 years of experience and specific knowledge of hydraulic projects. Specific experience in the Philippines is required for at least 2 years.

«Junior Engineer»: Technician for supporting the technical works complementing the core team. it includes a variety of sub-profiles according to the tasks to be done in each work package.

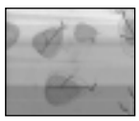
Any change in the structure of the working team proposed by the company must be submitted to the Planning Office of the Provincial Government of Ilocos Sur and the Spanish Administration for approval and if not accepted, it can be a reason for exclusion from the bid or for contract cancellation.

The firm awarded the contract will present a list of potential Spanish suppliers of goods and services required for the execution of the project.

The offers must have a period of validity of 6 months during which the participant companies are committed to honor the conditions of the offer, especially those concerning the structure of the working team, scope of the project, activities proposed for the objectives' realization, methodology, period of execution and price.

In case of association between consulting companies or subcontracting, the competencies and responsibilities of each one of the associates or subcontracting parties must be clearly defined.

During the elaboration of the study, the company awarded the contract will submit periodically a progress report stating the tasks carried out during the relevant period, existing and foreseen problems, proposed actions and possible deviations from the initial schedule.



The maximum percentage allowed for local expenses will be equivalent to 15% of the total contract amount.

Payment method:

— 25% after signing the contract, with the «no objection» from the Spanish Administration

— 25% after reaching and intermediate milestone to be agreed upon by the Planning Office of the Provincial Government of Ilocos Sur and the contract – winning company. The Client shall sign the corresponding certificate and send it to the Spanish Administration to receive the «no objection»

— 50% once the study has been concluded and approved by the Planning Office of the Provincial Government of Ilocos Sur and the Spanish Administration.

The works must begin as soon as the contract – winning company considers appropriate and not later than two weeks after signing the contract.

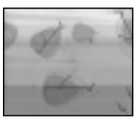
5. Working terms

The lump sum fee for the commission will be **Euro 300.000**. This commission will be funded by a grant from the Spanish Feasibility Studies Financing Facility (FEV).

6. Selection / award criteria

The selection and award criteria will be as follows:

CRITERIA	WEIGHT
1. TECHNICAL PROPOSAL	**40**
1.1. The UNA & FS studies linked with the alternatives definition process	4
1.2. Specific methodology for environmental assessment	4
1.3. Social preparation approach and work plan	2
1.4. Procedure for multicriteria evaluation method implementation	8
1.5. Coordination and project management procedures and tools	8
1.6. Technical approach	2
1.7. Financial initiatives	8
1.8. Social preparation proposal	2
1.9. Environmental impact analysis proposal	2
2. **TECHNICAL TEAM**	**40**
2.1. Experience and qualifications of the team according to the profile requirements and improvements offered by bidders	10
2.2. Participation of repute local institutions and professionals, taking into account the experience of such participants in the object of the project	5
2.3. Experience of the team in projects executed in this field	15
2.4. Experience of the team in project finance schemes and international finance	5
2.5. Participation in projects executed in the Philippines	5
3. ECONOMIC OFFER	**20**
TOTAL	**100**



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