



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE I
City of San Fernando, La Union

TERMS OF REFERENCE

MINERAL ASSESSMENT OF STREAM SEDIMENT ALONG PANTAL AND AGNO RIVER IN PANGASINAN

I. PROJECT DESCRIPTION AND PURPOSE

PROJECT NAME	SEDIMENT SAMPLE POINTS
1.) Pantal River Dredging Project, Dagupan City, Pangasinan	13
2.) Desilting of Agno River, Brgy. Tomana West, Rosales, Pangasinan	9
Location : Dagupan City and Rosales, Pangasinan	
Duration : 22 Calendar Days	

II. SCOPE OF WORK

The Consultant shall provide all the labor, instrument/equipment materials and supplies, vehicles, bunkhouses, etc., necessary to perform satisfactorily the mineral assessment herein required, viz:

- A. Fieldwork and Stream sediment sampling
- B. Sample preparation and volume reduction
- C. Laboratory analysis of Gold (Au) and Iron (Fe)
- D. Report on Mineral Assessment

The Consultant shall be held solely responsible for the result of this Mineral assessment and other activities under this Terms of Reference (TOR).

III. DETAILED EXPLORATION REQUIREMENTS/SPECIFICATIONS

A. FIELD WORKS

1. Sediment sampling location and depth

Spacing shall be one (1) at each near both ends of the project and additional sampling shall be conducted every 200-250 meters increment or at identified critical section/s. Exact location of boreholes shall be upon the instruction of the geologist or as provided by the client. Depth of sampling below the riverbed shall be the height of the sediment to be dredged.

2. Procedure

- a. Drilling shall be conducted at the plotted borehole locations to collect stream sediment samples.
- b. The extracted sediment samples from each borehole shall be subjected to sample preparations; drying, weighing, sieving, and weighing again and then volume reduction to obtain desired amount of final sample of regular, replicate, and control (field duplicate) samples for laboratory analysis.
- c. The consultant shall perform analysis and testing on the prepared samples. Fire assay with AAS finish shall be conducted to determine the Gold (Au) content. For the determination of Iron (Fe) content, the ICP-OES/MS following 4 acid digest test shall be conducted.
- d. The consultant shall discuss the laboratory analyses as well as the corresponding results thereof. Results of Gold and Iron concentrations shall be presented in graphs.

3. Handling of Core Samples

The contractor shall provide all the materials, equipment and labor necessary for preserving the samples for 2 years. Stream sediment samples need to be handled such that their properties are not altered in a way due to mechanical damage or changes in ambient conditions of moisture and temperature or other environmental factors. The stream sediment samples must be clearly, accurately, and properly labelled to show all pertinent information necessary in identifying the samples.

B. LABORATORY ANALYSIS

The following shall be made on samples obtained from drilling.

Fire Assay

This is an analytical technique used in the determination of the quality and purity of gold. It involves the use of heat to melt a sample and separate it into its purest components. The sample is mixed with a flux and is heated in a crucible to a high temperature. As the gold melts, other impurities such as base metals and other non-gold materials are oxidized and react with the flux to form a slag. This molten material is then poured into a mould to cool and solidify for inspection for quality and to ensure that the gold is pure. It is then weighed and calculated in the process called cupellation stage which allows for a more accurate determination of the gold concentration in the original sample.

Atomic Absorptopn Spectrometry (AAS)

This is a procedure primarily to analyze elements in either liquid or solid samples through the application of characteristic wavelengths of electromagnetic radiation from a light source. Individual elements will absorb wavelengths differently, and these

absorbances are measured against standards. This procedure shall be conducted for a more accurate determination of gold purity.

Inductively Coupled Plasma Optical Emission spectroscopy (ICP-OES)

This analytical technique is used to determine how much of certain elements are in a sample. Principle used in this test is the fact that atoms and ions can absorb energy to move electrons from the ground state to an excited state where the source of that energy is heat from an argon plasma that operates at 10,000 kelvin. This technique shall be used for the determination of Iron concentration.

C. KEY PERSONNEL'S DETAILED TASKS/RESPONSIBILITIES AND QUALIFICATION

Position	Qualification	No. of Person	Duration	Wt. per person (%)	Total Wt (%)
Senior Geologist	<ul style="list-style-type: none"> Must have at least five (5) years experience in the field of engineering geology and geotechnics, should be familiar with the latest technologies in borehole drilling and research work Must be a Registered Geologist Masters degree is an advantage 	1	22 man-days	50	50
Senior Chemist	<ul style="list-style-type: none"> Must have at least three (3) years experience in carrying out laboratory testing/ sampling and analysis for Heavy metals/ Non-metals / Soil / Earth materials Must be a Registered Chemist Masters degree is an advantage 	2	10 man-days	25	50

Detailed Tasks and Responsibilities of Key Personnel

A. Senior Geologist

- responsible for the conduct of geologic mapping and assessment; gathering information and reporting results of evaluations of areas of concern; come up with a sampling method for the mineral extraction and assessment
- conducts desk study, reconnaissance field work, collect stream sediment samples, and prepares Mineral Assessment report needed for the evaluation of stream sediment for dredging/ desilting.

B. Senior Chemist

- investigate and supervise the testing of physical and chemical properties of stream sediment samples from areas of concern and prepare reports thereof.
- collects necessary data and information in carrying out detailed laboratory test
- responsible in maintaining and calibrating test equipment and other duties related to lab operations as assigned

D. REPORTS AND DELIVERABLES

The Consultant shall prepare the following reports and deliverables:

1. Progress Report

The Consultant is required to submit a progress report eleven (11) calendar days from the commencement of work briefly and concisely describing all activities and progress of the project. Problems encountered or problems anticipated shall be clearly stated, together with the steps taken or recommendations for their correction. It shall also indicate the works to be performed.

2. Final Report

The Consultant is required to submit the final report twenty two (22) calendar days from the commencement of work in four (4) bound copies and a soft copy saved in a CD to the DPWH Regional Office I, Aguila Rd., Sevilla, City of San Fernando, La Union. The final report shall not be limited to the following:

- a. Introduction (Purpose and scope, Project Location, Project Description)
- b. Vicinity Maps in scale of 1:50,000
- c. Sampling Plan in scale of 1:250
 - reflecting the coordinates of the sampling site (WGS and PRS)
- d. Methodology (Field and Laboratory)
- e. Final Laboratory Tests Results (FLTR)
- f. Appendices and References

3. Other Data to be Submitted

A. Additional Data

1. Sample/ hole number, date, time, drilling, foreman, supervisor
2. Weather condition
3. Elevation and depth of extraction
4. Description of soil strata encountered
5. Size, type and depth of samples and sample number

B. Photographs

Photographs showing the sampling at each sites shall be taken by the consultant and incorporated in the report.

1. Equipment used
2. Sample extraction
3. All stream sediment samples during sample preparation
4. Geotagged photos (CRS:WGS)
5. Location or station, and markers

IV. PAYMENT

There should be no Advance Payment for Consultancy. The final payment shall be made only after the final report and a final statement, identified as such, shall have been submitted by the Consultant and approved as satisfactory by the Procuring Entity.

V. WORK SCHEDULE

The Consultant's contract period for undertaking the sub-surface exploration works including laboratory tests shall be Twenty Two (22) Calendar Days and the Consultant shall commence work after receipt of Notice to Proceed.

Prepared by:


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Approved by:


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