

Frieda River Copper-Gold Project Pre-Feasibility

KA PROJ REFERENCE: 15046B
INDUSTRY: Resources Power & Industrial
DISCIPLINES: Civil Engineering, Hydrology, Hydraulic Engineering, Architectural Services, Electrical Engineering, Constructability, Scheduling, Cost estimation

PROJECT SUMMARY

CLIENT

PanAust Limited

LOCATION

Border area of Sandaun and East Sepik Provinces, Papua New Guinea

PROJECT TYPE

Study and Preliminary Design

YEAR COMPLETED

2015



PROJECT DESCRIPTION

The Frieda River Project is a greenfield pit to port development located in the Sandaun and East Sepik Provinces of Papua New Guinea. There are no roads with-in 70km of the site. Our scope of works was to carry out preliminary engineering, quantity take-offs, estimating assistance, scheduling, and construction logistics for the following infrastructure components. Kramer Ausenco's scope of service in this peer review assignment is to assess the requirements for the constructability of civil works. KA will report the findings of the review assessment and make recommendations to XFRL from the feasibility design data supplied by XFRL and field site visit, of the proposed Frieda River Copper Mine.

Civil design: Approximately 30 bulk earthworks pads for permanent and temporary mine infrastructure, a 129km long main access road between the marine facilities and the mine site, secondary roads, construction laydown pads international standard airport, and temporary marine offloading facilities on the Frieda and Wario Rivers. The access road and pads were located in very difficult terrain ranging from the Sepik River floodplain to very steep mountainsides nearer the mine site. The site experiences 7m to 8m of rain a year. Our scope included earthworks and drainage design.

Industrial: Design and layout of all support facilities and associated buildings including; accommodation camps, MIA, administration & training, and temporary construction facilities.

Process and Pipelines: Water treatment (raw and pitwater), sewerage, and hydrocarbon storage and distribution. Concentrate, tailings, water, and hydrocarbon pipelines

Achievements: We completed this scope within budget and tight time constraints to the client's full satisfaction.

PROJECT ROLE

- Project Managers
- Civil Engineering
- Hydrology
- Architectural
- Electrical Engineering
- Constructability
- Scheduling
- Cost estimation

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PROJECT DATASHEET

Project Reference: 15046B

Industry: Resources Power & Industrial

ASSIGNMENT NAME:	APPROX. VALUE OF THE CONTRACT:
Frieda River Copper- Gold Project	~AUD2.5M
LOCATION & COUNTRY:	DURATION OF ASSIGNMENT (MONTHS):
Border area of Sandaun and East Sepik Provinces, Papua New Guinea	18 Months
NAME OF FUNDING AGENCY:	TOTAL NO. OF STAFF-MONTHS OF THE ASSIGNMENT:
PanAust Limited	83 Person Months
ADDRESS OF AGENCY:	APPROX. VALUE OF THE SERVICES PROVIDED BY YOUR FIRM UNDER THE CONTRACT:
1/15 James St, Fortitude Valley, Queensland 4006, Australia	~AUD1.25
START DATE (MONTH/YEAR): COMPLETION DATE (MONTH/YEAR):	NUMBER OF PROFESSIONAL STAFF-MONTHS PROVIDED BY ASSOCIATED CONSULTANTS:
Start date: September 2013 Completion date: February 2015	~50 Person Months
NAME OF ASSOCIATED CONSULTANTS, IF ANY:	NAME OF SENIOR PROFESSIONAL STAFF OF YOUR FIRM INVOLVED AND FUNCTIONS PERFORMED:
N/A	Peter Moodie - Senior Project Manager Richard Jurdeczka - Senior Project Engineer Adam Kramer - Project Engineer Will Winton - Lead Civil Engineer Barry Kitson - Lead Architecture Peter English - Aviation Specialist Barry Norman - Lead Estimator

NARRATIVE DESCRIPTION OF PROJECT:

The Frieda River copper-gold deposit is one of the largest known undeveloped copper deposits in the world and offers excellent potential for the establishment of a long-life operation. The Frieda River deposit is located on the border of the Sandaun (formerly West Sepik) and East Sepik provinces in PNG in the foothills of the Schattenberg Range at elevations ranging from 300mRL to 800mRL. The area has similar terrain to that in Laos where PanAust's existing operations are situated.

The Frieda River Project feasibility study concept is currently based on an open pit feeding ore to a conventional flotation processing plant at an average processing rate of 30 million tonnes per annum over a 20-year mine life to produce average annual copper and gold in concentrate of 125,000 tonnes and 200,000 ounces respectively. Relatively soft and highly fragmented ores are expected to be processed in the first five years of operation allowing mill throughput rates of more than 20 per cent above the life-of-mine average and as a consequence above average metal production. Thereafter, the ore is expected to become progressively harder, leading ultimately to throughput rates of approximately 20 per cent below the life-of-mine average in the final years of operation.

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Civil design:

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Achievements:

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DESCRIPTION OF ACTUAL SERVICES PROVIDED BY YOUR STAFF WITHIN THE ASSIGNMENT:

The Scope of Services covered by Kramer Ausenco includes:

- Management of geology, mining, environmental and permitting for which the detailed Study design, costing and reporting is provided by other selected specialist Consultants.
- Preparation of design, drafting, specification, quantity take of PFS, equipment pricing, estimating and Project planning services for:
 - transportation
 - communications
 - processing facility including crushing, agglomeration, stacking, heap leaching, solvent extraction and electrowinning (SX-EW)
 - infrastructure including water supply, access road and airfield, power station, permanent village as well as site buildings including offices, workshops, warehouses, and laboratory.
- Work was undertaken in two parts:
 - 1 – Discovery: Provision of a selection of highly experienced engineering resources to work with FRL to define, clarify, plan and budget for the Infrastructure Engineering portion of the FEL2 study for the Frieda River project
 - 2 – FEL2 Engineering and Estimating Support.
- Stage 1 – Discovery:

The 4 week stage will involve intensive information dissemination, data collection, gap analysis, team interviews, and assimilation of the FRL team's latest plans and development of the list of Trade-Off Studies to be completed in the subsequent stage. The Consultant will co-locate at the FRL/PanAust office a group of highly qualified specialists to promote a close working approach collecting all existing data, current work and future strategies. The list of Trade-Off Studies will form the basis for the start of the second stage of work.

Part of the Discovery Stage includes the interview process where the Consultant team will meet with FRL and understand the macro approach of the overall Frieda River project and how the infrastructure scope fits into the overall project scope of work. The desired outcome is to define where the emphasis is to put into the engineering effort, so as to develop a minimum credible scope of works.

Part of the team interviews will encompass a Gap Analysis process overlaid over the Discovery Stage to define the potential gaps between the work currently underway and the detail required for the Project. The Gap Analysis will focus on two levels:

- 1. Macro (study) level covering the integration between the technical areas, and
- 2. Micro (technical) level covering the detail within each technical area.

In summary the Discovery Stage includes the following steps:

- study alignment and kick-off meeting
- review of existing studies and existing information
- internal interview of FRL team
- define the scope of work to complete the study in the next stage to meet FRL's goals for a FEL2 study
- define trade-off studies and the period in which they will be completed, to complete the study in the next stage
- develop a resource-loaded schedule and budget to reflect the agreed scope of work
- develop the engineering deliverables list
- gap analysis to determine any missing data essential for the project development
- risk workshop and risk mitigation approach
- review of previous constructability work

Deliverables for Discovery:

- Minutes from the study alignment and kick-off meeting
- High level draft functional specifications for all major WBS elements relating to non-process infrastructure resulting from the interviews of FRL team, review of current documentation and the Consultants recommendations
- Scope of work detailing the next stage to meet FRL's goals for a FEL2 study
- Trade-off studies list and details
- A resource-loaded schedule and budget to reflect the agreed scope of work
- The engineering deliverables list including all expected documents, drawings, sketches, models, calculations, execution planning documents, estimate support documents and progress reporting.
- A gap analysis report defining any missing data essential for the project development
- Brief risk workshop and risk mitigation approach report
- Notes resulting review of previous constructability work

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- Stage 2 – FEL2 Engineering and Estimating Support of the refined scope from Stage 1, for the following facilities:
 - 1. Mine Industrial Area Buildings and Facilities
 - 2. Process Plant Support Facilities (excludes process infrastructure)
 - 3. Integrated Storage Facility Mobile Equipment Maintenance Support Facility
 - 4. Administration and training Facility
 - 5. Permanent Camp Facility
 - 6. Airport Facility
 - 7. Environmental Facilities
 - 8. LV and MV Power Reticulation
 - 9. Water Supply and Reticulation
 - 10. Main Roads
 - 11. Temporary Facility and Services