



Axis Consulting Services

Specialist Mine Dewater & Process Engineers and Project Managers



AUSTRALIA

NEW ZEALAND

ASIA

UNITED KINGDOM

USA

"Our mission is to provide the world's best practice and service to our clients through maintaining long term relationships, being innovative with the latest technology and expanding our services where possible to meet their demands."

Principal engineer

Project Management

Delivery partner

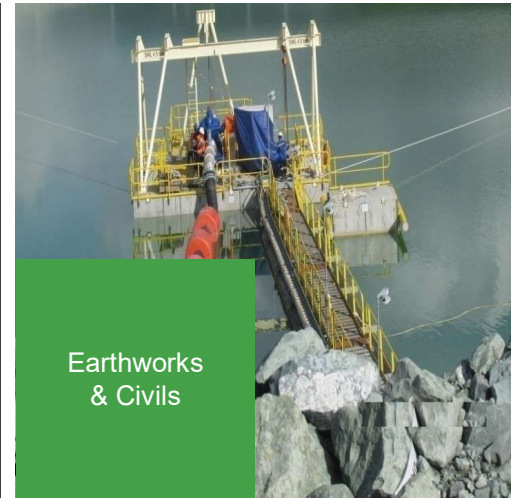
Specialist Water & Pipeline Engineers

Constructability
Design

Bore Fields &
De-Watering



Multi- Disciplined



Earthworks
& Civils

Fluid
Storage

Tailings
& Slurry

Facilities &
Plant Piping

Fluid
Conveyance

Design &
Project
Management

Operation &
Maintenance

Structural &
Mechanical

Engineering
Procurement
Project
Management

Water
Infrastructure

Pumping &
Fire Water

Pipeline &
Water Hammer
Analysis

Electrical,
Instrumentation
& PLC Controls

Site
Commissioning,
Electronic I.O.M.
Manuals



Energy

Water

Mining

Minerals

Pumps – Electric Booster Pumps



PT NEWMONT NUSA TENGGARA
Mine Pit Dewatering
\$40M AUD

Scope

Design of structure, mechanical and electrical systems, project management and site commissioning 34 electric Booster Pumps Stations between Y2005 - 2016

Design Features

Pump stations are installed in series in a deep mine, approximately 550m deep. The system has variable duty of maximum 1800m³/hr at 100m/head to minimum 600m³/hour at 45m/h. Pump stations are fully automated and adjust to the varying flow and pressure conditions.



PT NEWMONT Boddington Gold,WA
Mine Pit Dewatering
\$1.4M AUD

Scope

Design of structure, mechanical and electrical systems, project management and site commissioning 1 electric Booster Pumps Station in Y2014

Design Features

Pump stations are installed in series in a deep mine, approximately 250m deep. The system has variable duty of maximum 1800m³/hr at 100m/head to minimum 600m³/hour at 45m/h. Pump stations are fully automated and adjust to the varying flow and pressure conditions.



PT NEWMONT NUSA TENGGARA
Tongoloka Effluent Water
\$3.0M AUD

Scope

Design of structure, mechanical and electrical systems, project management and site commissioning 3 electric Booster Pumps Stations in Y2015

Design Features

Pump stations are fully automated to adjust to the varying flow conditions with maximum duty 1800m³/hour at 100m/head. Each pump station has 6 of fixed speed end suction electric motor pumps, and automated electric control panels.

Pumps – Process Water



PT NEWMONT NUSA TENGGARA
Tongoloka Effluent Pond
\$4.0M AUD

Scope

Design and water hammer analysis, NOM for DN 450mm SS 316L Sch 80/40 and DN 450MM PE 100 pipeline

Design Features

Pumps are automatic in operation and adjust system to duty of 1200m³/hr at 160m.h.



PT NEWMONT NUSA TENGGARA
Tongoloka Toe Dyke
\$5.0M AUD

Scope

Re-design of existing mechanical and electrical systems, and site commissioning 5 electric Booster Pump

Design Features

Pumps are automatic in operation and adjust system to duty of 3800m³/hr at 400m.h.



PT NEWMONT NUSA TENGGARA
Old Katala Pontoon Pump
\$0.8M AUD

Scope

Design of steel structure, mechanical and electrical systems, electronic IOM manuals, PLC programming, operator training and site commissioning

Design Features

Pumps are automatic in operation and adjust system to duty of 1800m³/hr at 30m.h.

Pumps – Electric Submersible



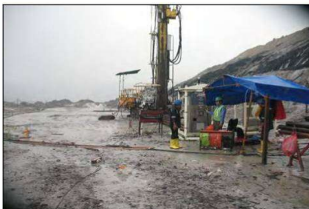
PT NEWMONT NUSA TENGGARA
Depressurisation of Pit Walls
\$4.0M AUD

Scope

Design of mechanical and electrical systems, project management and site commissioning of eight (8) bore hole electric submersible pumps and two (2) off booster pump stations.

Design Features

Pumps are automatically controlled to dewater to the specified water depth up to 370M



PT Adaro Indonesia
Depressurisation of Pit Walls
\$6.0M AUD

Scope

Design of mechanical and electrical systems, project management and site commissioning of twelve (12) bore hole electric submersible pumps

Design Features

Pumps are automatically controlled to dewater to the specified water depth up to 320M



PT Thiess Indonesia
Water Intake Tabang Coal
\$0.5M AUD

Scope

Civil design of water intake rock cage structure, floating submersible mine pumps and rising pump main to process plant.

Design Features

Pump are fully automated. This design provided a \$500,000 cost saving over the proposed design which used vertical turbine pumps fixed on concrete structure with SS screens.

Pumps – Slurry & Mud



PT NEWMONT NUSA TENGGARA
Dredging Tongoloka Toe Dyke
\$1.3M AUD

Scope

Design and site commissioning of Dragflow HY 85HC Dredge and Booster Pumps:- Duty 800m³/hr at 300m.h.

Design Features

The system comprises of 1 off Dragflow HY85HC diesel powered pontoon submersible dredge pump, 3 off KSB/GIW diesel powered DnD150 high head slurry booster pumps



PT Thiess Indonesia
Dredging KPC Retention Pond
\$0.8M AUD

Scope

Design and Site commissioning of Dragflow HY 400 Pump and Booster Pumps:-Duty 1,200m³/hr at 200m.h.

Design Features

The system comprises of 1 off Dragflow HY400 hydraulic powered submersible pump mounted on a Komatsu PC 1800, 2 off KSB/GIW diesel powered DnD 200 high head slurry booster pumps



PT BUMA Indonesia
Dredging Adaro Retention Pond
\$1.1M AUD

Scope

Design and Site Commissioning of Dragflow HY85HC and Booster Pumps:- Duty 800 m³/hr at 200m.h.

Design Features

The system comprises of 1 off Dragflow HY85/160HC hydraulic powered submersible pump mounted on a Komatsu PC 400, 2 off KSB/GIW diesel powered DnD 150 high head slurry booster pumps

Pipelines – Process Water pH 4

Specialised Water Hammer Equipment Designs



PT NEWMONT NUSA TENGGARA
Benete to Concentrator
Recycle Water Pipelines
\$3.0M AUD

Scope

Design and Water Hammer Analysis of DN 150 Carbon Steel.

Design Features

Replacement pipeline Length approximately 16,000m, pipeline was designed to reuse existing bracket system and road crossing conduits



PT NEWMONT NUSA TENGGARA
Katala to Santong Pipeline

\$3.5M AUD

Scope

Design and Water Hammer Analysis for 3 of existing DN 710mm PE 100 pipeline.

Design Features

Pipeline length approximately 3,300m. System duty 8,000m³/hr at 90m.H. Water hammer equipment was specifically designed to fit into the existing pipelines



PT NEWMONT NUSA TENGGARA
New Katala Pond Siphon Pipelines

\$3.2M AUD

Scope

Design, Procurement of PE Floats and DN 600 Vacuum Hoses, BOM's, PLC Programming, Electronic IOM Manuals, Operator Training and Site Commissioning.

Design Features

System Duty 1,800m³/hr per pipeline. The design provides 8m siphon from top water level to bottom water level. The siphon system replaces the existing pontoon pumps.



PT NEWMONT NUSA TENGGARA
Tongoloka Effluent Pond to Santong
\$0.1M AUD

Scope

Design of DN 450 SS 316L Vertical / Vacuum Break pipe.

Design Features

A specially designed SS 316 vertical break pipe use used in lieu of the large open break tank.



PT NEWMONT NUSA TENGGARA
Tongoloka Effluent Pond to Santong
\$0.12M AUD

Scope

Design of DN 600 SS 316L Vacuum Assembly with Check Valve.

Design Features

The SS 316 check valve and air valves assembly was designed on a portable steel skid



PT NEWMONT NUSA TENGGARA
New Katala Siphon Pipeline Systems
\$0.15M AUD

Scope

Design of DN 700 SS 316L Water Inlet with tilting disc Check Valve.

Design Features

The SS 316 inlet and check valve assembly was used as a foot valve for the siphon system

Pipelines – Process Water pH 4

Equipment - Designs



PT NEWMONT NUSA TENGGARA
Santong 3 to Concentrator Pipelines
\$5.6M AUD

Scope

Design and Water Hammer Analysis, BOM for 2 off DN 1,000mm PE 100 pipelines.

Design Features

Pipeline length approximately 2,500m System duty:-13,000m³/hr at 90m.H. New PE pipelines replaced the existing DN 1200mm steel pipeline which required internal PU lining .



PT NEWMONT NUSA TENGGARA
Tongoloka Toe Dyke to Santong
Pipelines
\$7.0M AUD

Scope

Design and Water Hammer Analysis, BOM for DN 600mm SS 316L Sch 80/40s and DN 630mm PE 100 Pipelines.

Design Features

Pipeline length approximately 9,000m System duty:- 3,800m³/hr at 400m.H. Water hammer equipment was specifically designed to fit into the existing pipelines



PT NEWMONT NUSA TENGGARA
Tongoloka effluent Pond to Santong
\$4.0M AUD

Scope

Design and Water Hammer Analysis, BOM for DN 450mm SS 316L Sch 80/40 and Dn 450mm PE 100 pipelines.

Design Features

Pipeline length approximately 10,000m System duty:- 1,200m³/hr at 400m.H. The system reused existing pumping equipment at site and saved \$1.1MIL



PT NEWMONT NUSA TENGGARA
Barakebo Stormwater Diversion
\$0.5M AUD

Scope

Design and commissioning of 3600mm x 3000mm SS 316L Flood Gates with electric controlled actuator. 7 units are installed at site. The design also included concrete profile drawings

Design Features



PT NEWMONT NUSA TENGGARA
Tongoloka WTP Sludge Collection
\$0.5M AUD

Scope

Design and commissioning of corrosion resistant waste collection system for water treatment plant

Design Features

The design uses chemical flocculation to dewater sludge in Geotube to replace the heavily corroded water press which failed from pH 4 acid water



PT Guna Era Manufacturer
Ecogreen Oleochemicals (EOB)
Plant - Batam
\$0.25M AUD

Scope

Preparation of GA workshop drawings for tank farm developed from Consultant's P&ID documents, comprising:-
6 off DMI Filter Tank, Dia 3000 x H 2350mm
2 off MB Tank, Dia. 1600 x H 2140 mm
2 sets of Platforms & Stage for DMI Tank, size L 9850 x W 1900 x H 5500 mm
1 set of Platform & Stage for MB Tank, size L 5350 x W 1000 x H 4850 mm

Design Features

The tanks are fabricated carbon steel, inside rubber lined with thickness 3mm. Outside of tank is painted with Silver Polyurethane.

Pipelines - Plastic

Electrical - Designs



Global Switch Singapore
Condenser Water Pipes

\$0.8M AUD

Scope

Design of Pre-fabricated of DN 500mm ABS Plastic pipes for 6 floors of piping to mechanical AC units

Design Features

Plastic pipelines were factory fabricated and tested in Jakarta Indonesia prior to shipment to Singapore. The finished system including valves and brackets was sent to Singapore for final assembly and testing



PT Freeport Indonesia
Process Water

\$0.4M AUD

Scope

Design of Pre-fabricated of DN 280mm PN 10 PE 100 Water Pipes.

Design Features

Plastic pipelines were factory fabricated and tested in Jakarta Indonesia prior to shipment to site in Papua. The finished system including valves and brackets was sent to site for assembly and testing



PT NEWMONT NUSA TENGGARA
Tailing Pipe Inspection

\$14M AUD

Scope

Multiple Inspections between Y2014 and 2017 for 13km of DN 1100mm PE 100 Tailing pipe for QC monitoring of production in Thailand and coordination of Shipment to Indonesia.

Design Features

The PE pipeline is used for tailing discharge under sea. The pipeline is installed at an average of 60m depth. Due the wall thickness and installation requirements, manufacturing tolerances of the PE pipe are significantly higher than all International PE pipe manufacturing standards. Regular pipe inspections limit the risk of poor quality pipe and pipe joint failure during the off-shore installation.



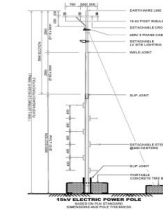
PT NEWMONT NUSA TENGGARA
Pit Pontoon Power Distribution Skids
\$1.8M AUD

Scope

Design of steel structure and electrical systems, PLC Programming and site commissioning and operator training for three(3) off electric pontoon power distribution skids

Design Features

Each PDS Skid has, 1,250kVA 6.6Kv to 3.3kv transformer, MV electric control panels and switchgear, all mounted on a 6m(L) x 2.6m(W) x 3.4m(H) portable steel skid weighing approximately 12 tons



PT Adaro Indonesia
15kV Overland Power Distribution in Pit
\$0.8M AUD

Scope

Design of steel power pole structures and 15kv electrical systems

Design Features

Pre-fabricated modular power poles are fixed in old haul truck tires filled with concrete for stability and installation flexibility



PT Siana Gold Philippines
VSD Motor Control Center and Overland Power Distribution
\$1.5M AUD

Scope

Design of VSD & PLC MCC and 3.3kv power distribution in open cut pit

Design Features

Redesign of 4 off 450kw existing VSD's in 2 off new air-conditioned container styles MCC.

Pump Station Details

((())) SITE TELEMETRY (WIFI)



Y2002 Electric Dewater Pump Stations – 5 Units
Duty 1,750 m³/hr @ 105m.head
Decommissioned for Pit Dewatering Y2014
and reused on New Tongoloka
Effluent Pond Pipeline System



Y2006 Electric Dewater Pump Stations – 7 Units
Duty 1,800M³/hour @ 100m.head

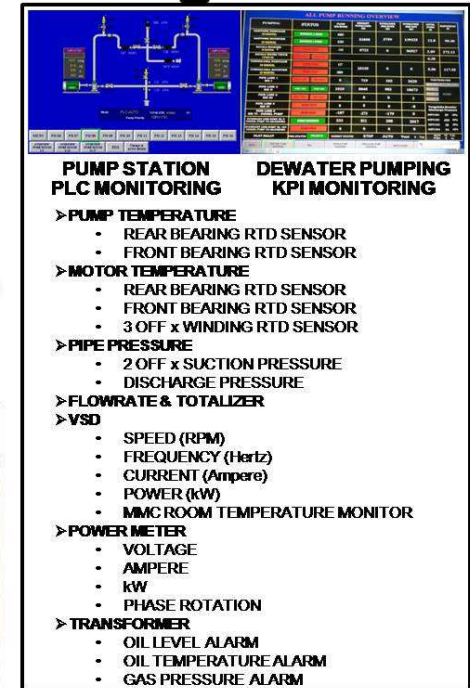
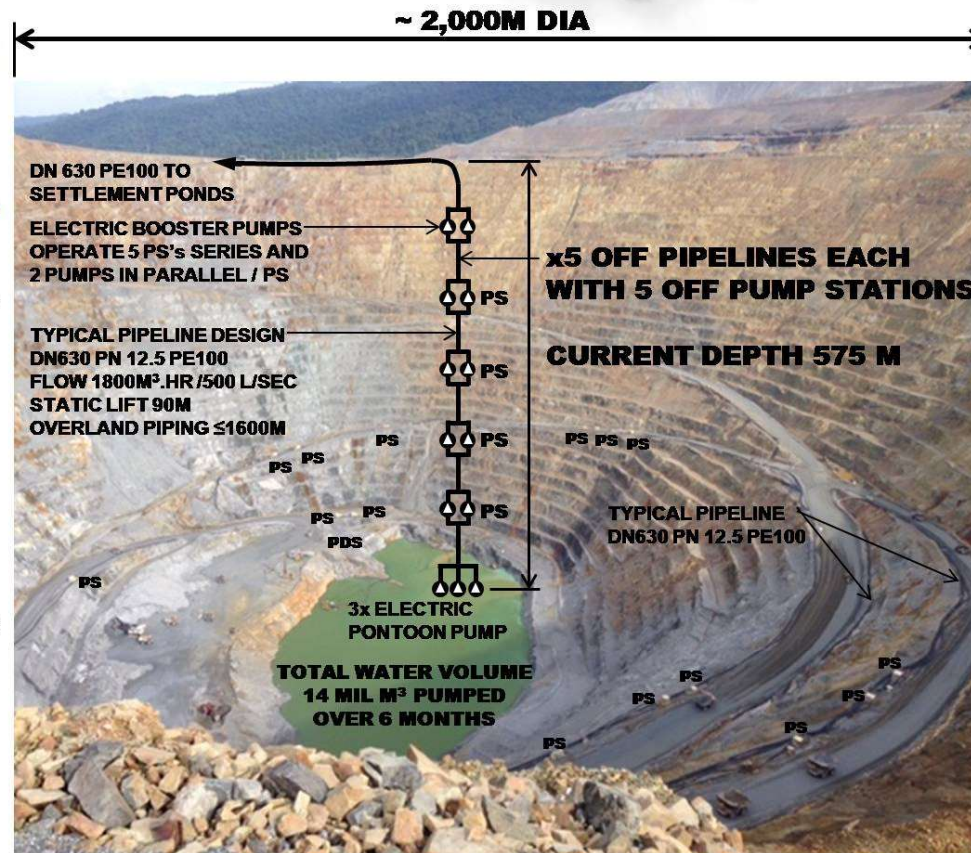


Y2009/11 Electric Dewater Pump Stations–10 Units
Duty 1,800M³/hour @ 100m.head



Y2009 Pontoon Power Distribution Skid– 3 units
PDS Skid Supplies 6.6kV - 3.3kv power supply
to 3 off electric Pontoon Pumps

RAIN FALL 3,752mm / YEAR
60% OF RAINFL OVER 4 MONTHS PERIOD



MINE CONTROL CENTER



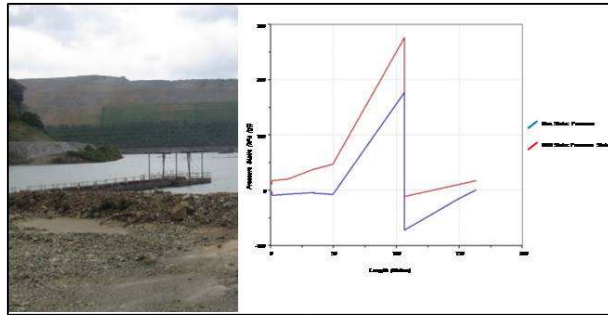
Y2012 Electric Dewater Pump Stations – 4 units
Duty 900M³/hour @100m.head



Y2016 Electric Dewater Pump Stations – 4 units
Duty 1,800M³/hour @ 100m.head

PT NEWMONT NUSA TENGGARA, SUMBAWA INDONESIA
PUMP STATION DESIGN & PROJECT MANAGEMENT
FOR SUPPLY OF: - 34 OFF ELECTRIC PUMP STATIONS (PS)
- 3 OFF PONTOON POWER DISTRIBUTION SKIDS (PDS)

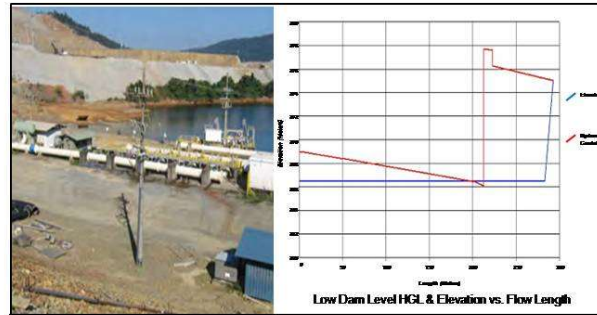
Major Pipeline Details



Santong 2 Retention Pond

Water Hammer Analysis

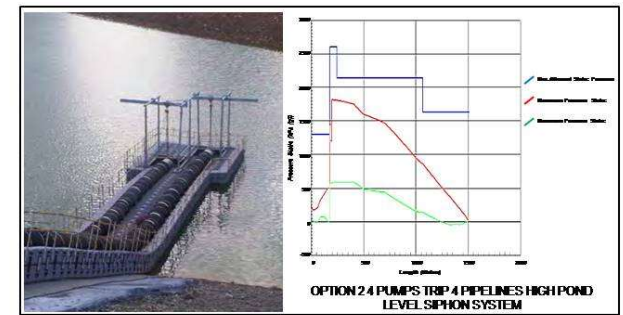
Y 2015- Santong 2 Siphon System



Katala Booster Pumps

Water Hammer Analysis

Y 2014- Katala to Santong Pipeline



New Katala Pond

Water Hammer Analysis

Y2013 New Katala Pond Siphon Pipelines (8m lift)

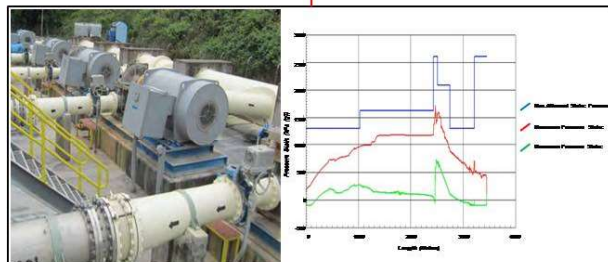


**Y2015- Benete to Concentrator
Recycle Water Pipeline**

Design and Water Hammer Analysis
DN150 Carbon Steel. Pipeline Length
Approximately 16,000m



**Old Katala Pontoon Pump
Design, (Incl. structural steel) BOM's
Electronic IOM Manuals, PLC
Programming, Site Commissioning**



Santong 3 Ex. Booster Pumps

Water Hammer Analysis

Y 2013- Santong 3 to Concentrator Pipeline

Design and water hammer analysis, BOM for 2 off DN 1,000mm PE
100 pipelines. Pipeline length approximately 2,500m
System duty: - 13,000m³/hr at 90m.head



Tongoloka Ex. Booster Pumps

**Design & Supply of
Noreva Check Valve Skid**

Y 2011- Tongoloka Toe Dyke to Santong Pipeline

Design and Water Hammer Analysis, BOM of DN 600mm SS
316L Sch 80/40s and DN 630mm PE 100 pipeline. Pipeline length
approximately 9,000m System duty:- 3800m³/hr at 400m.head.



Tongoloka Effluent Booster

**Design & Supply of Water
Hammer Break pipe**

Y 2015- Tongoloka Effluent Pond to Santong WTP Pipeline

Design and water hammer analysis, BOM for DN 450 mm SS 316L
Sch 80/40s and DN 450mm PE 100 pipeline. Pipeline length
approximately 10,000m System duty:- 1200m³/hr at 400m.head