

**FRASER  
ALEXANDER**

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# Hydro Mining Of Tailings Dams

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## Introduction to Fraser Alexander

- Fraser Alexander Tailings started in South Africa 107 years ago (founded in 1912), with operations in Australia, Botswana, Chile, Brazil, Democratic Republic of Congo, Ghana, Ivory Coast, Mali, Namibia, Tanzania, Zambia and Zimbabwe. Fraser Alexander have successfully completed projects in Asia, North America, South America and Europa.
- The company manages and operates 127 deposition and hydraulic re-mining sites globally, handling a total of 268 Mt of tailings annually.

# Company Value Chain

## Mining

- Hydraulic Re-mining
- Mechanical Re-mining



## Processing

- Mineral processing
- Crushing & screening
- Water treatment



## Moving

- Dry materials
- Product handling
- Load & haul



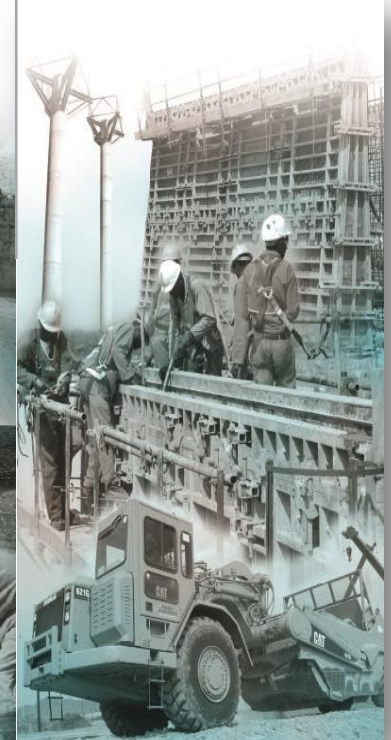
## Deposition

- Tailings (wet)
- Discard (dry)
- Paste
- Water Management



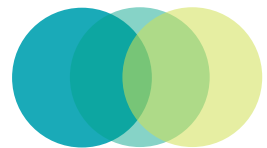
## Rehabilitation & Construction

- Water infrastructure
- Mine infrastructure
- Tailings infrastructure
- Rehabilitation

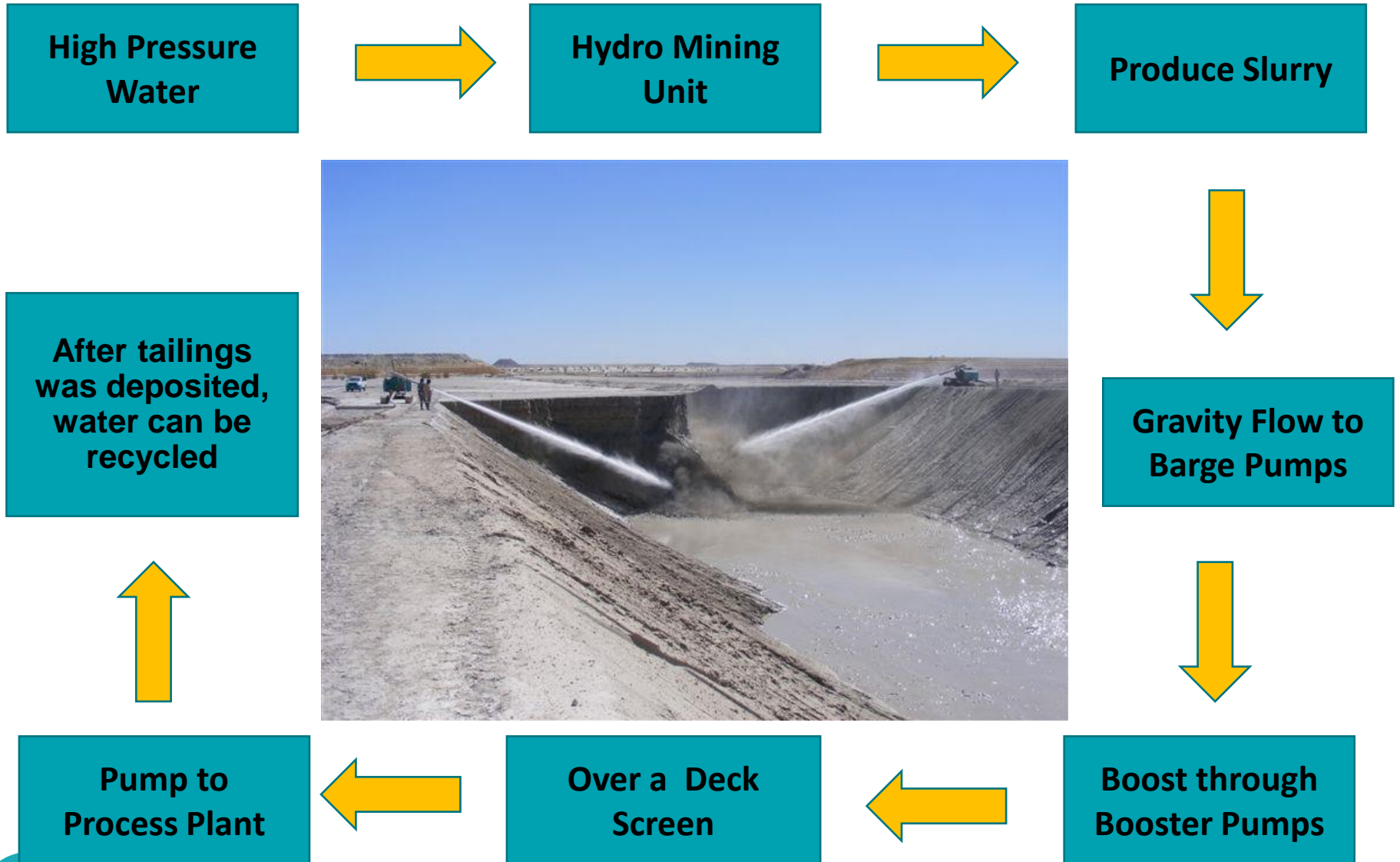


# Hydro Mining Description

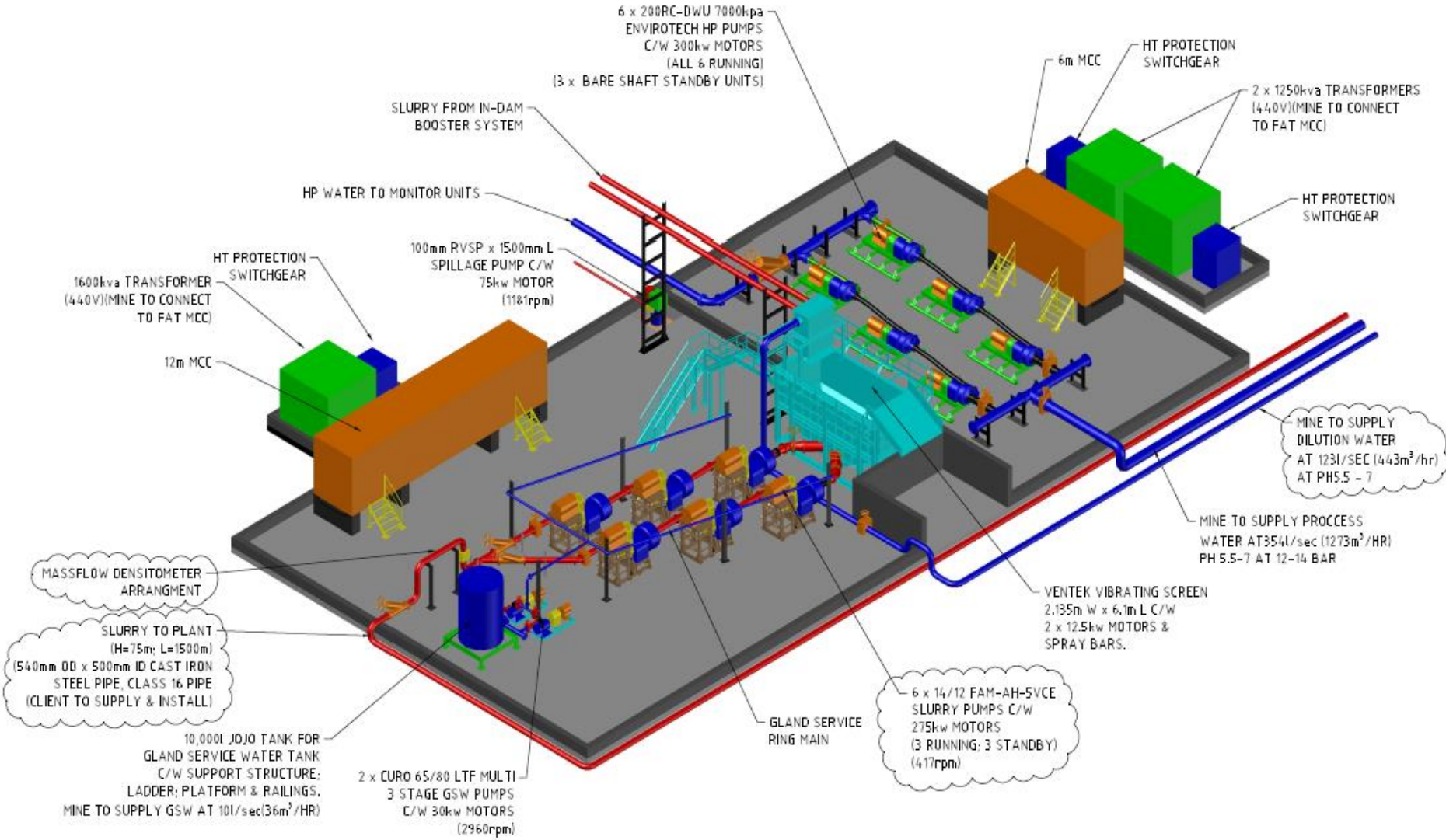
- Hydro Mining can be best described as producing slurry or “pulp” from a material in either a dry solid, compacted, deposited or stacked form originated from a metallurgic process
- This activity is generally undertaken on the surface and uses the energy created by specialised high pressure equipment known as Track Mounted Water Monitor Units with high pressure water generated by a designed high pressure pumping system to create a slurry/pulp that is gravity fed to a series of slurry pumping systems
- Reclamation using the hydro mining method has few volume limitations, systems of up to 2000 t/h has been designed and effectively operated safely
- This method is generally adopted for environmental rehabilitation, mineral extraction and recovery and tailings dam de-characterisation (e.g. Gold, Copper, Silver, Aluminium, Nickel and Platinum) due to relative low cost base measured against conventional re-mining methods for example Load and Haul or Dredging.



# Hydro Mining Basis Flow



# General Design of Main Pump Station

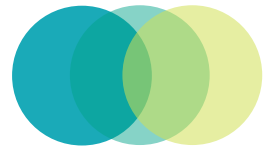


# Pump Station Pictures

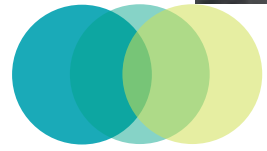
High Pressure Water Pumps



Vibrating Screen And Transfer Pumps

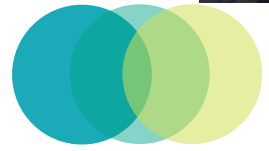


# Remote Controlled Track Mounted Water Monitor Unit





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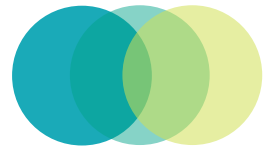
# Slurry/Pulp



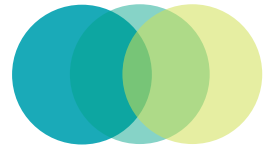
Percentage solids (RD) are managed at the mining area



No thickeners are needed



# Typical Trench/Laundry Development



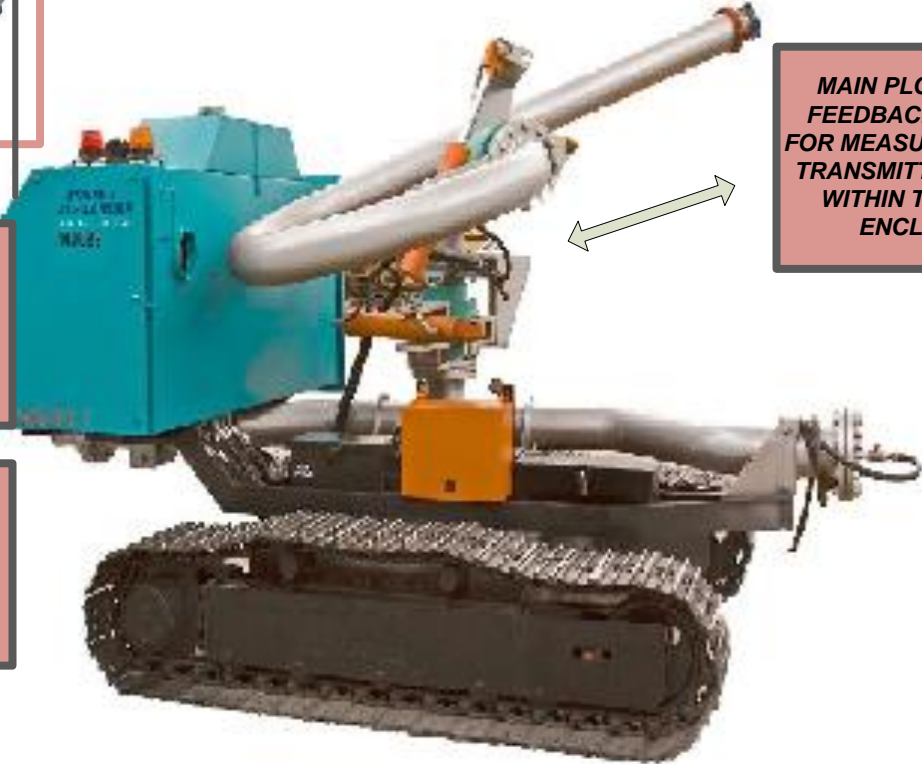
# Track Water Monitor Unit Automation

**AUTOMATED TRACK GUN with CAMERA and 10" INTERFACE and PROGRAMABLE LOGIC CONTROLLER**



**DXM100 2.4Ghz  
Transmitter with  
Modbus**

**SENSORS  
INTERGRATED FOR  
MONITORING TRACK  
GUN PARAMTERS**



**MAIN PLC WITH ALL  
FEEDBACK SENSORS  
FOR MEASUREMENT AND  
TRANSMITTER HOUSED  
WITHIN TRACKGUN  
ENCLOSURE**

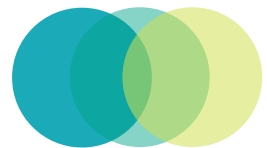
**ELECTRIC  
ACTUATOR FOR  
WATER SUPPLY  
CONTROL**

**UPDATED TRACK GUN PLC SOFTWARE WILL INCORPERATE TRACK CONTROL  
AND ENGINE PARAMETERS**



# Fully Automated Operation

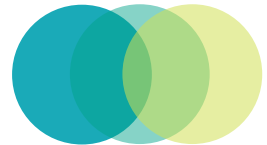
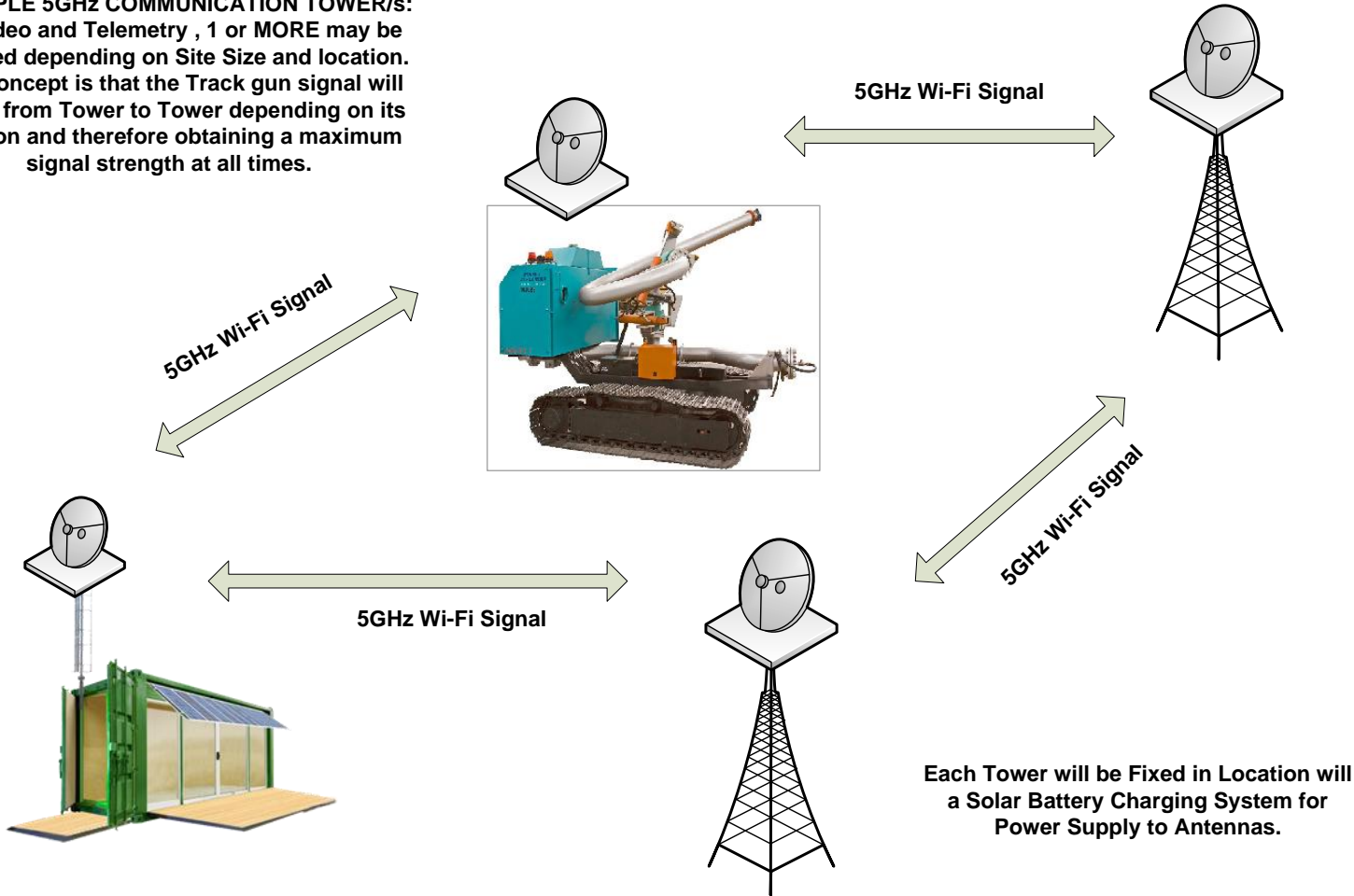
- Fraser Alexander has embarked on the development of Remote Hydro Mining capability and has invested extensively during the research and development of this technology.
- This forms part of FA's strategic framework to broaden our service offerings.
- In order to further improve safety as well as to enable operation during inclement weather, Fraser Alexander successfully completed the development of a programmable track gun capable of operating various mining patterns including a "learn" mode. Programmable guns were used by Fraser Alexander Australia for a number of years with the technology now updated and trialled in South Africa since 2018. The trial unit was fully programmable and included a video feed to the control room to monitor progress. This was referred to as Phase 1 of our in-house R&D of remote reclamation/automated monitor unit.



# Track Water Monitor Unit Automation

## Proposed Frequency Hopping Technique – Site Specific

**MULTIPLE 5GHz COMMUNICATION TOWER/S:**  
for Video and Telemetry , 1 or MORE may be required depending on Site Size and location. The Concept is that the Track gun signal will “Hop” from Tower to Tower depending on its location and therefore obtaining a maximum signal strength at all times.



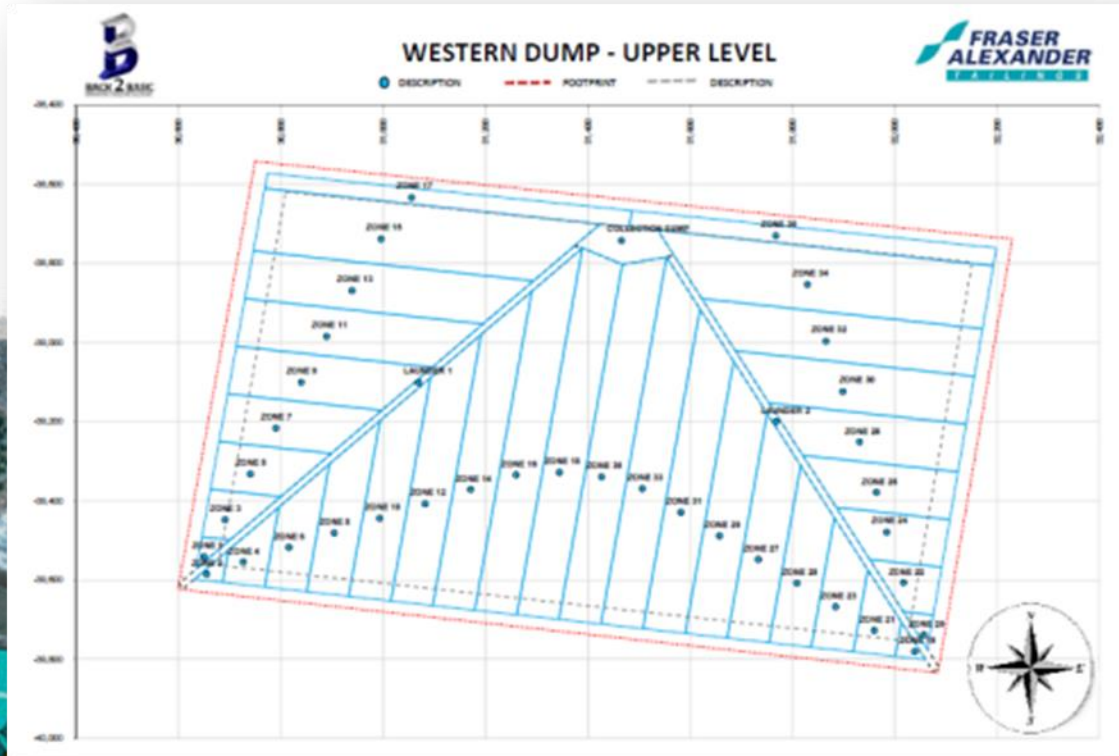
# Mining Plan Examples

Reclamation Planning

Block model planning will occur prior to actual operations commencing

Develop 3D models

Determine 3 month block model

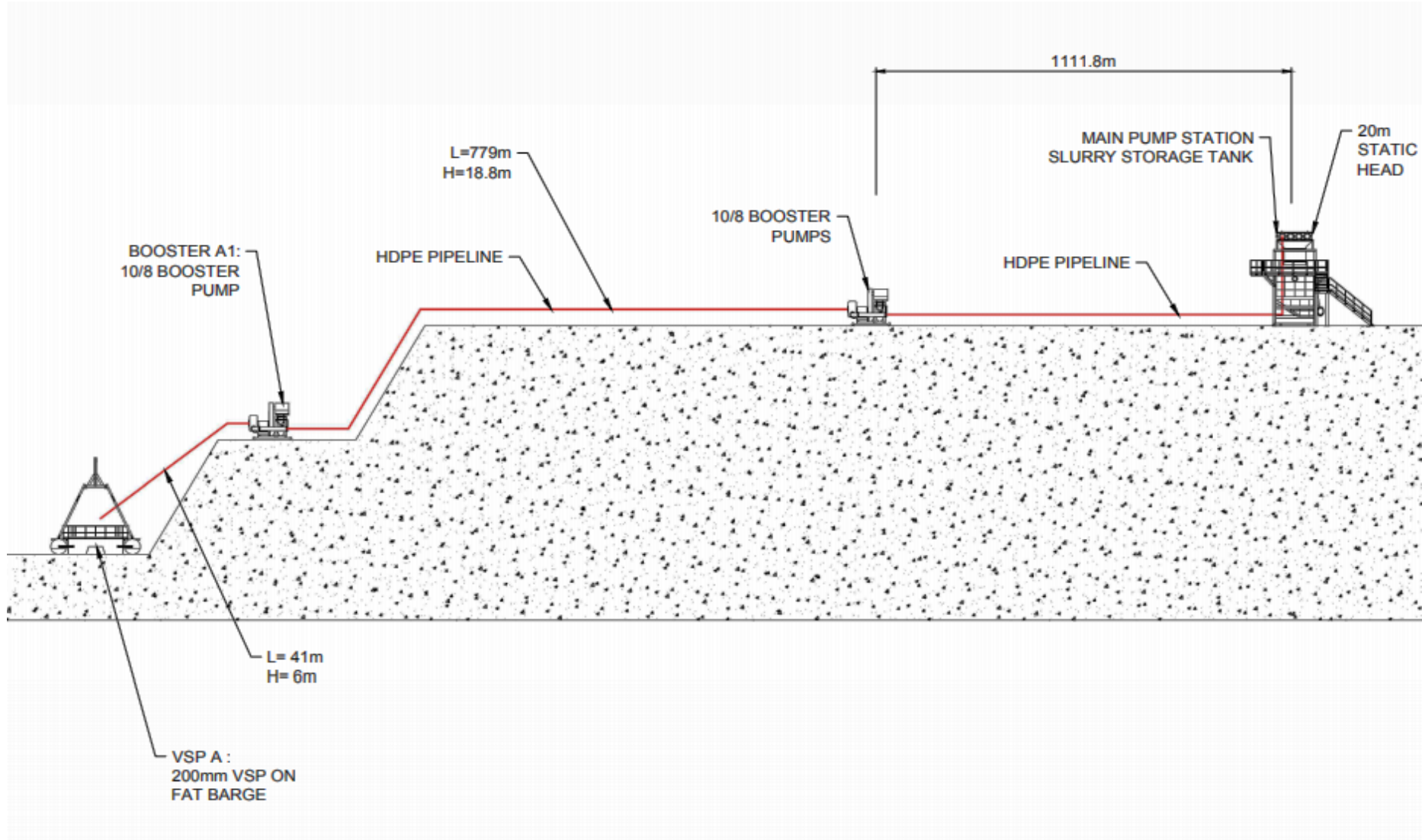




# Sump and Floating Barge



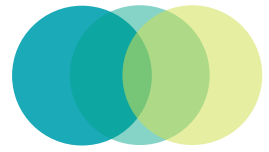
# Illustration of a typical operational lateral cut



# Aerial View Of A Hydro Mining Operation



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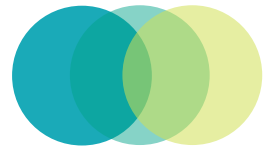



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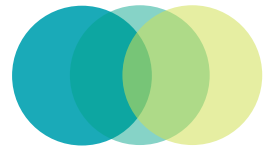




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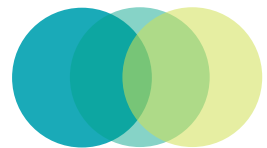
# Self Propelled Cyclone Unit

- The SPCU was developed by the Fraser Alexander research and development team in order to reduce the amount of equipment required to lower capital requirements but more specifically the labour force required for a typical cyclone operated facility.



# Perspective

- A single SPCU is designed to accommodate the flow of about eleven standard 250mm cyclones.
- In a down-steam cyclone operation, one operator per two cyclones is required whereas in an upstream operation, one operator per three cyclones is usually adequate.
- A downstream operation with eleven individual 250mm cyclones will require approximately twenty operators, based on a four shift operation, whereas the SPCU only requires four operators, one per shift.
- An operation requiring six SPCU's operating concurrently, results in a saving of about one hundred operators.
- Although the size of the delivery and overflow pipes require the use of an excavator, the work force required for moving and setting up of individual cyclones is also reduced.



Three overlapping circles in shades of teal and green. The leftmost circle is a bright cyan, the middle one is a medium teal, and the rightmost one is a light lime green. They overlap from left to right.

Thank You





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