



FIG Working Week 2024

19-24 May

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Presented at the FIG Working Week 2024,
19-24 May 2024 in Accra, Ghana

Managing the construction of Tailing Storage Facility (TSF) under Multiple Contractors – The Role of the Survey Consultant

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Managing the construction of Tailing Storage Facility (TSF) under Multiple Contractors – The Role of the Survey Consultant

- As part of the mining process, ore is crushed, grinded and processed to extract the valuable minerals and metals. The remaining waste materials are then referred to as tailings,



Mined Ore

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Managing the construction of Tailing Storage Facility (TSF) under Multiple Contractors – The Role of the Survey Consultant

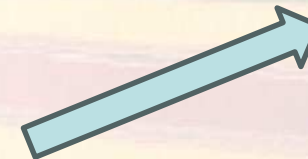
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Process Plant



Gold

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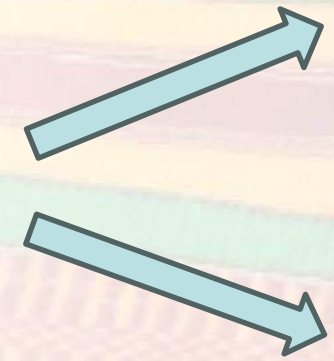
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Process Plant



Gold



Tailings



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Tailings are left – over materials from the processing of mined ore



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- Tailings consist of:

Ground rock

Unrecoverable and uneconomic metals

Chemicals (eg. Cyanide)

Organic matter and

Effluent from the process used to extract the desired products from the Ore

- It must therefore be contained in a facility called the Tailings Storage Facility (TSF) and managed in a safe and sustainable manner

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General Authority for Surveying
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TSFs are engineered structures which comply with specific designs, safety and environmental control regulatory requirements.

They often become a key element to considered before regulatory approval.

Its construction requires experienced teams of geotechnical, geomatic and civil engineers

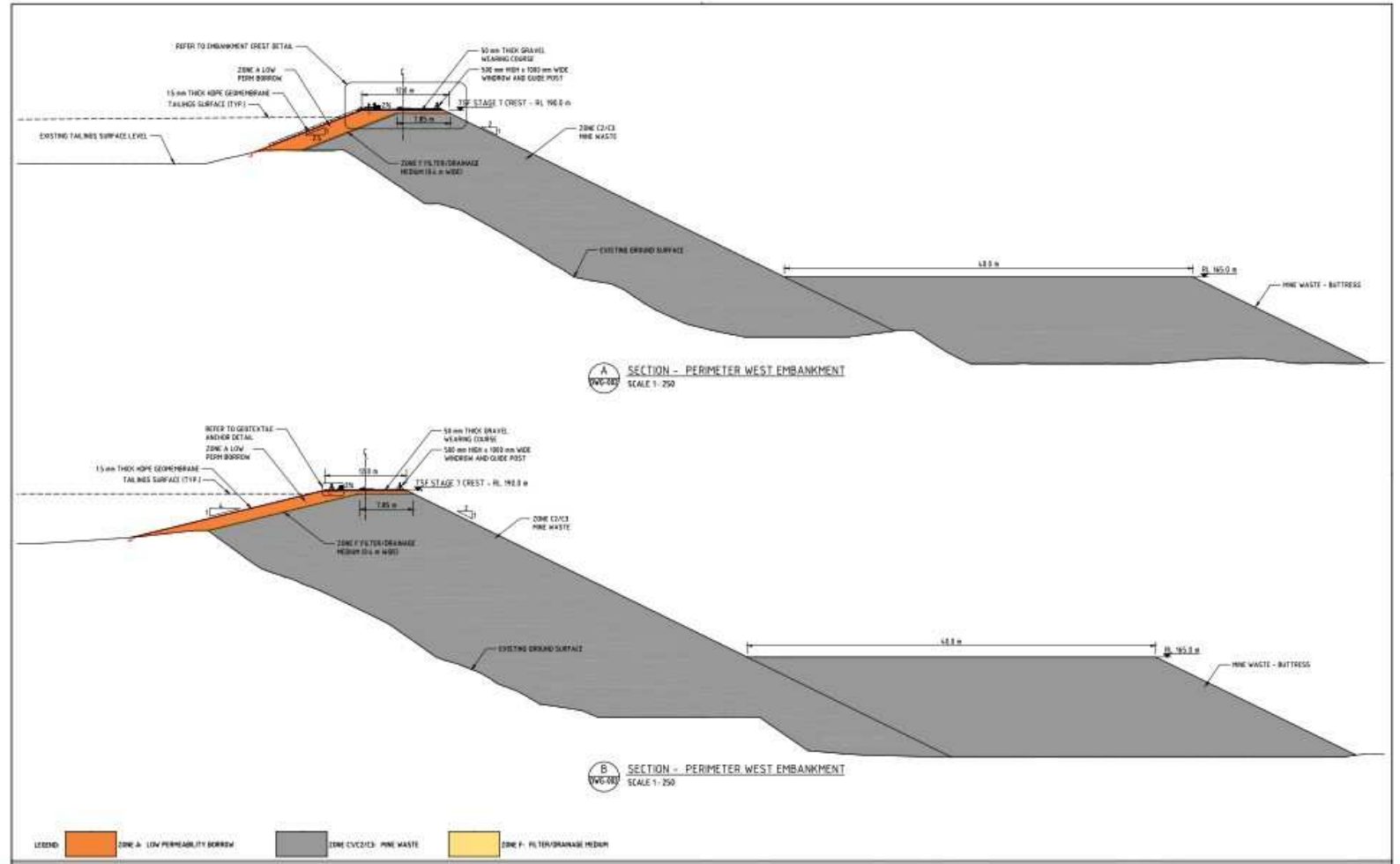




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- In the early days of TSFs constructions in Ghana, foreign companies with many years of experience led the charge to construct these facilities.
- However, in 2020, the Government of Ghana (GoG) enacted a Legislative Instrument (L.I 2431) through Minerals Commission which directs holders of a license to export or deal in mineral to offer technical and engineering services to companies owned by Ghanaian citizens or to a foreign company who is in collaboration with a company owned by a citizen, licensed to provide such services and registered to the commission.

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- This has necessitated the award of TSF construction projects to local companies in Ghana.
- Local company :
Few years of TSF construction experience
Minimal technical capacity to handle TSF construction.
Limited resource
- The limited resource of local companies also influence the award of TSF construction to multiple local companies or contractors in order to meet project timelines.
- A Survey Consultant, on the such a project will face a variety of challenges that will often take extra commitment to resolve. Notable among these challenges are:



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Challenges

1. Data Classification

Having multiple contractors on the project create multiple data sets that must be acquired and managed.

To easily acquire, store, search and retrieve data of the TSF construction, data must be classified properly by

Company name

Job specific and

Material type used in the construction.

Table 1.0 shows a few examples of the data set that must be acquired.

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DATA SET	CONTRACTOR				
	Contractor A	Contractor B	Contractor C	Contractor D	Contractor E
Clear and Grubb					
Original Ground Levels					
Rocks-Zone C2/C3					
Zone F3					
Rocks - Zone G					
Laterite - Zone A					
Wearing Coarse					
HDPE Liner					
Unsuitable Material					



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2. Data Management

Multiple data is generated frequently within a short time,

It becomes a difficult task to provide weekly progress report to the client, having to deal with a lot of data within a short time.

Unless the survey consultant develop a rigorous and systematic approach in acquiring, analyzing and managing the data to obtain meaningful information.

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3. Absence of Dedicated Survey Teams Among Contractors

Some local contractors do not have dedicated survey teams,

meanwhile the construction of these facilities is characterized by demanding surveying requirements and the absence of in-house survey teams in the local contractor's organizations cause significant hurdles for survey consultants.

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Strategies to Address the Challenges

1.0 Data Classification

Develop a coding system that will help in the classification of data.

The coding system should put into consideration the name of the Company/Contractor, Job specific and the type of data that is being acquired.

Table 2.0 shows examples of how data types can be classified

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DATA TYPE	CONTRACTOR				
	Contractor A	Contractor B	Contractor C	Contractor D	Contractor E
Clear and Grubb (CG)	A_CG				
Original Ground Levels (OGL)		B_OGL			
Zone C2/C3 (C2C3) 0.1m < X > 0.3m			C_C2C3		
Zone F3 (F3)				D_F3	
Zone G					E_Zone_G
Zone A	A_Zone_A				
Wearing Coarse (WC)	A_WC				
HDPE_Liner (HDPE)		B_HDPE			
Unsuitable Material (UM)			C_UM	D_UM	E_UM



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2.0 Data Management

Create a systematic and rigorous approach to acquire, analyse and manage all the different type of data for swift reporting to the client.

In developing this system, The various sections and phases must be considered, the Material type and name of contractor must also be put into account.

An example of such a data management system is shown [here](#)

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3. Provide Survey Services to the Contractors

In some situations, the Survey Consultant will have to be with the contractors on site and provides survey services throughout the construction process to ensure that work is done according to design specification.

Surface models and area specific drawings may be created as the project progresses to further educate the contractors and ensure that accurate measurement and assessment are conducted throughout the construction process.

Using advance survey technology such as the RTK GPS, and drone survey afford the Survey Consultant to acquire a lot of data for multiple contractors within a short time. Drone survey also becomes a useful tool to monitor the progress of the project in real time.

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Educate contractors on the need to include surveyors/ geomatic engineers into their teams of engineers and in decision making

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Conclusion

- Developing a coding system that helps in data classification and creating an effective data management system, Survey consultants are able to overcome many challenges that come with working with multiple local companies
- The use of advance survey technologies such as drone survey, scanners and RTK GPS improves the efficiency and effectiveness of Survey Consultants
- Continuous education of the need to include surveyors into company portfolios and in every project

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SUSTAINABLE DEVELOPMENT **GOALS**

International Federation of Surveyors supports the Sustainable Development Goals

Commission

#10 TS12H: Construction Contract Management

Serving Society for the Benefit of People and Planet



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