

MONITORING OF TAILINGS
DAM WITH PEIZOMETER
READINGS

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Overview

- It is a real case study of a data visualization of instrumentation on a Tailings Dam in a mine in Namibia(southern part of Africa)
- A tailings dam is typically an earth-fill embankment dam used to store byproducts of mining operations after separating the ore from the commercially valueless material
- Piezometers measure water pressure which allows consultants and engineers to verify their design and prove the behaviour of a structure is performing as expected

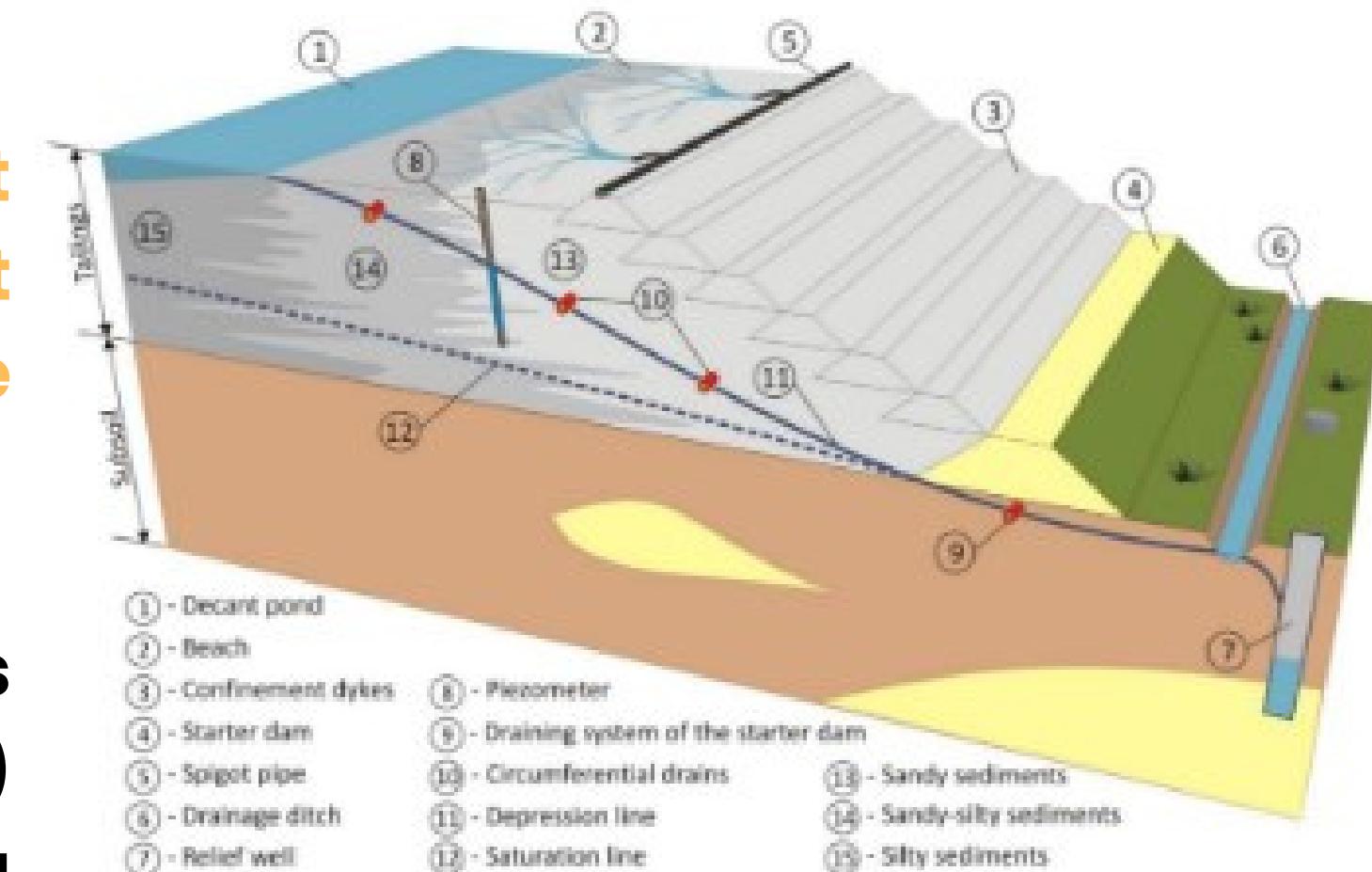


Research scope

- To build an interactive dashboard to track water pressure readings from piezometer in a tailings dam.
- This information is related to safety in a mining infrastructure. The target market related to the project is the engineering or mining area.

Data Source

- Data is collected from private client directly from API linked to the equipment on site and the source cannot be revealed due to privacy issue
- A total of 1756 Pressure water readings from 5 Vibrating Wire Piezometers(vWP) at a tailings dam at a mine in Namibia from 2016 to 2021.(vWP38-330, vWP39-330, vWP40-436, vWP41-330, vWP42-330)



Tools Used

- 01** Pandas to convert Json data and store in SQLITE
- 02** SQLITE and DB BROWSER for storing our database with two tables extracted from csv files
- 03** Python Flask powered API
- 04** D3.js library used to portray our visualisation in the webpage
- 05** Plotly to create Bar Chart, Gauge chart and Line Chart
- 06** LEAFLET library used to show the location in the map where the research was conducted
- 07** BOOTSTRAP to add navbar through HTML and styling through CSS
- 08** GitHub and Heroku to deploy the webpage

Python APIs



tailings.herokuapp.com/api/v1.0/nodes



- This API stored our nodes which represents 5 different VWP

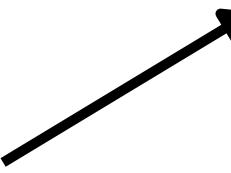
```
["38","39","40","41","42"]
```



tailings.herokuapp.com/api/v1.0/Node_id/38

```
{"Date_last_reading": "20/03/2021", "Gateway_ID": "21545", "Latest_pressure": "-21.8", "Maxpressure": "-10.97",  
"FCC", "Node_id": "38", "Piezometer_Channel": "5", "Piezometer_ID": "VW38", "Tip_Elevation": "605"}
```

- This API stored details given from readings for every node which changes with the user input that is used to display the Bar graph and Gauge Chart.

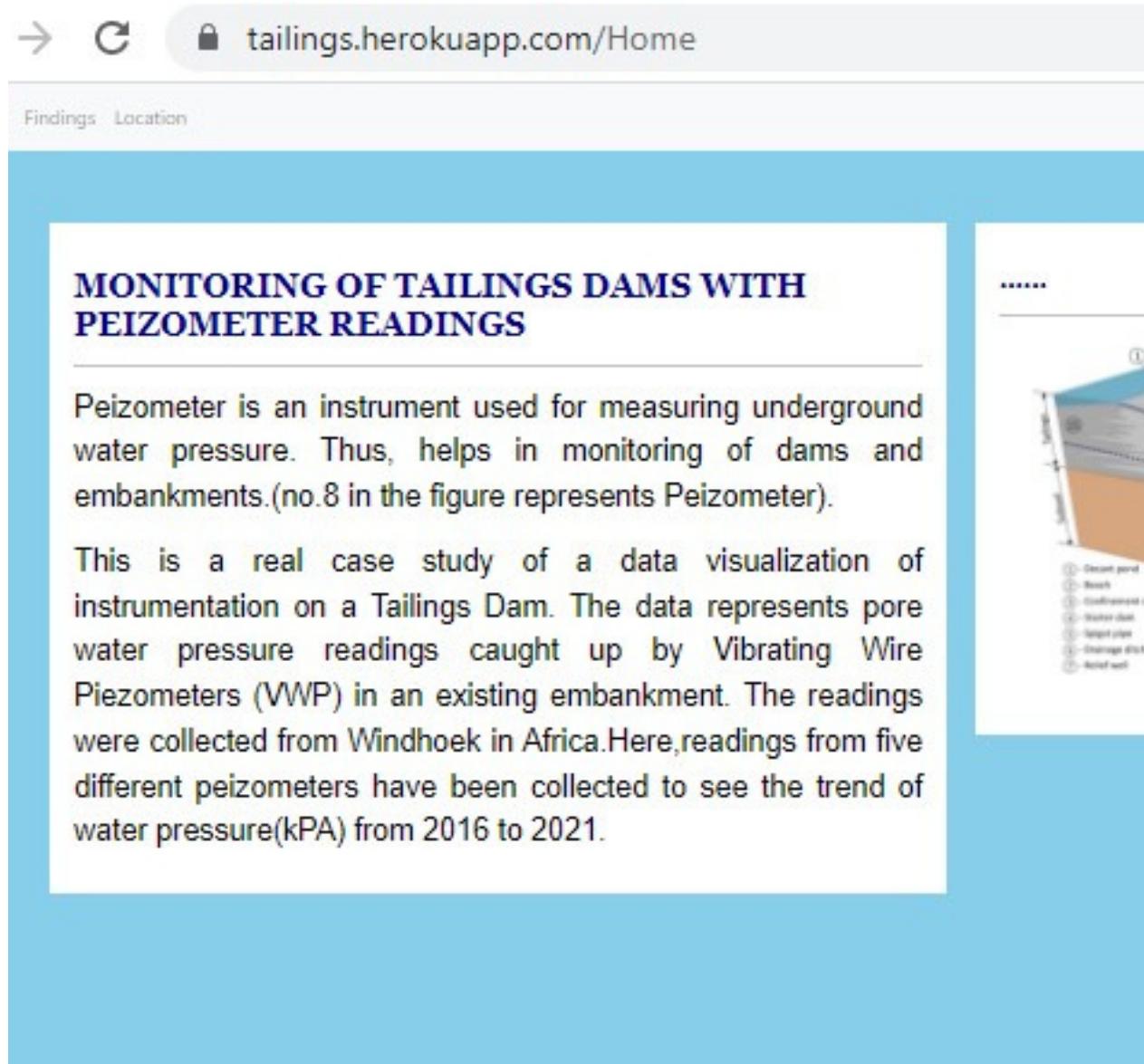


Python APIs

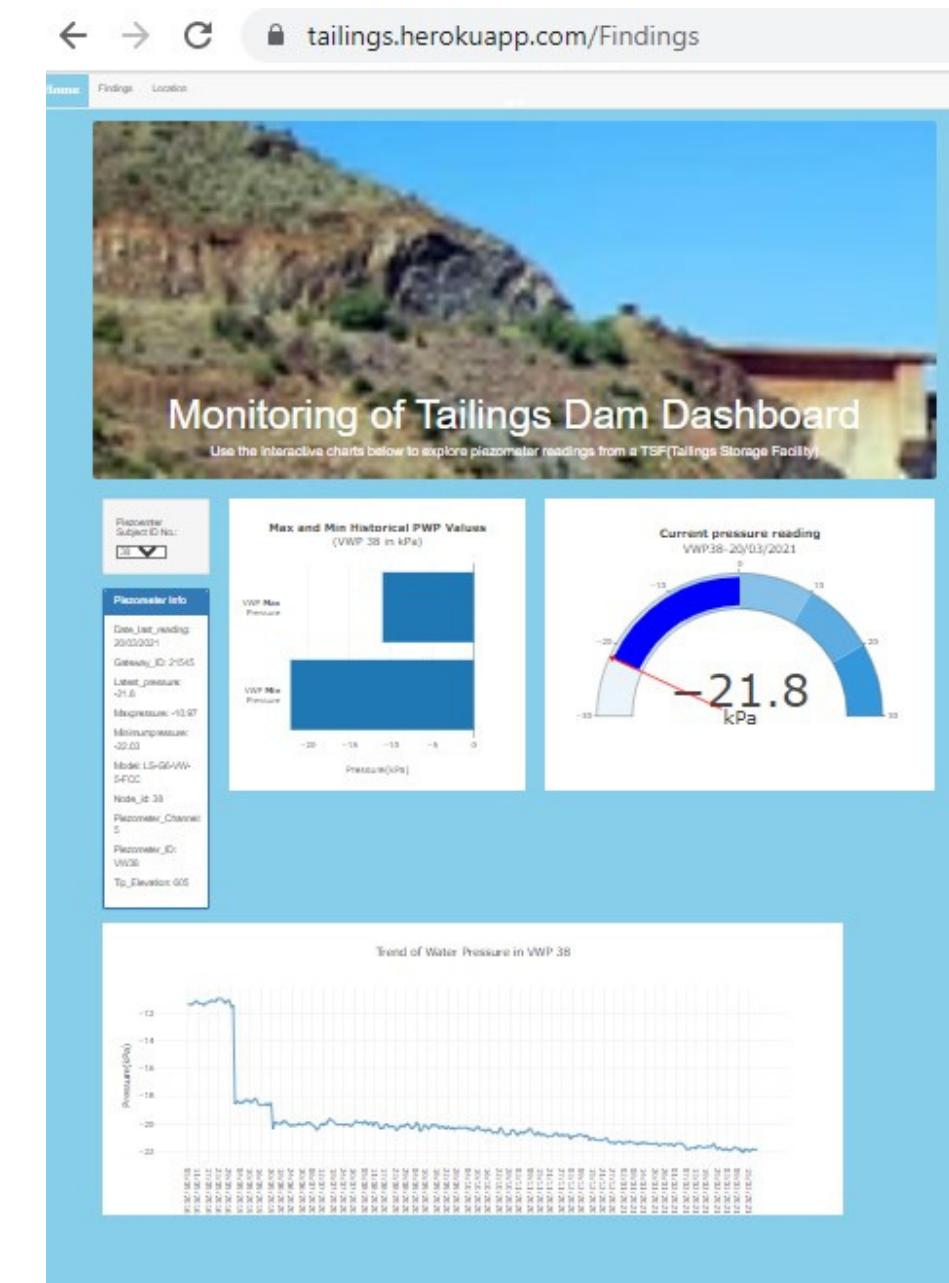
- This API stored the 330 readings for every node from 2016 to 2021 which is used to display line graph**

Python API for webpage

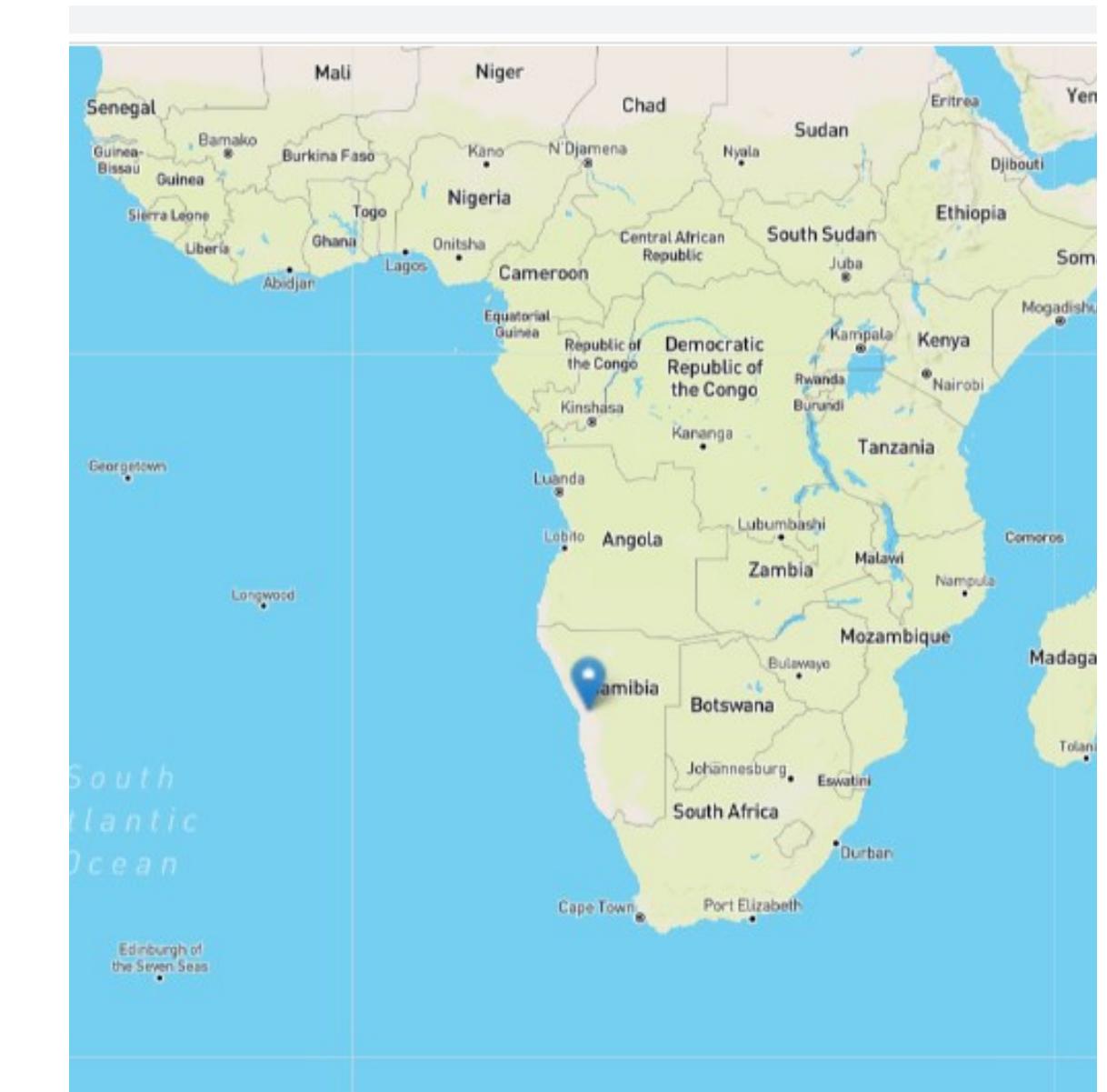
<https://tailings.herokuapp.com/Home>



1. HOME PAGE



2. DASHBOARD PAGE



3. LOCATION PAGE

Findings

- **The increment in the pore water pressure is the most important characteristic of the data analysed**
- **The readings of piezometers 39, 41 and 42 require further investigation**
- **The fluctuations in pressure at these points indicate the potential risk of saturation in these areas of the dam**

Functionality of website

The Web organizes the data that it is able to identify the following aspects:

- **Piezometer location with georeferenced as well as technical information**
- **Any anomalies by tracking pressure fluctuations with the line chart**
- **Allows us to see the latest readings**
- **Easy to compare current reading with the historical max and min.**

Thank
you