

Tidal Observation / Information Of Olero Creek North Water Station And Flowstation Area.

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ABSTRACT

Key words: Tidal information, Reference datum, Hydrographic services

- The need to carry out the tidal observation of Olero Creek area for a specific period was to ascertain the current water level behaviour of the area and to aid in the tide monitoring of the North Water Station (NWS) barge movement to fabrication yard in preparation for the Olero creek rebuild project.
- The study has demonstrated and shown the water level behaviour with the characteristics of Olero Creek in general, and in comparison with the Benin River tidal prediction by providing information on the tidal parameters - Mean Water Level for both Low and High Tide and the reference Datum used in Olero Creek area.
- This presentation will highlight the experience, the tasks, and moreover the challenges faced in data observation, compilation and processing of the Olero Creek North water station and flow station area.

INTRODUCTION

■ What motivated the need to carry out tide observation for a specific period?

- ❖ To ascertain the water level behaviour of the area.
- ❖ To aid in the North Water Station (NWS) barge movement to fabrication yard for operational and facilities management.



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INTRODUCTION

■ What informed the need for the tidal monitoring of North Water Station and Flow station area?

- ❖ The increase demand for hydrographical services within the company.
- ❖ The Oloro Creek rebuild project initiated as a result of the vandalized facilities by the militants within Oloro Creek area during the 2003 crisis in the Niger Delta region of Nigeria.



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OBJECTIVES AND PURPOSE

OBJECTIVES:

- To determine the Tidal parameters
 - Mean Low Water (MLW),
 - Mean High Water (MHW),
 - Lowest Astronomical Tide (LAT),
 - Relationship between LAT and the North Water Station (NWS) barge hull deck elevation.
- To provide information on the Datum used.

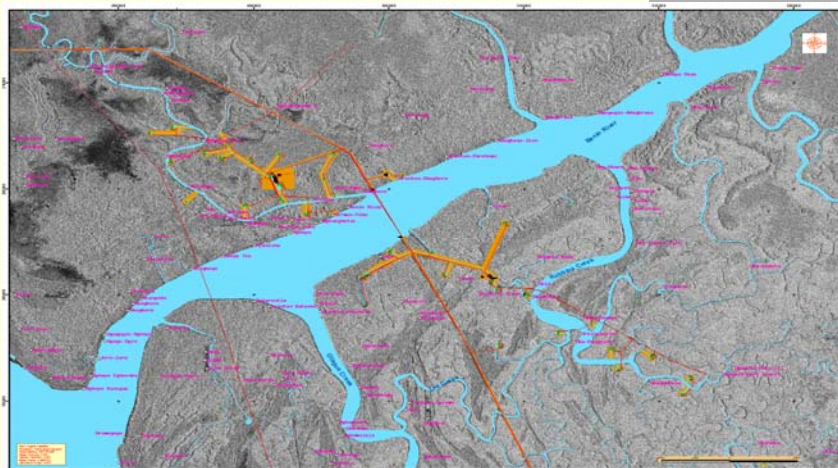
PURPOSE:

- For the tidal monitoring of North Water Station (NWS) barge movement to fabrication yard in preparation for the Olero creek rebuild.

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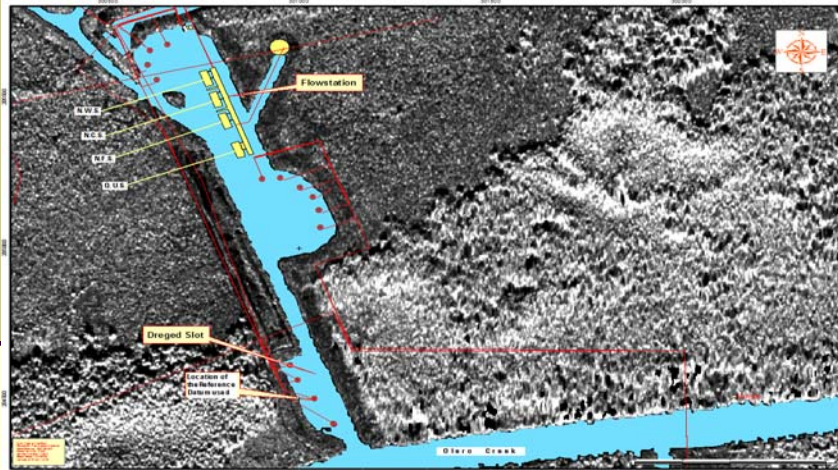
PROJECT STUDY AREA



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PROJECT STUDY AREA



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PROJECT STUDY AREA

Production Platform



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TIDE PRE-PLANNING

Reference Datum and Tide Gauge Installation



Olero GB-3 location with the 1m mark.



Check on the 1m mark at GB-3 location.



Tide Gauge Installation at the project area.

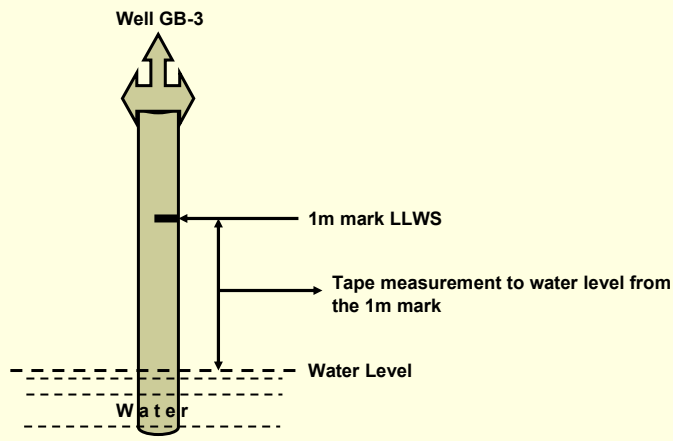
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TIDE PRE-PLANNING

1m mark Reference Datum at GB-3 Location

Sketch below shows the 1m mark LLWS reference datum at Olero GB-3 location used for the project.



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FIELD OBSERVATION

Methodology

- **Personnel** – a team of our tidal crew (1 surveyor and 3 assistants)
- **Operations:**
 - ~ *Setting up and installation of tide gauge in water.*
 - ~ *Simultaneous observation at both the 1m mark datum and tide gauge station for tide correction.*
 - ~ *Computation for tide correction using the 1m mark reference datum at GB-3 location.*
 - ~ *Tidal observation / monitoring for 24 hours a day.*
 - ~ *Weekly analysis of observation to determine the weekly mean of water level.*
 - ~ *Comparison of input data with Benin River tidal prediction for the period of observation.*

DATA PROCESSING

Computation for Tide correction using 1m mark Reference Datum at GB-3 Location

The table below shows observed readings for 2 days at different periods for Tide Correction.

Date	Time h : m	Ref Datum (1m mark)	Measurement to Water Level (m)	Tide (m)	Reading from Tide Gauge (m)	Tide Correction (m)
Day 1	15 : 00	1	0.775	0.225	0.548	0.323
	15 : 30	1	0.79	0.21	0.52	0.31
	15 : 45	1	0.785	0.215	0.525	0.31
	16 : 00	1	0.77	0.23	0.528	0.298
Day 2	08 : 30	1	0.515	0.485	0.783	0.298
	08 : 45	1	0.5	0.5	0.79	0.29
	09 : 00	1	0.49	0.51	0.808	0.298
	09 : 15	1	0.485	0.515	0.812	0.297
					Mean Corr.	0.303
					Approx.	0.30

RESULTS AND DISCUSSION

Final Result

The table below shows the final result for the specific period of observation.

Reference Datum: 1m mark LLWS at GB-3 location at Olero Creek.

Location	LAT	MLLWS	MLW	MTL	MHW	MHHWS	HAT
Olero Creek	-0.244	0.059	0.138	0.373	0.608	0.683	2.299

The Lowest and Highest Water Levels for the specific period of observation and their period of occurrence:

Lowest Water Level = -0.266 at 14:30 hours

Highest Water Level = 0.839 at 05:45 hours

RESULTS AND DISCUSSION

Comparison between Olero Creek and Benin River

The table shows weekly comparison between Olero Creek tide information and Benin River tide prediction.

Period	Olero Creek	Olero Cr.	Benin River	Benin R.
	MLW Olero Cr.	MHW Olero Cr.	MLW Benin R.	MHW Benin R.
Week 1	0.180	0.544	0.536	1.164
Week 2	0.221	0.730	0.229	1.521
Week 3	0.279	0.624	0.55	1.193
Week 4	0.289	0.725	0.364	1.414
Week 5	0.242	0.585	0.586	1.179
Week 6	0.216	0.741	0.243	1.593
Week 7	0.199	0.578	0.614	1.193
Week 8	0.063	0.599	0.393	1.436
Week 9	0.101	0.558	0.6	1.221
Week 10	0.047	0.662	0.293	1.579
Week 11	0.066	0.535	0.614	1.229
Week 12	-0.069	0.512	0.514	1.4
Week 13	-0.04	0.519	0.486	1.4
Sum	1.794	7.912	6.022	17.522
Frequency	13	13	13	13
Mean	0.138	0.608615	0.4632307	1.3478461
Approx.	0.138	0.609	0.463	1.348
Tide Range	0.471		0.885	
Difference	0.414 m			

RESULTS AND DISCUSSION

Comparison between Olero Creek and Benin River

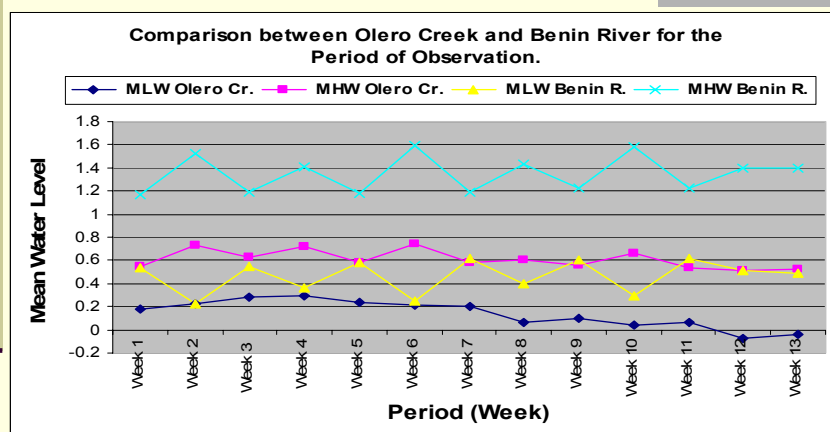
- A weekly comparison carried out for the period of observation.
- **Findings:**
 - Benin River is higher in tide than Olero Creek.
 - Difference in tide elevation between the two is about 0.414 m.
 - The difference is as a result of Benin River being closer to the sea than Olero Creek.

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RESULTS AND DISCUSSION

Comparison between Olero Creek and Benin River (Chart)



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RESULTS AND DISCUSSION

Relationship between LAT and NWS barge hull deck elevation.

LAT: -0.244m (computed from the tide observation)
HAT: 2.299m (computed from the tide observation)

NWS barge Hull Deck Elevation:

Bottom of Hull: -1.118m (given)
Top of Hull: 2.134m (given)

The table below shows the relationship between LAT and NWS barge hull deck elevation.

LAT	-0.244m	HAT	2.299m
Bottom of Hull	-1.118m	Top of Hull	2.134m
Difference	0.874m	Difference	0.165m

RESULTS AND DISCUSSION

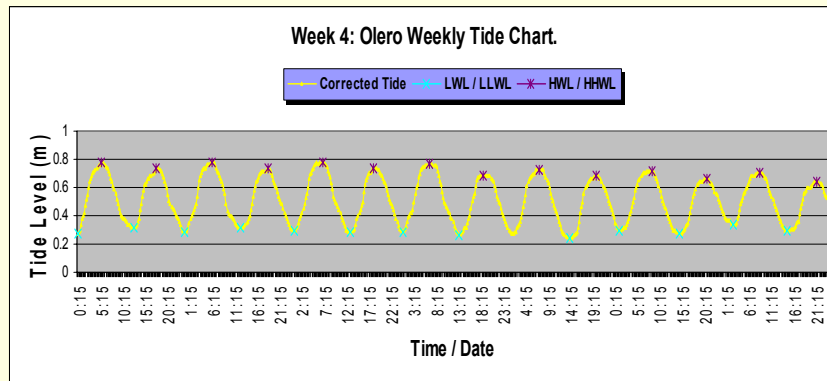
Tide Characteristics

- Olero Creek has a mixture of Semidiurnal and Mixed Tide, whereby there are two high waters and two low waters each tidal day.
 - At the semidiurnal tide period, the two high waters for each tidal day are almost equal in height and the two low waters are also approximately equal in height.
 - At the mixed tide period, the two high waters and the two low waters of each tidal day have marked differences in their heights.
 - *(See some of the weekly tide charts for details on the tide characteristics next slide).*

RESULTS AND DISCUSSION

Weekly Tide Charts showing Tide Characteristics

The chart below shows the **Semidiurnal tide**.



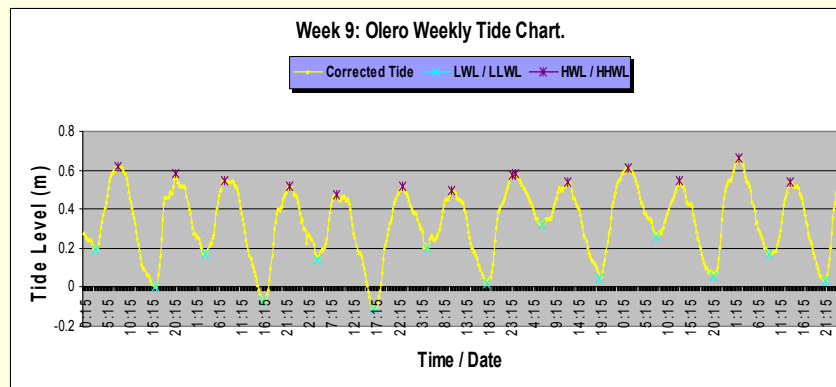
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RESULTS AND DISCUSSION

Weekly Tide Charts showing Tide Characteristics

The chart below shows the **Mixed tide**.



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CONCLUSION

The study has:

- Demonstrated and shown the water level behaviour of Olero Creek and its characteristics.
- Provided information on the tidal parameters
 - Mean Water Level for Low and High Tide
 - Lowest Astronomical Tide (LAT)
 - Highest Astronomical Tide (HAT)
 - Relationship between LAT and North Water Station (NWS) barge hull deck elevation and reference datum used.
- Achieved the purpose for tidal monitoring and forecast for North Water Station (NWS) barge movement to fabrication yard.
- Provided opportunity for tidal studies and management of company facilities.

RECOMMENDATIONS

- Tidal data should be saved and stored so that it may be retrieved later for further use and study.
- Continuous monitoring and upgrade through GPS positional data and digital tide gauge.
 - The use of digital tide gauge and GPS combined with the field application of the conceptual work will generate more and better tidal information for onshore and offshore facilities planning, engineering analysis, and research.

Thank you.

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BIOGRAPHICAL NOTES

■ **Surv. Sylvester Efe Owhojeta**, born in 1967 is a member of the Nigerian Institution of Surveyors. Graduated in 1991 with a B.Sc in Surveying, Geodesy and Photogrammetry from University of Nigeria, Nsukka, Nigeria. Obtained a Masters degree in Petroleum Economics from Ambrose Alli University, Ekpoma, Nigeria in 2005. He was registered to practice as a Surveyor in Nigeria in 2001. Up to date he has been practicing as a Registered Surveyor. Since July 2005, he has been on contract engagement with the GIS-Survey Unit, Chevron Nigeria Limited, Escravos – Nigeria.

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■ **Surv. Emmanuel Olayinka Ajayi**, born in 1957 is a fellow of the Nigeria Institution of Surveyors. Graduated in 1982 with a B.Sc in Surveying from University of Civil Engineering, Bucharest, Romania. Obtained M.Sc degree in Surveying (with bias to Geodesy) from University of Lagos, Nigeria in 1988 and MBA degree in Project Management from Obafemi Awolowo University, Ile-Ife, Nigeria in 2001. He was registered to practice as a Surveyor in Nigeria in 1989. He joined Chevron Nigeria Limited in 1994 as a Survey Engineer in the Facility Engineering Department and rose to the position of Chief Surveyor, GIS-Survey Unit, Chevron Nigeria Limited since May 1998.

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