



FORESTGATE
SHIPBROKERS
LIMITED



FORESTGATE - TOMARO ISLAND PROJECT DEVELOPMENT

**Preliminary
Design - Draft**

BORAG (NIG.) LIMITED

FEBRUARY 2021



	No.	Description	Date	Borag Limited				PROJECT Tomaro Reclamation			CLIENT Forestgate Shipbrokers Limited		
								Issue Date:	Project Number	DRAWING NUMBER	REV		
								Down by: Obaze - Adesiyun	Checked by	Checker	ZZ		



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Introduction

Borag Nig. Limited was originally commissioned by Forestgate Shipbrokers Limited on the 31st October 2020 as Consultants and Project Supervisors for the reclamation of 18 hectares land area on Tomaro Island in Lagos State. As at this time, **M/s Telmarine Support Services Limited**, a Lagos based company had carried out preliminary studies and geotechnical investigations on the project.

Borag Nig. Limited studied the documents prepared by the above mentioned companies and came up with two Engineering Appraisals which were discussed in detail with representatives of MTBS at a meeting held in M/s Forestgate Shipbrokers Limited's office on Thursday 12th December 2020. It was agreed at this meeting that Borag Nig. Limited should design and prepare cost estimates for the reclamation phase of the project based on our earlier submitted Engineering Appraisal of November 2020.

Our Preliminary Design derives from data gathered from the following:

- Numerous site visits.
- MTBS Initial Due Diligence Report of July 2020
- MTBS Technical Plan – Draft of October 2020
- MTBS Technical Plan of December 2020
- Survey Plan from Nigerian Ports Authority commissioned Surveyor
- Bathymetric Survey Plan of the Middle Creek Channel from Nigerian Ports Authority
- Google Earth Imagery
- Our Engineering Appraisal of November 2020



The scope of works in this Preliminary Design and Cost Estimates include the following:

- Completion of De-rooting and site clearance works.
- Delineation and re-establishment of lost property beacons as allotted for 15 hectares.
- Acquisition dredging for materials required for the Hydraulic reclamation of the delineated property
- Geotechnical investigations after reclamation for soil integrity.
- Shore and property line protection and Jetty wall design studies

SCOPE OF WORKS.

1.0 DE-ROOTING AND SITE CLEARANCE

This item of work which was contracted to Messrs Laris Equipment (Nigeria) Limited is currently at about 80% completion as observed during a site inspection carried out on the 31st January 2021. Outstanding works on this aspect are the removal of roots, stumps and general clearing of the site. Tidal inundation of the site is observed to be 90% at high tide. Only one property beacon was found in place.

2.0 DELINEATION.

Proper delineation of the site boundaries for the re-establishment of property beacons (which were found missing) during the de-rooting exercise is to be carried out before the reclamation starts. This is to include the installation 5.8m length of GI posts finished with water based anti-rust paint, driven to a point depth of 2.3m and pegged at 60m intervals along the perimeter lines. *(See delineation drawings)*

Pre-reclamation survey, for the purpose of establishing the quantity and cost of sand filling, should follow at this stage.



3.0 DREDGING AND RECLAMATION.

A sand-fill thickness of 4.0m over the 19 ha site area will require approximately 760,000m³ of fill material. Please note that our design consideration is for a finished site level of 3.0m. The provision of an additional 1.0m to a total of 4.0m backfill is to allow for both bulking of sand and settlement. This is based on the rule of the thumb though still subject to our final empirical assertion.

According to the MTBS report, the channel area is a probable source for the sand to be used for this reclamation (for which a permit is required from NPA).

Assuming a channel width of 200m over the 600m frontage of the site, the depth of dredging required within the channel (to reclaim the site) will be about 6.5m.

Based on the indicated estimated production of approximately 51,500m³ of dredging per week [MTBS report of 4 December 2020 using the Client's dredger 1870 Dragon (CSD)], reclamation of the site by hydraulic means would require 24 weeks or about 6 months to complete.

Post-reclamation survey for the purpose of establishing the quantity of sand-filling to verify settlement and cost should follow. (Please see referral drawings for this stage)



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4.0 SHORE, JETTY AND PROPERTY PROTECTION

Once full reclamation of the site has been achieved by sand-fill, the next thing will be to protect the integrity of the shoreline through installation of sheet piles.

Our design proposal is for a retaining wall type jetty (instead of the finger type which would lead to a reduction in channel width when a vessel is anchored). This makes great economical sense as the retaining wall acts as the jetty and provides protection to the shoreline at the same time.

Bearing in mind the 13.5m draught desired at the jetty and the indicative poor structure of the subsoil (from soil tests conducted so far), our design is for steel sheet piles as retaining wall with anchorage for its stability along the entire alignment of the shoreline.

Detailed design will be required to ascertain relevant information about the steel sheet piles e.g. size/section of sheet piles required, lengths of sheet piles, distance of anchor sheet pile behind the front sheet pile, tie-rod spacing, etc. This detailed design exercise can take place in parallel with the site hydraulic reclamation activity.

(See referral drawings included in this report)



5.0 METHODOLOGY FOR PROPERTY PERIMETER PROTECTION

It is preferable that the retaining wall be in place before dredging of the channel to the desired draught (13.5m) is carried out.

- Reclamation will commence along the shore line length (600m) with some space left for egress of water. This is to establish a work platform for geo-technical investigation survey activities to obtain the necessary parameters for the design of the retaining wall jetty which should be available almost at the inception of back-filling.
- The Sub-soil investigation should be commissioned within two weeks of the commencement of the sand-filling work.
- Geotechnical investigation over the entire site to determine relevant parameters that will be used in the design of both the retaining wall along the perimeter of the site and the piles for the structures proposed for the tank farm can be continued to completion in line the with the sand-filling for the rest of the site.
- The process for the procurement of sheet etc. should commence at about the same time with the sand-filling.

6.0 PROPOSAL FOR ADVANCE PROCUREMENT OF SHEET PILES

- An initial quantity of sheet piles can be estimated from design calculations based on the available soil report from Messrs **Telmarine Support Services**. With this information the steel manufacturers can commence production of a specific quantity which may be increased with the outcome of our proposed confirmatory geo-technical investigation. The effect of the confirmatory geo-technical investigations will help in concluding the final estimation of the total length of sheet piles required for the project. This process of advance procurement will help to save time.



SITE & ENVIRONMENTAL CONSIDERATIONS



- SITE ALLOTMENT SURVEY
- PROPOSED FORESTGATE - TOMARO CONTAINER TERMINAL PROJECT
- GOOGLE IMAGERY STUDIES
- SITE OBSERVATIONS

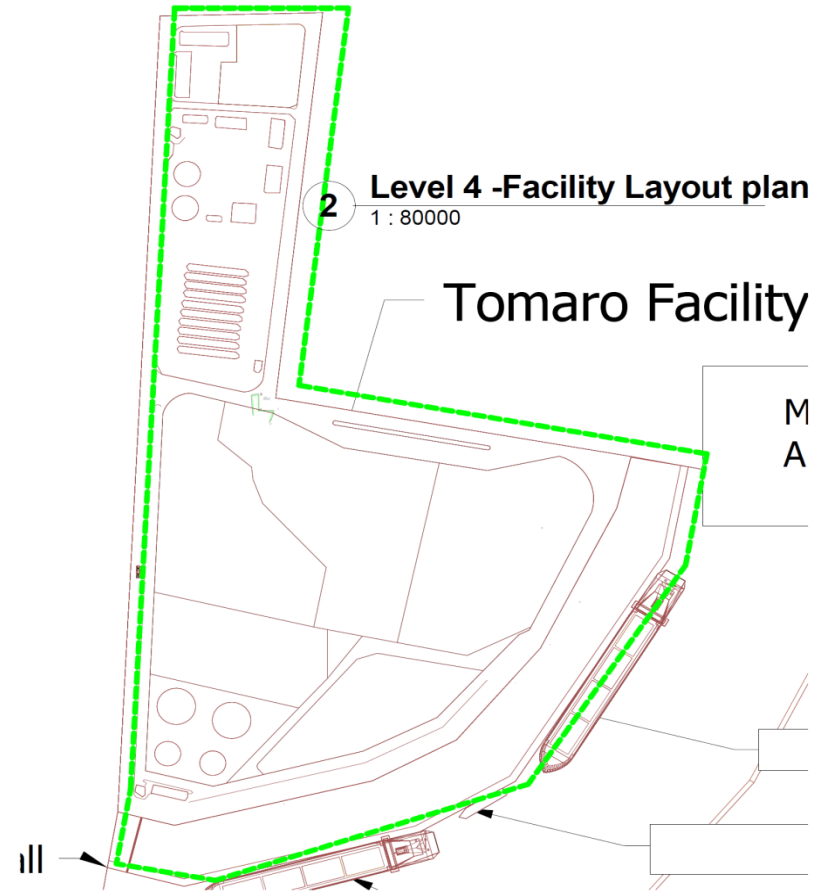
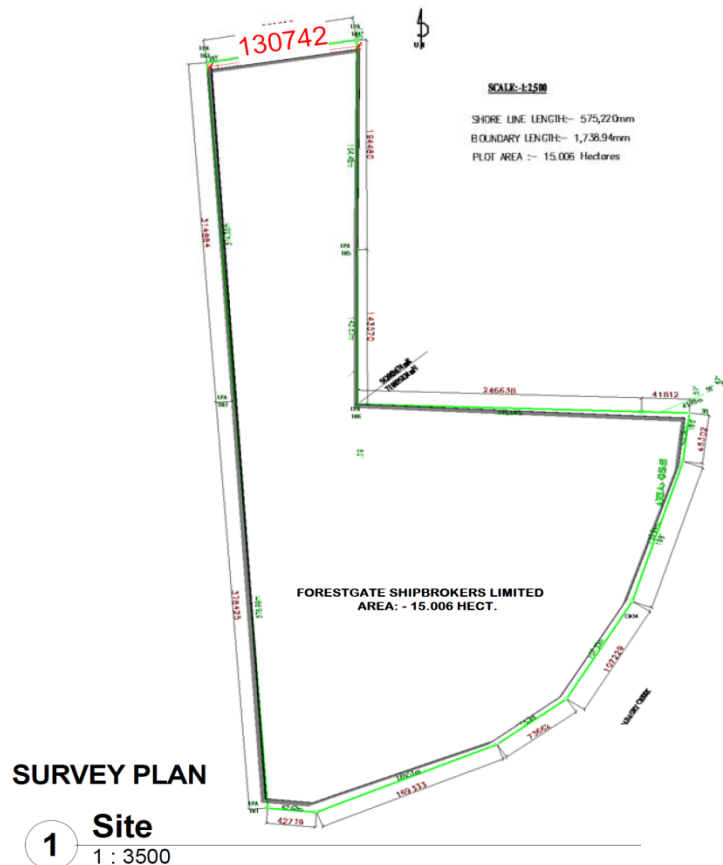
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ODE	STATUS	SUITABILITY DESCRIPTION	PURPOSE OF ISSUE

PROJECT Tomaro Reclamation
SHEET CONTENT PAGE

CLIENT Forestgate Shipbrokers Limited		
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Issue Date:	Project Number	
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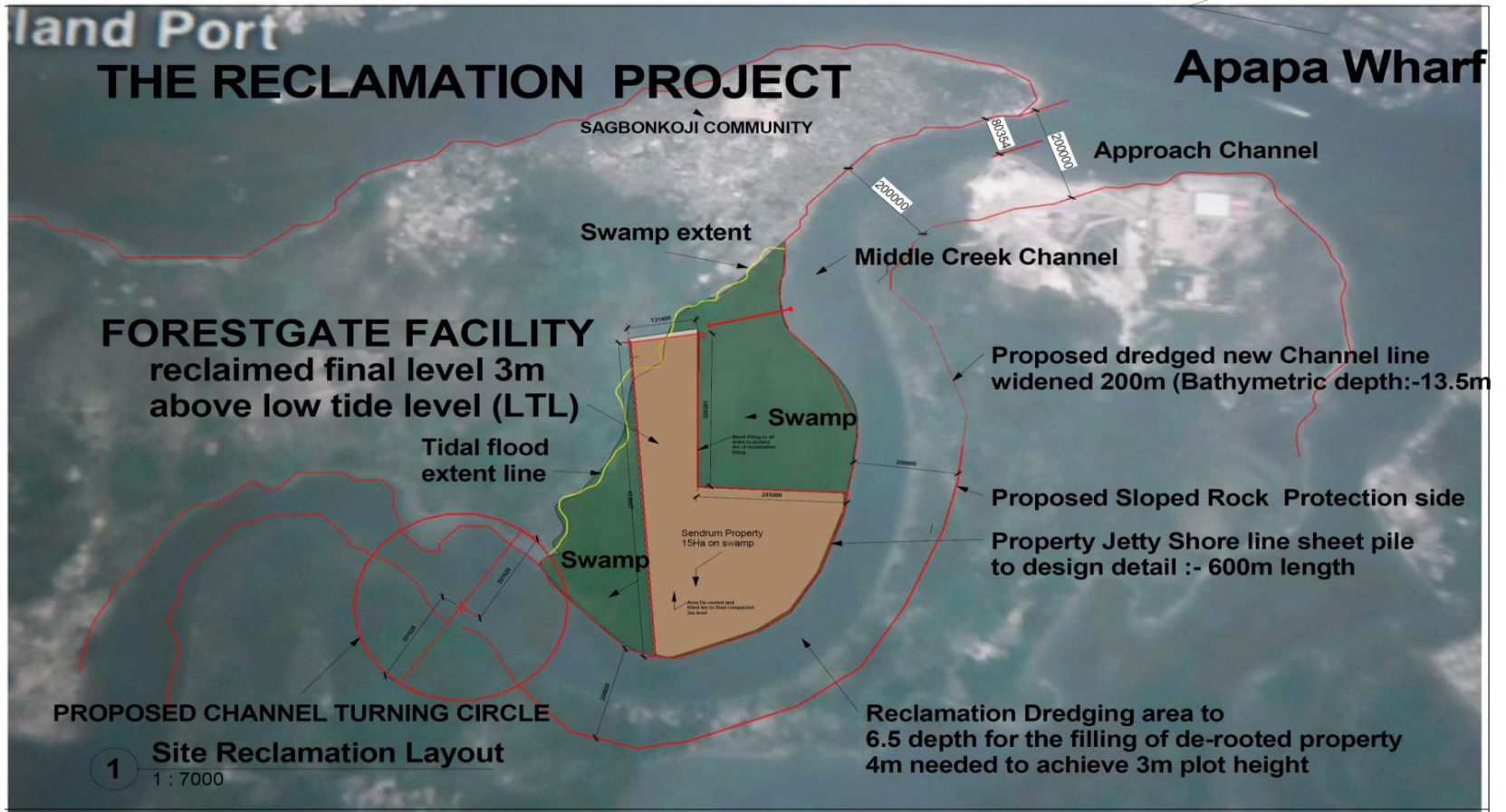


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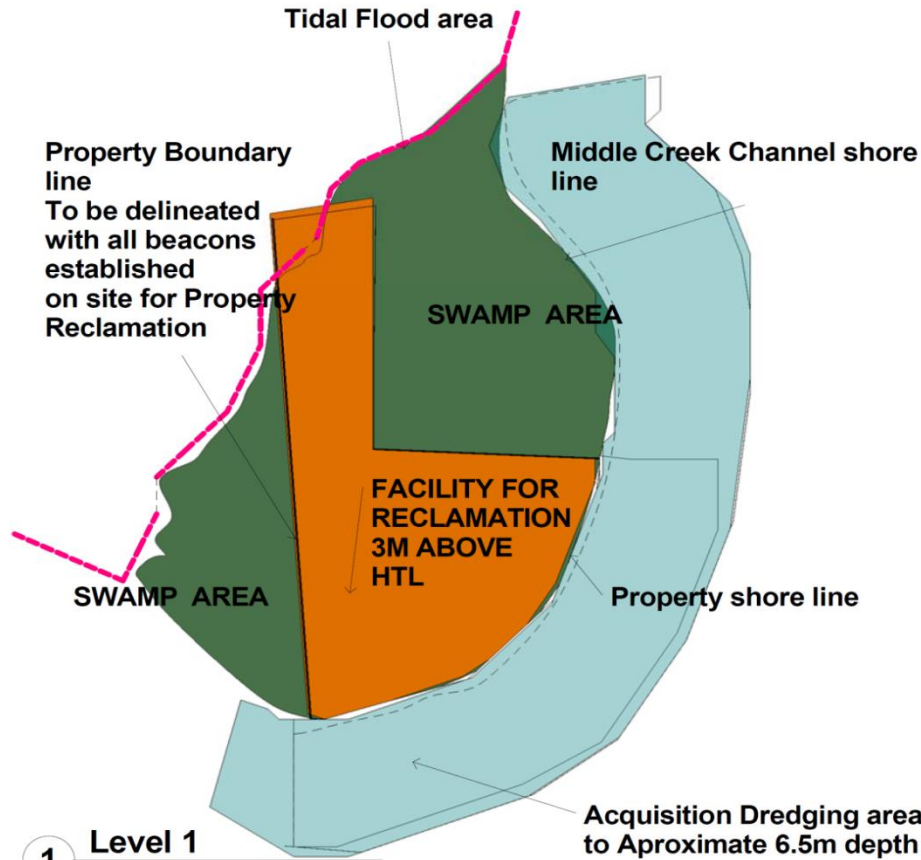
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1 Level 1
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SCOPE OF WORKS



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**FORESTGATE
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PROPOSED DREDGING & RECLAMATION ACTIVITIES AT FORESTGATE FACILITY

FOR
FORESTGATE SHIPBROKERS LIMITED



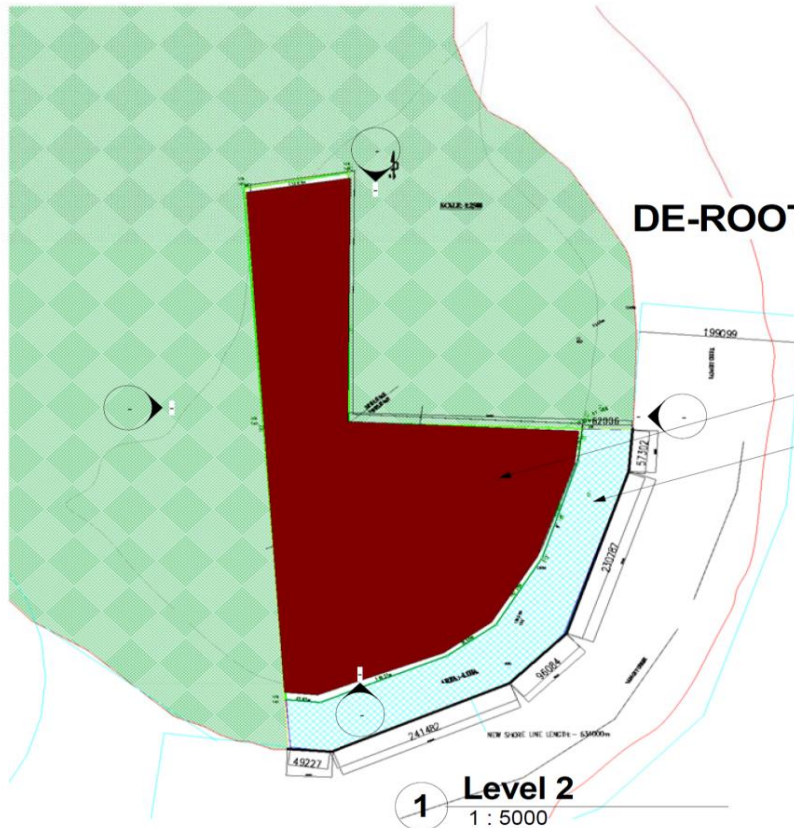
- 1. De-Rooting & Clearing**
- 2. Delineation survey**
- 3. Aquisition Dredging**
- 4. Hydraulic Reclamation**
- 5 Geotechnical Investigation**
- 6 Shore & Property Line Protection**
- 7. Pile Foundation Structures for the
Proposed Forestgate Facility**

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DE-ROOTING AND SITE CLEARANCE

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DE-ROOTING AND SITE CLEARANCE



15 Hectares of
Allotted survey
property
4 Hectares of
proposed extension

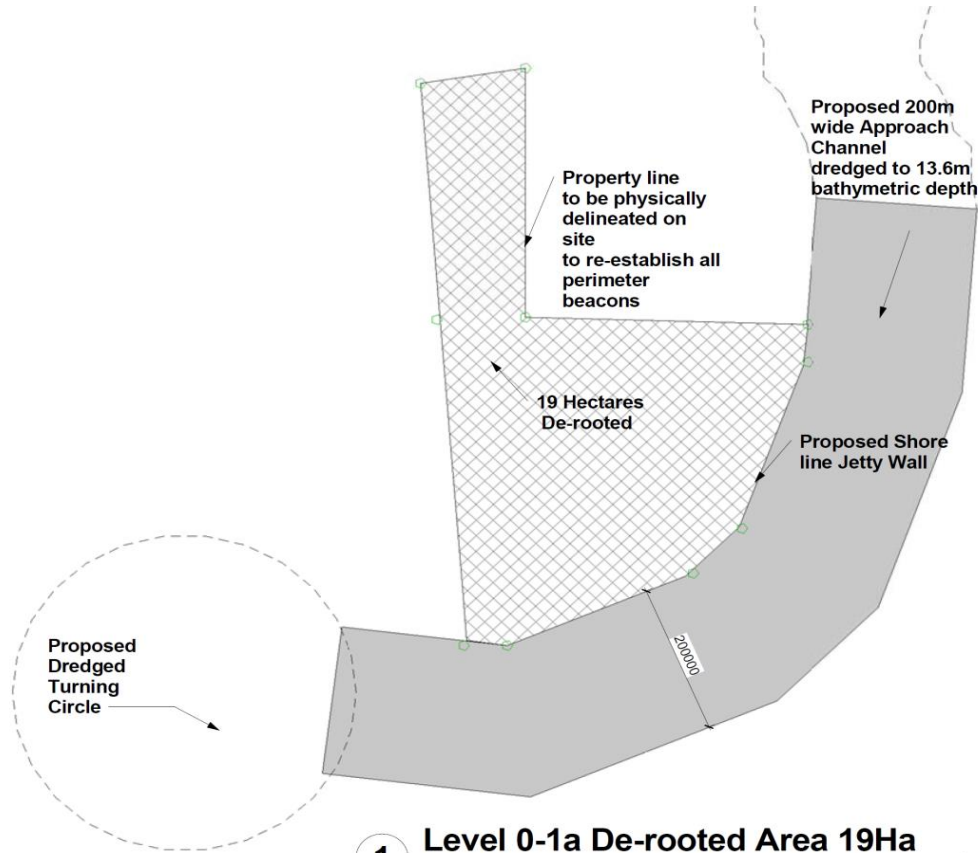
De-rooted properly
ready for delineation
Reclamation and soil
protection works

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1 Level 0-1a De-rooted Area 19Ha
1 : 5000



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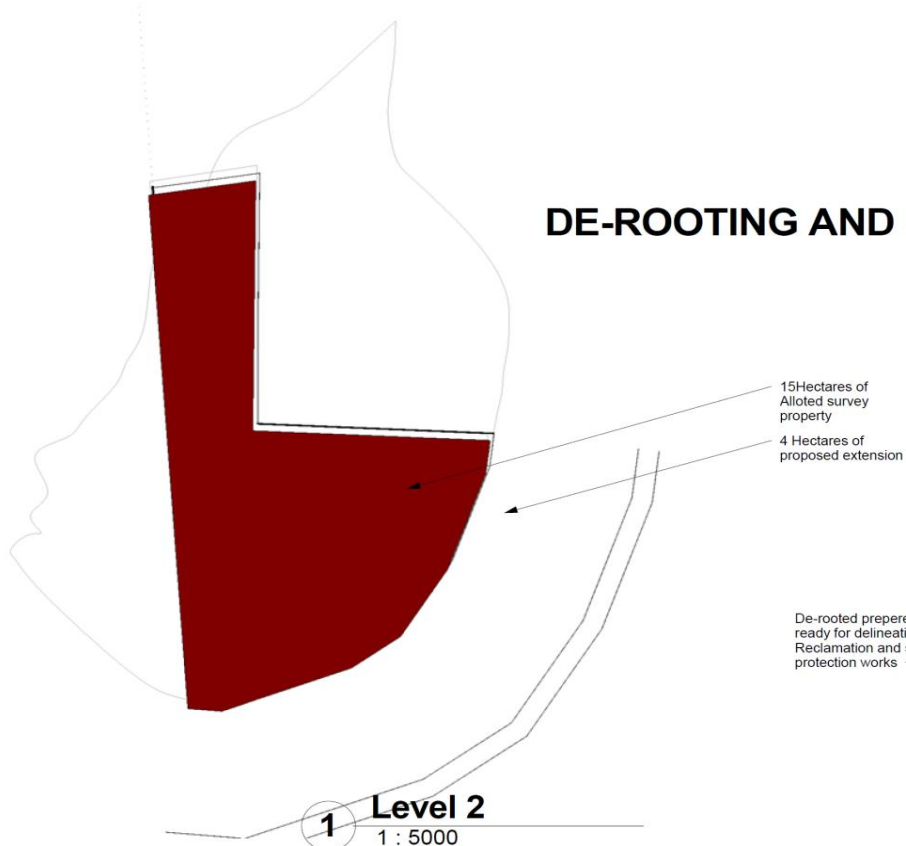
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DE-ROOTING AND SITE CLEARANCE

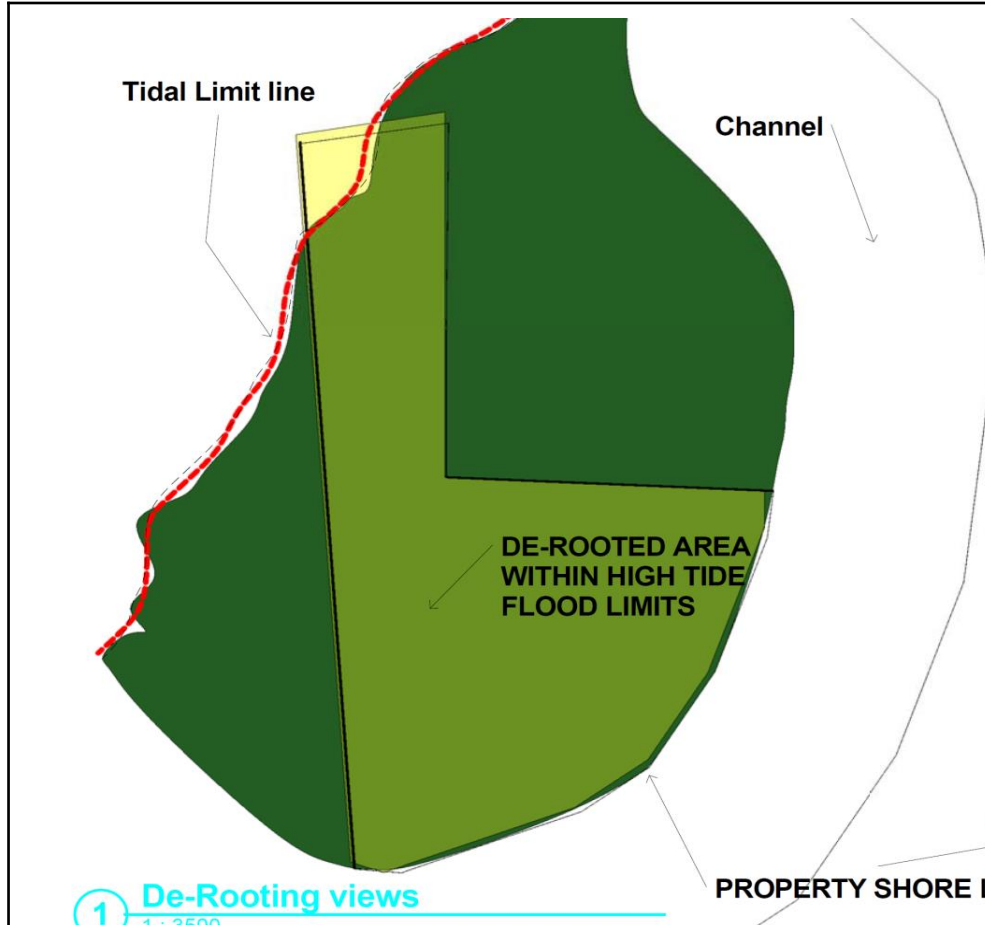


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1 De-Rooting views
1 : 3500

PROPERTY SHORE LINE

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DELINEATION WORKS

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Galvanised iron posts at 60m to delineate property boundaries

Establishing property surveyed perimeter boundaries

Establishing property Beacons



No.	Description	Date

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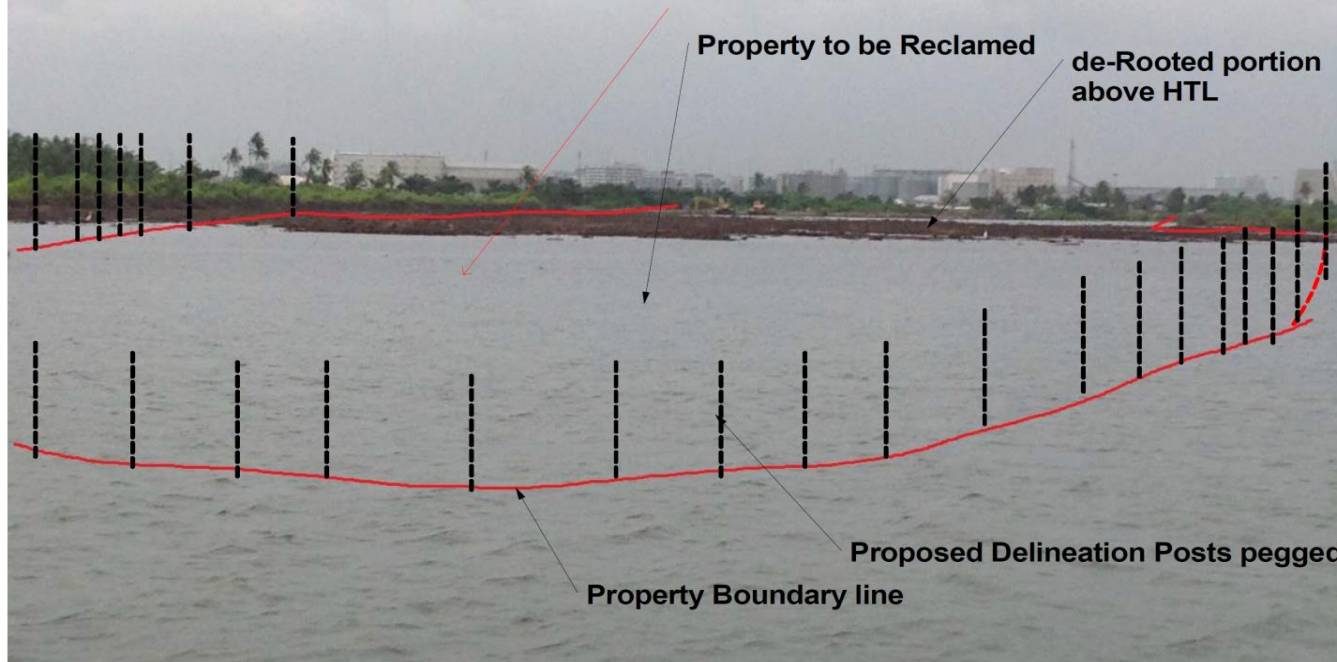
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VIEW OF DE-ROOTED PROPERTY AT HIGH TIDE

90% inundation at high tide level



**DELINEATION
BEFORE
HYDRAULIC
RECLAMATION**

- LOST BEACONS
- TIDAL FLOODS

Proposed Delineation Posts pegged 60m apart

Property Boundary line

Property to be Reclaimed

de-Rooted portion
above HTL

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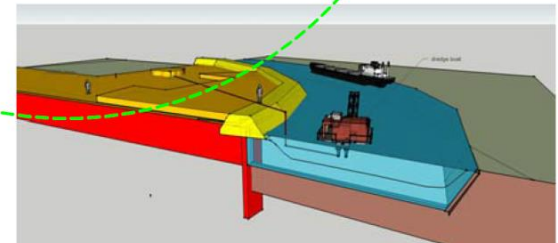
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ACQUISITION DREDGING AND HYDRAULIC RECLAMATION WORKS

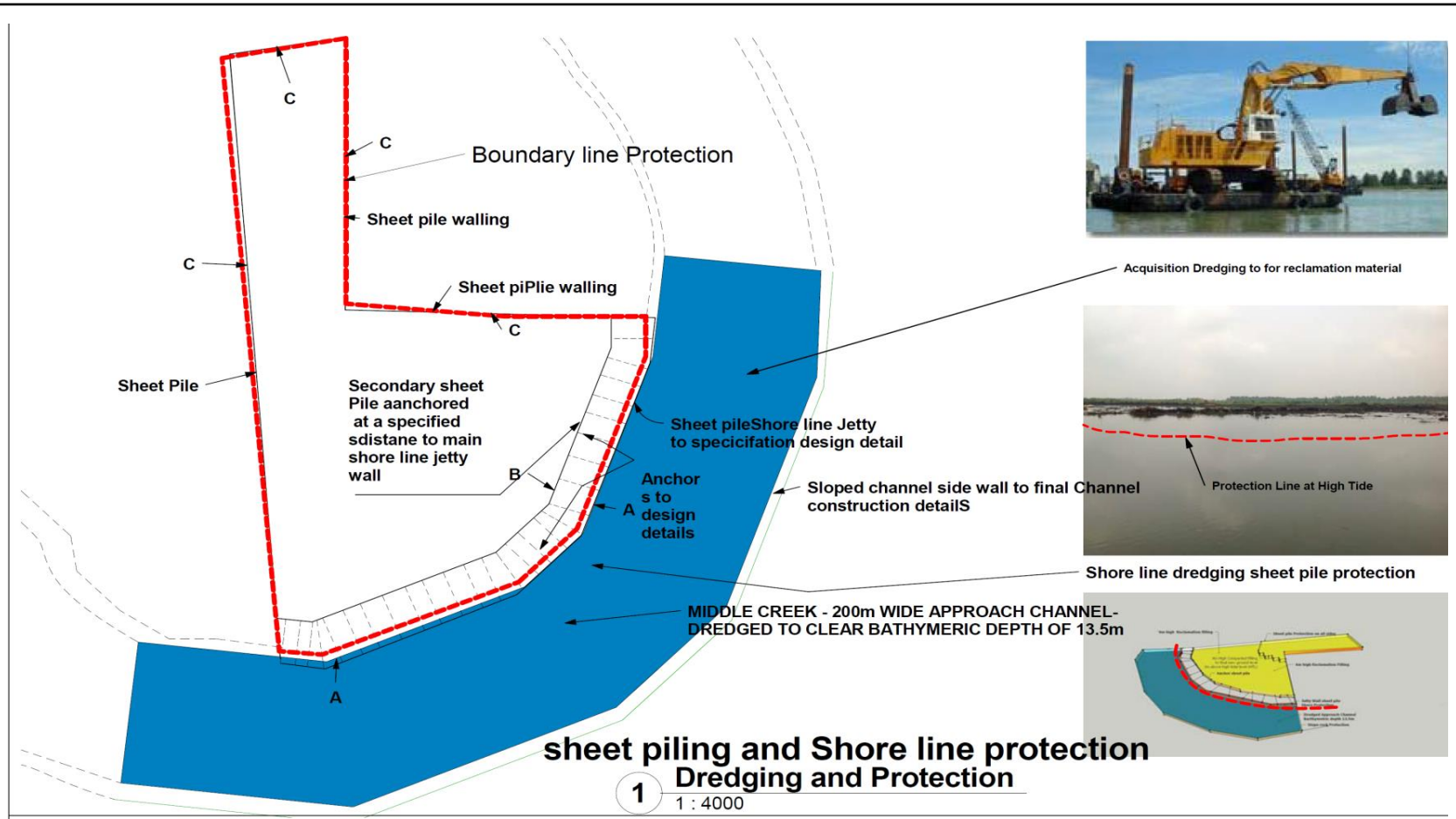


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**sheet piling and Shore line protection
Dredging and Protection**

1
1 : 4000

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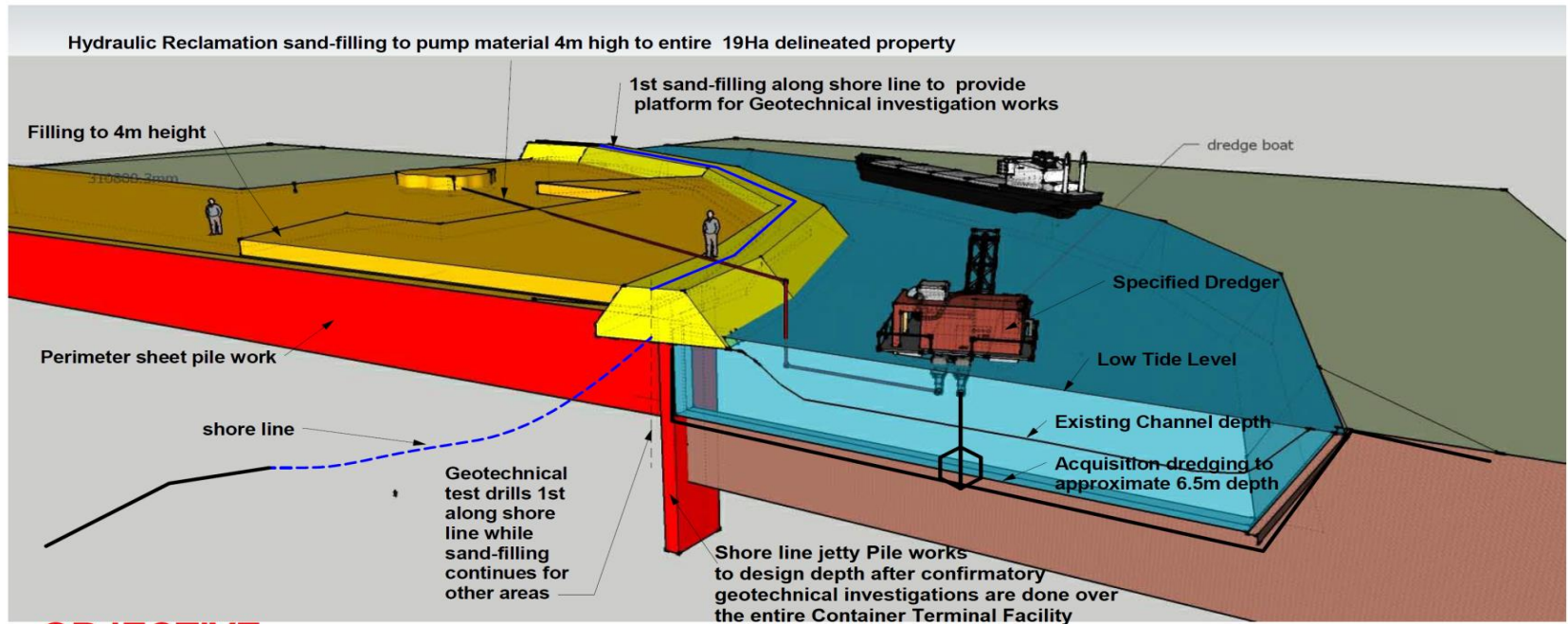
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RECLAMATION METHOD: -

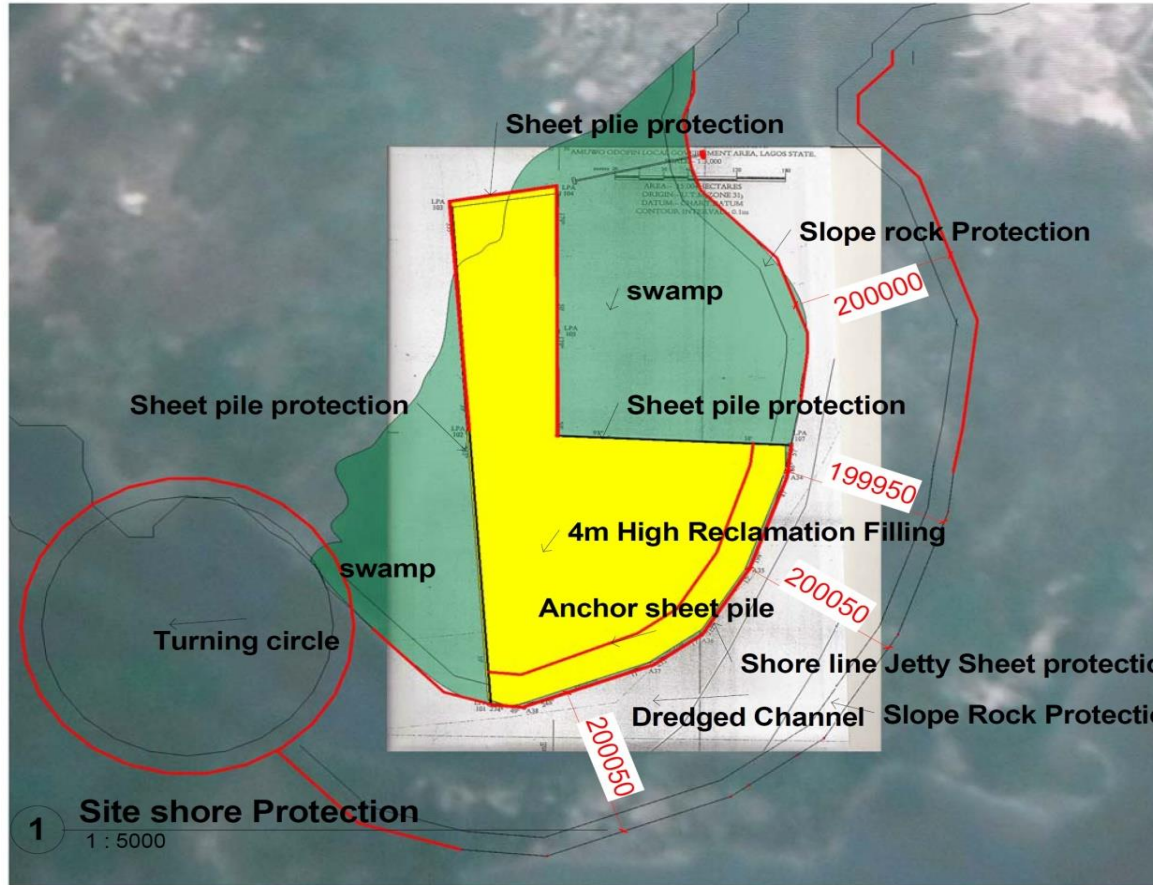
SAND-FILLING TO START ALONG SHORE LINE AND BUILD A PLATFORM FOR CARRYING OUT GEOTECHNICAL INVESTIGATION ACTIVITES WITHIN 2 WEEKS



OBJECTIVE :

- EARLY COLLATION OF ALL RELEVANT PARAMETERS FOR THE DESIGN OF ALL BOUNDARIES AND SHORE LINE JETTY RETAINING WALLS
- EARLY COMMENCEMENT OF PROCUREMENT PROCESS FOR SHEET PILES ETC ONCE RELAMATION STARTS

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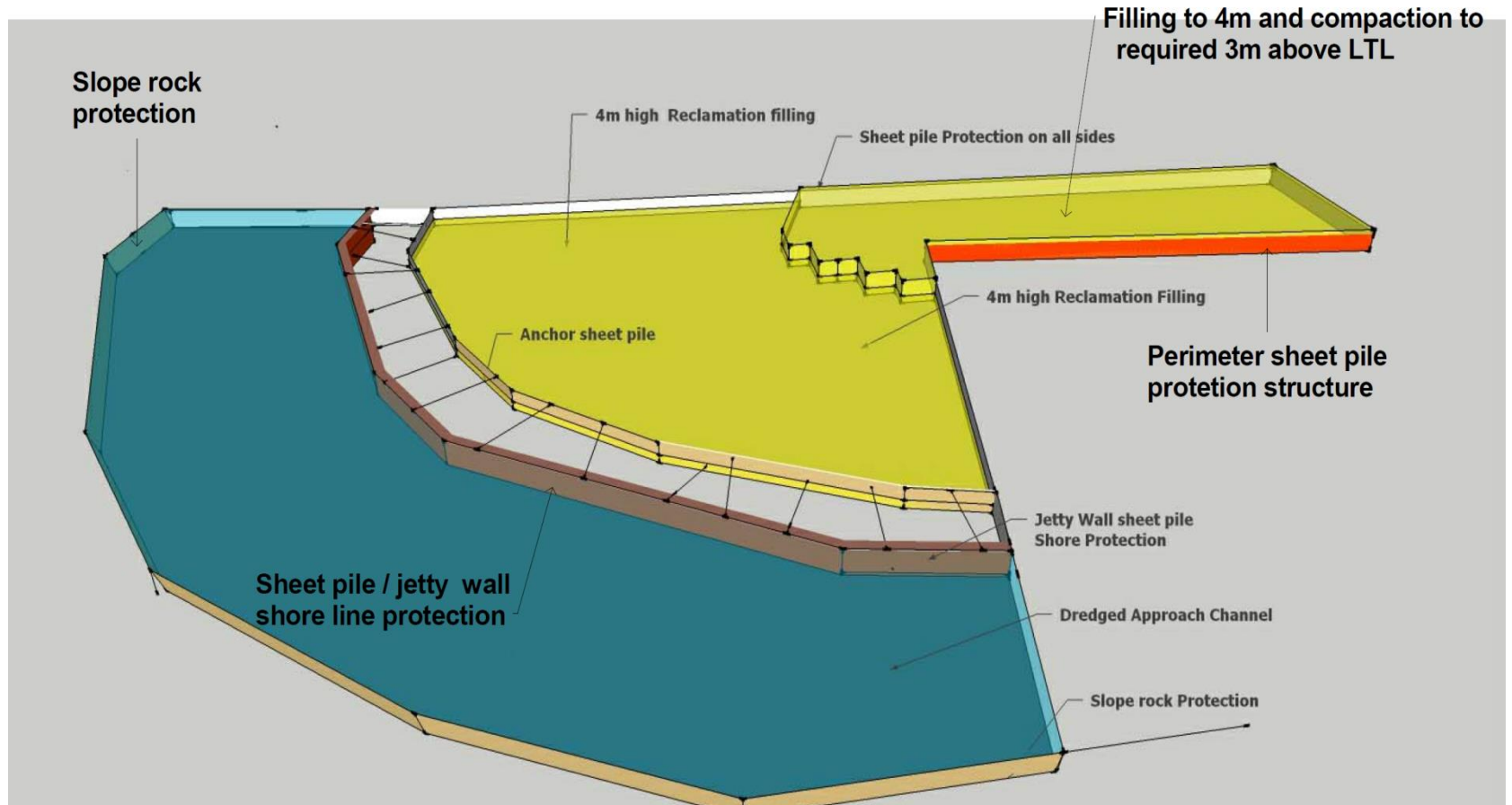
1 Site shore Protection
1 : 5000

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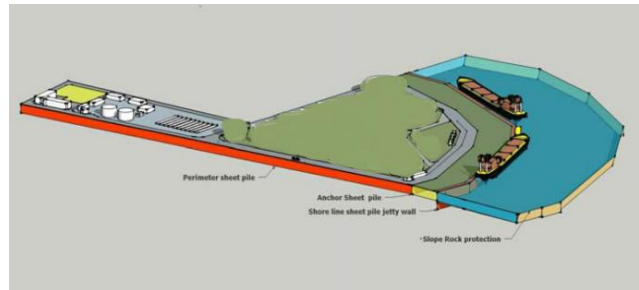
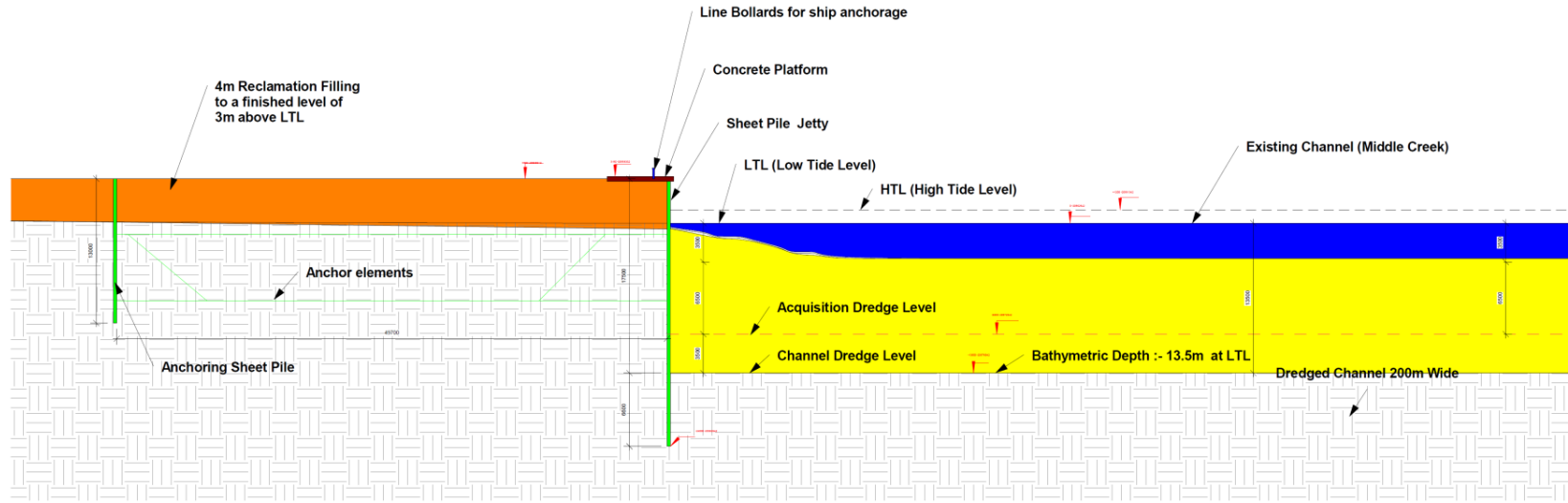


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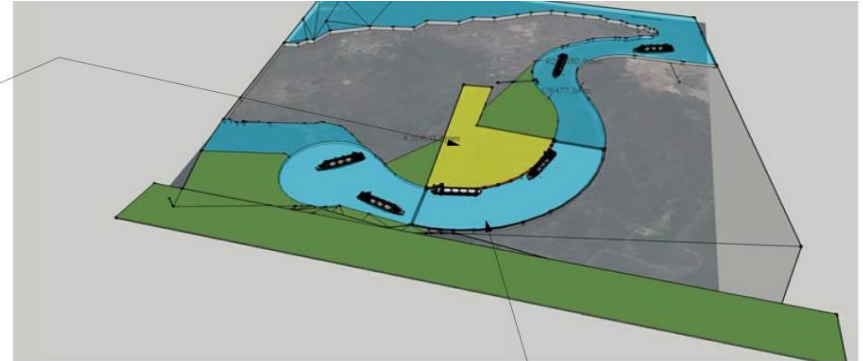
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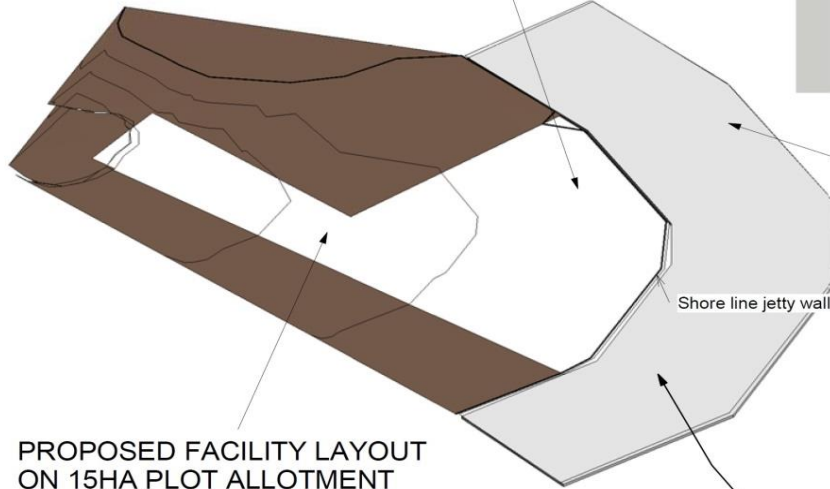
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19 hectares reclaimed
and compacted to final 3m
above Determined LTL (low Tidal Level)



**Acquisition Dredging area
reclamation materials
(See Report on Dredging)**



**PROPOSED FACILITY LAYOUT
ON 15HA PLOT ALLOTMENT**

DREDGED 200M WIDE APPROACH CHANNEL

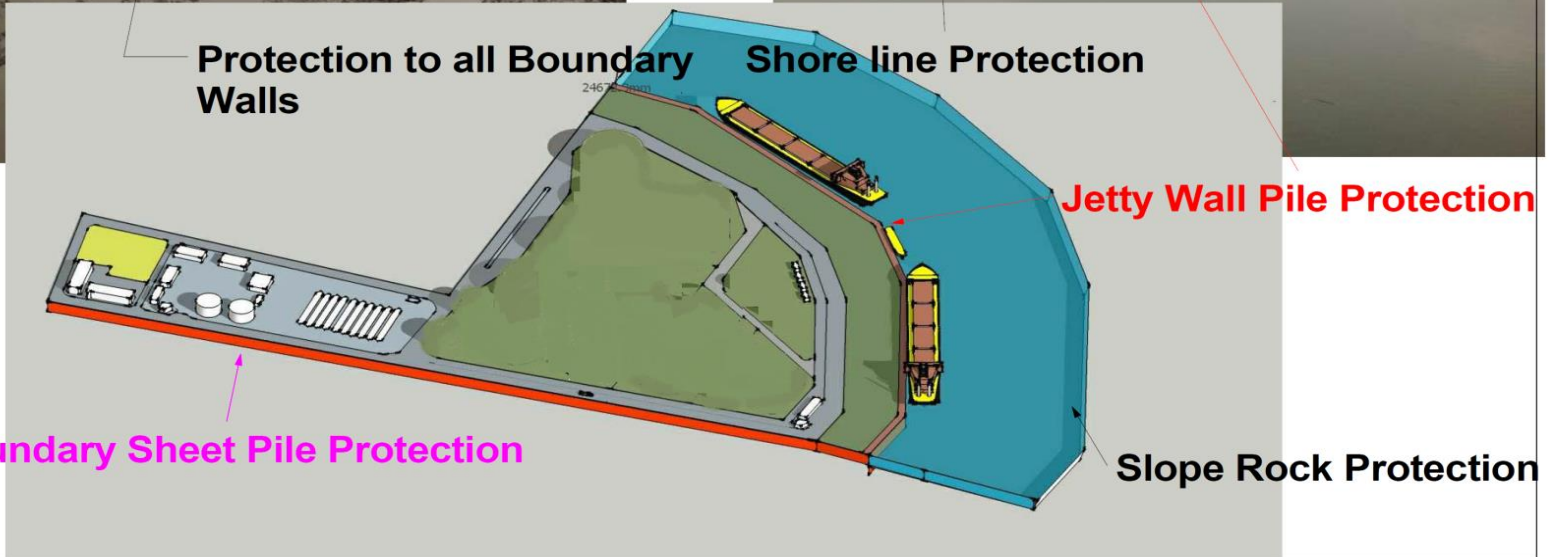
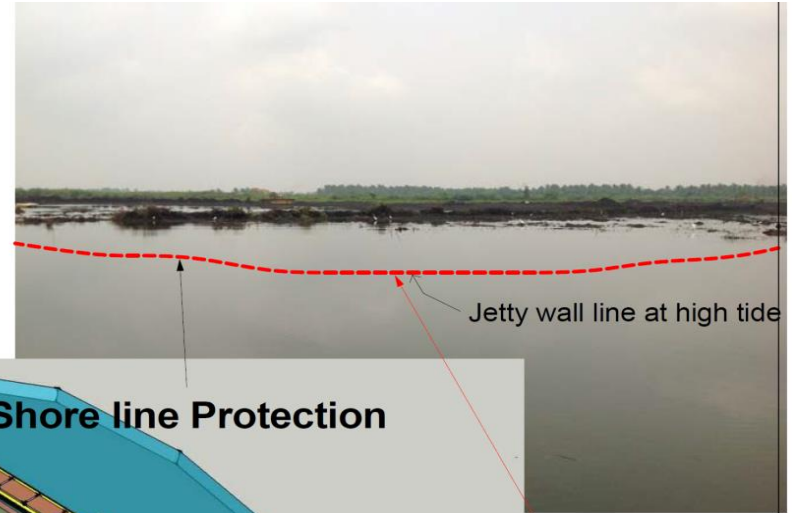


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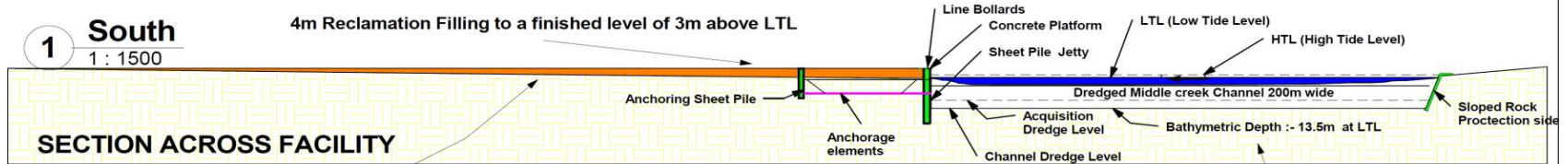


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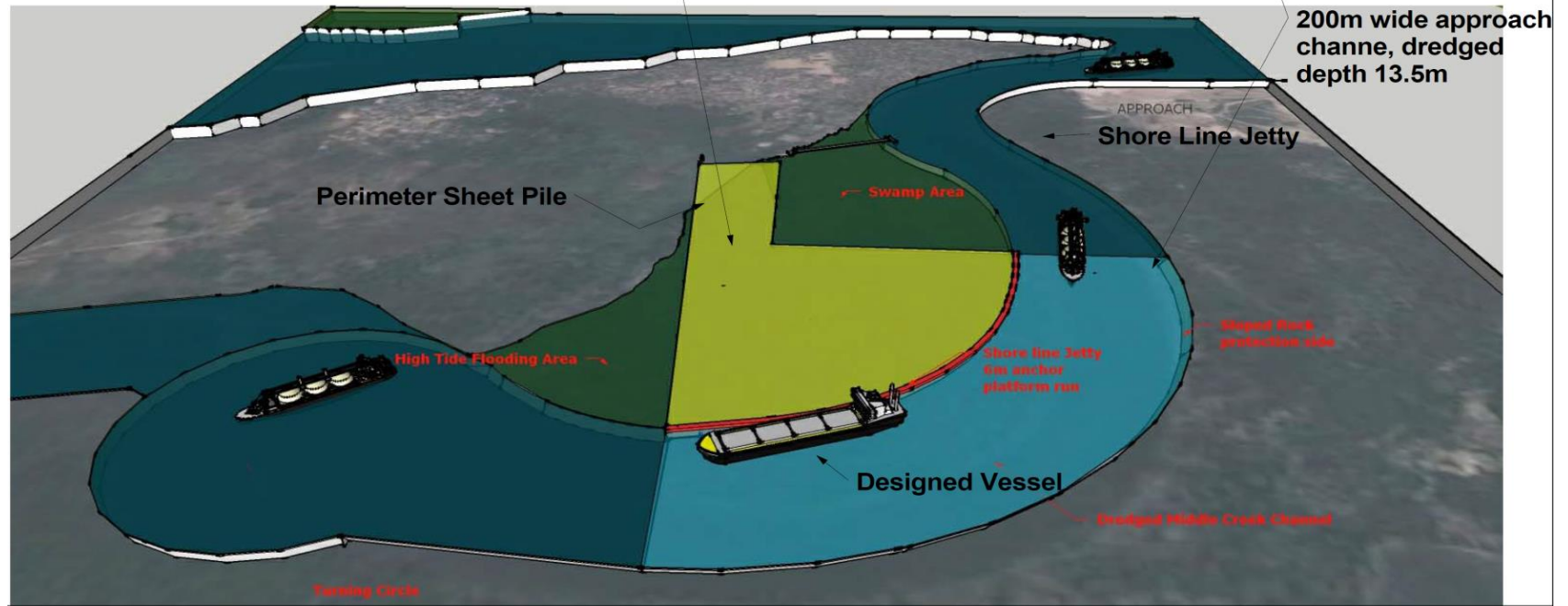
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Reclaimed 19HA. Forestgate Facility



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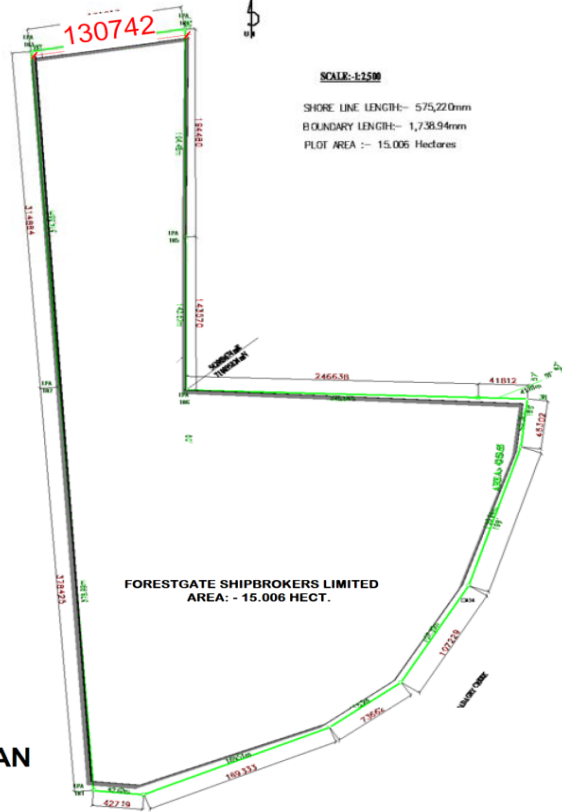
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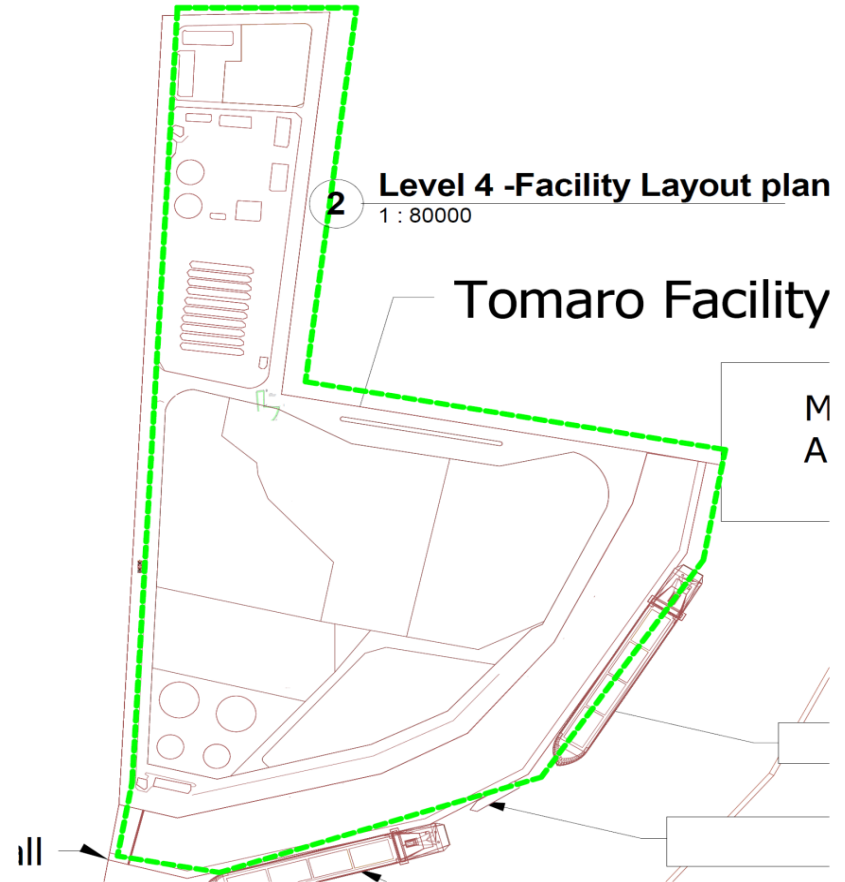
POST RECLAMATION WORKS

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SURVEY PLAN

1 Site
1 : 3500

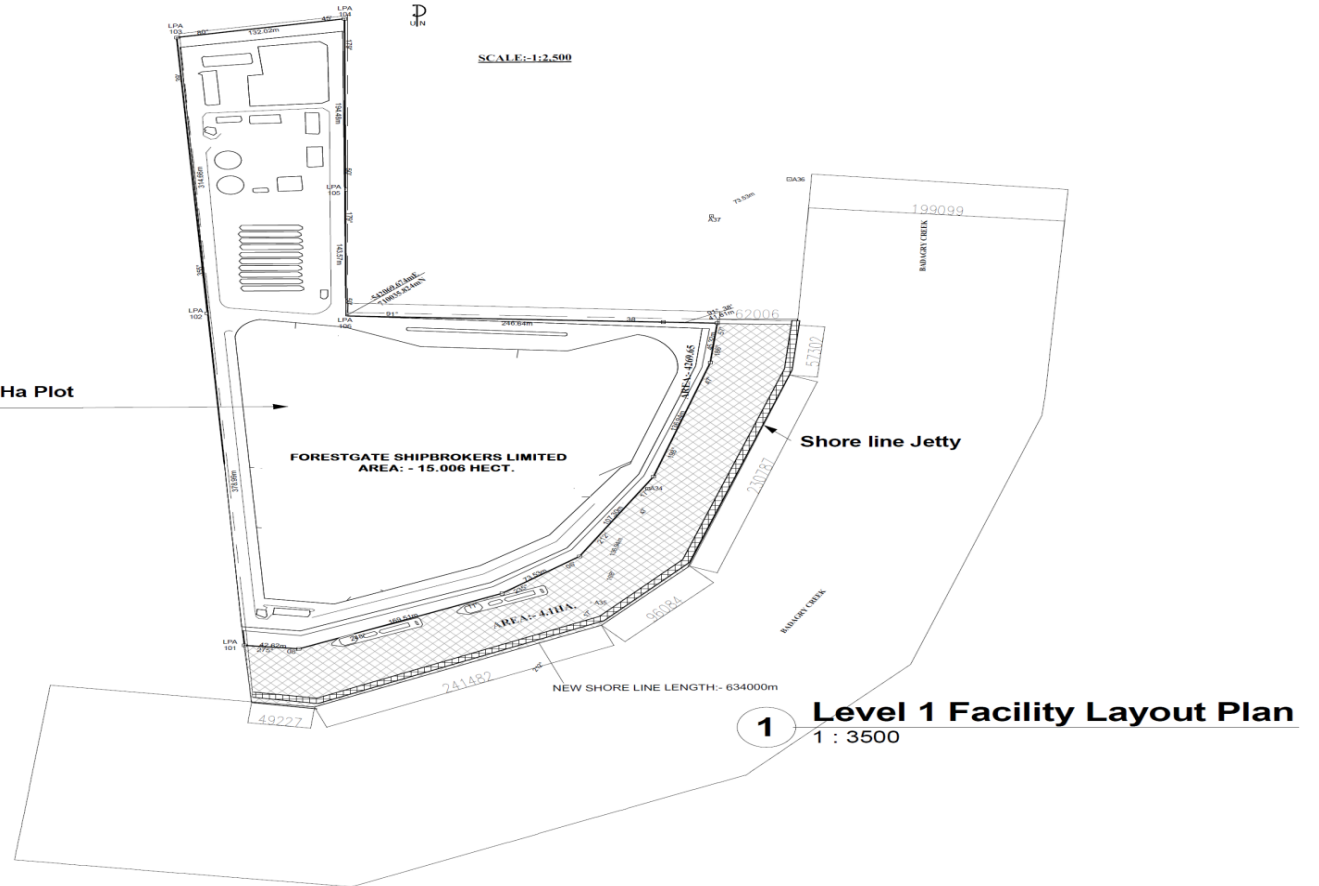


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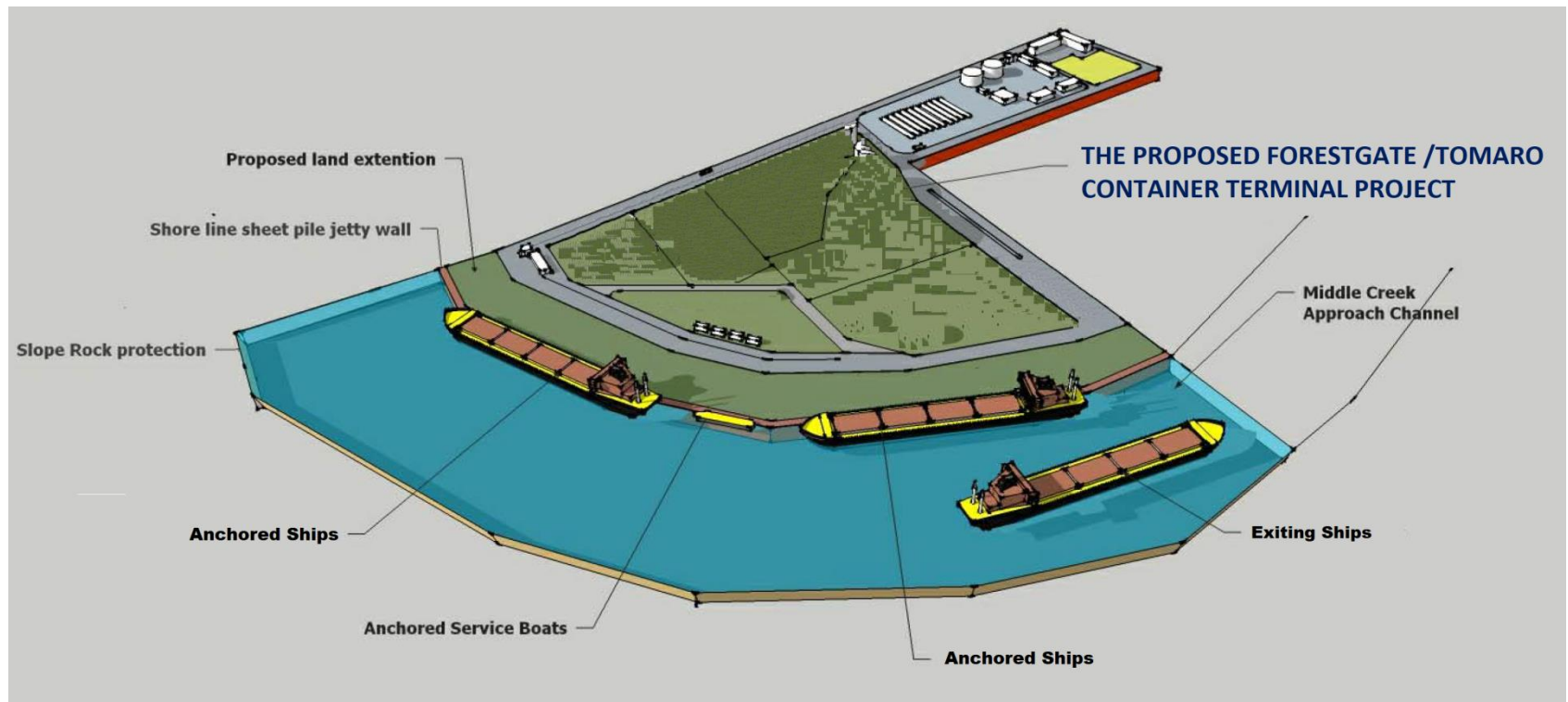
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FORESTGATE – CONTAINER TERMINAL AT TOMARO ISLAND, LAGOS



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CLIENT		
Forestgate Shipbrokers Limited		
Date:	Project number	Scale (@ A3)
Issue Date:	Project Number	
Drawn by: Obaze – Adesiyun	DRAWING NUMBER	REV
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FORESTGATE
SHIPBROKERS
LIMITED



7.0 CONCLUSION

This Preliminary Design and Cost Estimates are based on a land area of 15 hectares. The survey plan available to us is for 15 hectares. It is very important at this stage to resolve the true extent of the property to facilitate the delineation exercise which is key to the reclamation project.

BORAG NIG. LIMITED
9th February 2021