EDS POINT (i): Goa Coastal Zone Management Authority (GCZMA) recommendation
To,

The Director,

CRZ Infrastructure and Building Construction,

Ministry of Environment, Forest and Climate Change,

Government of India,

Paryavarn Bhavan, CGO Complex,

Lodhi Road-New Delhi 110003.

Sub: Recommendation for revised plans of Hotel Construction in the plot bearing Survey No. 159/3 of Calangute Village Bardez, Taluka.

Sir,

The Goa Coastal Zone Management Authority (hereinafter referred to as the ‘GCZMA’ in short) has examined the proposal of M/s. Namesh Hotel, in respect of revised plan of hotel construction in CRZ area bearing Survey No. 159/3 of Calangute Village Bardez, Taluka. The main proposal was earlier approved by the Ministry of Environment, Forests and Climate Change, Government of India.

The entire proposal was discussed in the 139th GCZMA Meeting held on 07/02/2017 and it was decided to refer the said proposal to SEAC/SEIAA. At present the term of Goa SEAC and SEIA have expired. As mandated under the EIA Notification 2006 proposal is required to be submitted to MoEF & CL for appraisal and grant of requisite clearance if SEAC/SEIAA is not constituted. The SEAC/SEIAA is yet to be constituted by the State of Goa pending approval from the Ministry of Environment.

The Goa Coastal Zone Management Authority also noted that the proposal of the project proponent was earlier approved by the Ministry of Environment, Forests & Climate Change vide letter No. J-19011/7/2003-IA-III dated 04/02/2004 in the name of Anthony Fonseca- the predecessor-in interest of Namesh Hotels Pvt. Ltd. Approval was also granted by the Goa Coastal Zone Management Authority (GCZMA) vide its letter No. GCZMA/N/234/05 dated 02/04/2004.
Copy of the proposal received from the project proponent along with the requisite documents are enclosed herewith as Annexure I.

The GCZMA observed that the term of the Goa-SEIAA has expired on 18/12/2016. Since Goa-SEIAA is not reconstituted yet in terms of EIA Notification the proposal and recommendation have to be placed before the MoEF& CC in the matter of grant of CRZ Clearance for revised plans.

This is to further inform that as per the Hotel Policy dated 10/06/2011, para 7 and para 8 shall not apply to the hotel projects approved earlier by the State Government / MoEF/ are in the process of being considered for approval by the MoEF based on the earlier State Government / GCZMA approval.

In view of the above the proposal submitted by the Project Proponent is hereby forwarded to your Office of the Ministry of Environment, Forests & Climate Change, Government of India for final approval.

Yours faithfully,

[Signature]

(Agnelo Fernandes)
Member Secretary (GCZMA)

Encl: As above.

Copy To:
M/s Namesh Hotels Pvt. Ltd.
Through its Proprietor,
Calangute, Bardez-Goa.
EDS POINT (ii): EIA/EMP report
Nameh Hotel & Resort Project at Calangute Goa, requires only CRZ clearance. Built Up Area of the Entire project is 4912.89 Sq.mtrs. Plot area is 14757 sq.mts. It doesn’t attract EIA AND Environmental clearance Hence EIA REPORT is not envisaged.
EDS POINT (iii) : CRZ Map on 1:4000 Scale with clear indication of CRZ-I, CRZ-II, CRZ-III and CRZ-IV and project location superimposed
ANNEXURE III

CRZ MAP
EDS POINT (iv): NOC from State Pollution Control Board
To,
Shri Anthony Fonseca
C/o EFD Consultants
Bldg. No. 5, Sadharth Apts
Tunea, Caranzalem,
 Goa 403002

Ref: Your application for N.O.C of this Board for the proposed Hotel project at Calangute.

Sir,

With reference to your application for N.O.C of this Board for the proposed Beach Resort at survey no. 1593 (Part), Calangute Village, this is to inform you that your application for N.O.C has been cleared in principle. However, you are requested to submit the detailed design calculation of the sewage treatment plant for perusal of this Board.

Yours faithfully,

A.A. Parulekar
Member Secretary
EDS POINT (v): CRZ Map covering 7 KM radius
EDS POINT (vi): HTL/LTL Demarcation report
DEMARCATION OF HIGH TIDE LINE, LOW TIDE LINE AND COASTAL REGULATION ZONE FOR THE PROJECT SITE IN S.No.159 PART 3 OF CALANGUTE VILLAGE, BARDEZ TALUK, NORTH GOA DISTRICT

SPONSORED BY

M/s. NAMEH HOTELS & RESORTS PVT. LTD.
GROUND FLOOR, UNIT NO. 005,
COPIA CORPORATE SUITES
PLOT NO. 9, JASOLA, NEW DELHI - 110 025.

INSTITUTE OF REMOTE SENSING
ANNA UNIVERSITY, CHENNAI-25

FEBRUARY 2016
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Executive Summary

On the request of the M/s Nameh Hotels & Resorts Private Limited, Ground Floor, Unit No. 005, Copia Corporate Suites Plot No. 9, Jasola, New Delhi - 110 025, a survey was carried out to demarcate the High Tide Line (HTL), Low Tide Line (LTL) and Coastal Regulation Zone (CRZ) for the proposed Hotel project of M/s Nameh Hotels & Resorts Private Limited, New Delhi - 110 025 in S.No. 159 Part 3 of Calangute Village, Bardez Taluk, North Goa District, Goa. The satellite imagery of the project area was interpreted for topographic and geomorphic features in the vicinity of the proposed project site. The proposed site falls in the vicinity of Arabian Sea. The proposed project site falls within Calangute Village of Bardez Taluk and falls partly inside CRZ-II as per existing CZMP provided by the client.

The cadastral map of the Calangute Village, provided by the client was used as the Base Map. IRS, an agency authorized by MOEF, Government of India for demarcation of HTL, LTL has conducted required field surveys and measurements for demarcation of CRZ on 4th May 2015. Based on the geomorphology and topography in the vicinity of project area, HTL has been identified and traced in the field by Kinematic GNSS survey. LTL has also been identified based bathymetry and geomorphic conditions of the project area. The HTL, LTL, Ecologically sensitive areas along with setback lines as per CRZ Notification 2011 were superimposed on to georeferenced cadastral map to prepare a local level CRZ map at 1:4,000. The boundary of project site as provided by the client was superimposed on the CRZ map. The coordinates of the HTL in WGS84 system are presented in the Annexure-I along with field photographs in Annexure II. The CRZ map of project area (Annexure –III) is enclosed for reference.
PROJECT TEAM

Technical Members

1. Dr. S.S.Ramakrishnan  ... Project Manager
2. Dr. M.Shanmugam  ... Project Leader
3. Dr. Srinivasa Raju K  ... QC Member
4. Mr. E.Singaravel  ... Team Member
5. Mr. J.Premkumar  ... Project Assistant

Administrative Members

1. Mr. Haridoss  ... Senior Superintendent
2. Mr. Sriram  ... Accounts
3. Mrs. Chitra  ... Office Assistant
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1.0 INTRODUCTION

1.1 Coastal Regulation Zone

The coastal zone is the area of interaction between land and sea. The coastal Zone of Goa has a very high concentration of population along with ecologically sensitive areas like mangroves. There is a spurt of developmental activities arising from huge residential colonies, new industries and tourism centres along the coast and in coastal zone. There is a need to protect the coastal environment while ensuring continuing production and development. This zone is extremely vulnerable and has to be managed judiciously striking a balance between ecological and developmental needs.

Government of India has issued a notification during February 1991 for regulating the developments along the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action. The land between 500 meters from the High Tide Line (HTL) and the Low Tide Line (LTL) is identified as Coastal Regulation Zone (CRZ). The coastal stretches within CRZ are classified into four categories, namely, Category I (CRZ-I), Category II (CRZ-II), Category III (CRZ-III) and Category IV (CRZ-IV). The notification has also laid down regulations to regulate the various activities in the coastal zone. The Ministry of Environment and Forests, Government of India, has approved a set of CRZ maps on 1:25,000 scale prepared from SPOT satellite imagery. On these maps, zones are demarcated as CRZ I, CRZ II and CRZ III, by GCZMA.

Coastal Regulation Zone I includes the zone between High Tide Line and Low Tide Line. It also includes the areas that are ecologically sensitive
and important, such as national parks/marine parks, sanctuaries, reserve forests, wildlife habitats, mangroves, corals/coral reefs, areas close to breeding and spawning grounds of fish and other marine life, areas of outstanding natural beauty/historically/heritage areas, areas rich in genetic diversity, areas likely to be inundated due to rise in sea level consequent upon global warming and such other areas as may be declared by the Central Government or the concerned authorities at the State/Union Territory level from time to time.

CRZ-II covers the areas that have already been developed up to or close to the shoreline. For this purpose, the "developed area" is referred to as that area within the municipal limits or in other legally designated urban areas which are already substantially built up and have been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains. CRZ-III covers the areas that are relatively undisturbed and those which do not belong to either Category-I or II. These include the coastal zone in the rural areas (developed and undeveloped) and also areas within municipal limits or in other legally designated urban areas which are not substantially built up. CRZ-IV refers to the coastal stretches in the Andaman and Nicobar, Lakshadweep and small islands other than those designated as CRZ-I, CRZ-II or CRZ-III.

The Ministry of Environment and Forest in the CRZ Notification, 2011 declared the following areas as CRZ and imposed with effect from the date of the notification the restrictions on the setting up and expansion of industries, operations or processes and the like in the CRZ. The areas that are defined as CRZ as per CRZ Notification, 2011 are

Demarcation of High Tide Line, Low Tide Line and Coastal Regulation Zone for the Project Site in S.No.159 Part 3 of Calangute Village, Bardez Taluk, North Goa District
(i) The land area from High Tide Line (HTL) to 500 mts on the landward side along the sea front.

(ii) CRZ shall apply to the land area between HTL to 100 meters or width of the creek whichever is less on the landward side along the tidal influenced water bodies that are connected to the sea and the distance upto which development along such tidal influenced water bodies is to be regulated shall be governed by the distance upto which the tidal effects are experienced which shall be determined based on salinity concentration of 5 parts per thousand (ppt) measured during the driest period of the year and distance upto which tidal effects are experienced shall be clearly identified and demarcated accordingly in the Coastal Zone Management Plans.

(iii) The land area falling between the hazard line and 500 mts from HTL on the landward side, in case of seafront and between the hazard line and 100 mts line in case of tidal influenced water body the word 'hazard line' denotes the line demarcated by Ministry of Environment and through the Survey of India taking into account tides, waves, sea level rise and shoreline changes.

(iv) Land area between HTL and Low Tide Line (LTL) which will be termed as the intertidal zone.

(v) The water and the bed area between the LTL to the territorial water limit (12 Nm) in case of sea and the water and the bed area between LTL at the bank to the LTL on the opposite side of the bank, of tidal influenced water bodies.

The Classification of the CRZ is also modified for the purpose of conserving and protecting the coastal areas and marine waters as CRZ – I.
CRZ - II, CRZ - III and CRZ - IV. The CRZ - I include the areas that are ecologically sensitive and the geomorphological features which play a role in the maintaining the integrity of the coast like (a) Mangroves (b) Corals and coral reefs and associated biodiversity (c) Sand Dunes (d) Mudflats which are biologically active (e) National parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas (f) Salt Marshes (g) Turtle nesting grounds (h) Horse shoe crabs habitats (i) Sea grass beds (j) Nesting grounds of birds (k) Areas or structures of archaeological importance and heritage sites and the area between Low Tide Line and High Tide Line. The CRZ-II includes areas that have been developed upto or close to the shoreline. The CRZ-III includes areas that are relatively undisturbed and those do not belong to either CRZ-I or II, which include coastal zone in the rural areas (developed and undeveloped) and also areas within municipal limits or in other legally designated urban areas, which are not substantially built up. The CRZ-IV includes the water area from the Low Tide Line to twelve nautical miles on the seaward side and the water area of the tidal influenced water body from the mouth of the water body at the sea upto the influence of tide which is measured as five parts per thousand during the driest season of the year.

The Ministry of Environment and Forest has also provided guidelines for demarcation of High Tide Line in the CRZ Notification, 2011. As per the guidelines, Cadastral (village) maps in 1:3960 or the nearest scale shall be used as the base maps. HTL and LTL will be demarcated in the cadastral map based on detailed physical verification using coastal geomorphological signatures or features in accordance with the CZM Maps approved by the
Central Government. 500metre and 200metre lines shall be demarcated with respect to the HTL.

In order to facilitate classification of Coastal Regulation Zones Government of India has approved few agencies/institutions across the Country vide Jr. No. J17011/8/92-1A III, dated 10.05.1999 of Ministry of Environment and Forests. Institute of Remote Sensing, Anna University being one of them, has been carrying out HTL and LTL mapping following the guidelines issued by Ministry of Environment & Forests, Government of India.

1.2 BACKGROUND

M/s Nameh Hotels & Resorts Private Limited, Ground Floor, Unit No. 005, Copia Corporate Suites Plot No. 9, Jasola, New Delhi - 110 025 has requested Institute of Remote Sensing, Anna University to demarcate HTL, LTL and CRZ for the Sea/Bay/tidal influenced water bodies and ecologically sensitive areas on 1:4,000 scale in the vicinity of their proposed hotel project in Calangute Village. The proposed project site has proximity to the Arabian Sea. It is in this context, the proposed site needs to be evaluated to assess whether the proposed site is falls under regulations of CRZ Notification, 2011. Hence IRS has taken up a ground verification survey for demarcation of HTL, LTL and ecologically sensitive areas for preparation of local level CRZ Map.

1.3 OBJECTIVES

The objective of the present study is to examine the project site in Calangute Village of Bardez Taluk with reference to CRZ Notification, 2011. Keeping in view of the requirements of notification, Institute of Remote
Sensing, Anna University under took the project with following agreed scope of work:

- Demarcation of HTL for the Arabian Sea near project site by conducting field survey using DGPS survey.
- Demarcation of ecologically sensitive entities such as Mangroves, Sand dunes, Turtle breeding grounds in the vicinity of project site
- Superimposition of HTL, Ecologically Sensitive Areas along with project site on to the georeferenced cadastral map
- Demarcation of Coastal Regulation Zone by mapping 100m, 200m, 500m setback lines from High Tide Line for Arabian Sea in the neighbourhood of project site.

1.4 EQUIPMENTS AND DATA PRODUCTS

The field verification of HTL, LTL, Ecologically Sensitive Areas and tidal influence in water bodies is carried out using advanced accurate survey and insitu measurements instruments like GNSS, Total Station, and Salinity Meter. The data products used for demarcation includes Satellite Imagery, Survey of India topographic maps, NHO Navigation Charts, Bathymetric data, Tide Tables, approved CZMP. For demarcation of High Tide Line during field verification of Coastal Geomorphology and Topography, dual frequency GNSS receivers were used in Kinematic Mode. Trimble R5 GNSS receivers were used to determine the position of HTL reference.
points with high accuracy. The specification of R5 receiver used for survey is described below.

- **Hardware and Technology used**
  - Trimble R-Track technology
  - Advanced Trimble Maxwell Custom Survey GNSS Chip
  - High precision multiple correlator for GNSS pseudorange measurements
  - Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
  - Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
  - Signal-to-Noise ratios reported in dB-Hz

- **No. of Channels : 72 Channels**

- **Tracking Frequencies:**
  - GPS L1 C/A Code, L2C, L1/L2 Full Cycle Carrier
  - GLONASS L1 C/A Code, L1 P Code, L2 P Code, L1/L2 Full Cycle Carrier
  - 4 SBAS WAAS/EGNOS Channels

- **Accuracy in High Precision Static GNSS Surveying**
  - Horizontal Accuracy is 3 mm + 0.1 ppm RMS
  - Vertical Accuracy is 3.5 mm + 0.4 ppm RMS

- **Accuracy in High Precision Static GNSS Surveying**
  - Horizontal Accuracy is 8 mm + 1 ppm RMS
  - Vertical Accuracy is 15 mm + 1 ppm RMS

Salinity in the tidal influenced water bodies is verified using insitu measurements of salinity with a salinity meter. As per CRZ Notification, 2011 the HTL shall extend in tidal influenced water bodies till the salinity a concentration of 5 parts per thousand. Hence salinity meter is used to assess
tidal influence during High Tide in the water bodies along with geomorphology and vegetation signatures near the study area.

The IRS P6 satellite images of the study area along with other satellite images from web based sources were used for reconnaissance and geomorphology mapping of the study area. The LISS-IV camera in IRS P6 is a high resolution multi-spectral camera operating in three spectral bands (B2, B3, B4). In the multi-spectral mode (Mx), a swath of 23 Km is covered in three bands. The LISS-IV camera can be tilted in the across track direction thereby providing a revisit period of 5 days.

Tide Tables are published by Survey of India, Government of India with Prediction of tides at 44 ports including 14 foreign ports every year. 19 years tide tables were used along with Navigation Charts from NHO, Dehradun for finding Lowest Low Tide and Highest High Tide.

Bathymetry data from Navigation Charts published by NHO, Dehradun along with bathymetric data provided by the client are used for determination of LTL in the vicinity of project.

CZMP prepared as per CRZ Notification 1991 and approved by MOEF, New Delhi were collected from the client/authority and used as reference and comparison of HTL demarcated through GNSS Survey.

1.7 Methodology

The village map of Kalangute Village provided by the client has been used as the base map. The Geomorphology of the Coastal Zone has been studied from the temporal medium resolution satellite data. In order to prepare the local level map on 1:4,000 scale, the site has been inspected by IRS Scientists. Based on the geomorphic units, the high tide line has been
identified in the field and traced by field survey using GNSS. The tide level observations were collected from the Tide Tables and were interpolated for Marmagao Port, which is the nearest port to the site. The highest high tide level and lowest low tide level for the past 19 years was determined from these tide tables.

As per the definition of high tide line, “The High Tide Line means the line on the land up to which the highest water line reaches during the spring tide”. There is a clear boundary between the areal spread of mudflats and vegetation usually very much apparent. This boundary line coincides with the HTL line interpreted from the satellite imagery. On the other hand LTL is defined as the seaward limit to which the waves recede during low tide.

In case of inland waters such as creeks and backwaters, the ICRZ guidelines indicates that the development along rivers, creeks, creek lets and backwaters has to be regulated up to a distance where the tidal effects are experienced which has to be determined based on salinity concentration of 5 parts per thousand (ppt).

1.8 GNSS Surveying

The Trimble R5 GNSS receivers were used to conduct the surveying at the project site. The survey involves three components namely, 1. Establishing Base Station, 2. Control Survey for Village Maps and 3. Real Time Kinematic Survey for HTL Demarcation.

1.8.1 Establishing Base Station

The survey involves establishing one base station for Static Survey. The base stations were identified on stable locations with clear view of sky for uninterrupted access to GNSS satellite signals. The control point with known
elevation was used as initial reference station. The base station for the project site was established on firm ground and observed with static GNSS survey from the known coordinates of the control point. The observations times were fixed based on the length of base lines to obtain highest possible accuracies.

1.8.2 Static Survey

The conduct of Static Survey using GNSS requires two GNSS receivers, one to be setup over the control point (with known co-ordinate) and another one over a reference station whose coordinates and distance from the control point are to be determined. Both these receivers must record data simultaneously. These known co-ordinates of the control point were fed and fixed for processing of the logged data to accurately determine the co-ordinates of the base stations.

1.8.3 Control Survey for Georeferencing Village Maps

The cadastral map pertaining to the project site was provided by the client. The hard copy cadastral map was scanned and georeferenced with the help of GNSS coordinates of boundary points provided by the client and used for the preparation of local level HTL Maps.

1.8.4 Real Kinematic Survey for HTL Demarcation

Kinematic Surveying enables a very rapid survey of a number of base lines in areas where there is good satellite visibility. At least, two GNSS receivers are required to perform a kinematic survey. One receiver is designated as the reference receiver and is set up over the Base Station. All baselines are measured relative to this station. The other receivers, called rovers, are moved in succession to trace and record the HTL on ground through ground profiling.
1.8.5 Demarcation of HTL

Surrogate data such as Coastal Geomorphologic features identified from the satellite imagery, indicators available on the ground and Tidal data obtained from Marmagoa were used to verify the HTL demarcated by Kinematic Survey. In case of tidal influenced water bodies like creeks, rivers, estuaries the extent of tidal influence in the creeklet/stream is assessed by in-situ measurements of salinity and vegetation. As per CRZ Notification, 2011 the CRZ will extend till the location along the creek/stream at which the salinity is observed as 5 PPT.
2.0 STUDY AREA

2.1 Description of Study Area

The project site is located in S.No.159 Part 3 of Calangute Village, Bardez Taluk, North Goa District, Goa. The aforesaid site falls adjacent to Arabian Sea. Residential and Recreational developments are predominant in the vicinity of project site. The site is vacant with a nallah passing near the project site. The field photographs of project area is enclosed Annexure II.

2.2 Status as per Approved CZMP

The project site falls within 500m from High Tide Line of Arabian Sea as per Approved CZMP. The project site falls within CRZ II as per CZMP map approved by MOEF, Government of India, New Delhi.

2.3 Field Verification Survey

The HTL was demarcated by physical survey in the study area as per the guidelines provided by CRZ Notification, 2011 issued by MOEF&CC, New Delhi. The position of HTL associated with wave runup at Highest High Tide and geomorphic and topographic features such as ground elevation, Permanent terrestrial vegetation were considered for field verification of HTL. In addition, geomorphic features such as mudflats, mangroves were used to demarcate HTL. Protection structures such as embankment, bunds, revetments existing in 2011 also used to demarcate HTL. LTL is also verified based on geomorphology and bathymetric details available.
3.0 RESULTS AND CONCLUSIONS

3.1 Results

The observed baselines of GNSS receivers were processed using TBC software to derive the coordinates of HTL reference points, ground control points for Georeferencing of satellite imagery and cadastral maps. The ground control points were used to georeference cadastral map of Calangute Village. The HTL for Arabian Sea was superimposed on to georeferenced cadastral map along with ecologically sensitive areas if any. 100m, 200m and 500m set back lines from HTL for Arabian Sea were generated and superimposed on to map to prepare local level CRZ map at 1:4,000. The processed HTL coordinates in WGS 84 system are presented at Annexure I. The CRZ Map of project site is presented below for reference.

3.2 Conclusions

- CRZ shall be applied for the land/site within the 500m buffer zone from HTL for Sea as per Para (i) of CRZ Notification 2011 of MOEF vide S.O. 19(E), dated 06.01.2011. In this case, the project site in S.No.159 Part 3 of Calangute Village, Bardez Taluk, North Goa District falls entirely within 500m.
ANNEXURE I

COORDINATES OF HTL REFERENCE POINTS

Reference System: WGS 84 Datum

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<th>Point No</th>
<th>Latitude</th>
<th>Longitude</th>
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<td>1</td>
<td>15° 32' 34.630&quot; N</td>
<td>73° 45' 20.972&quot; E</td>
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<td>2</td>
<td>15° 32' 25.765&quot; N</td>
<td>73° 45' 23.984&quot; E</td>
</tr>
<tr>
<td>3</td>
<td>15° 32' 18.857&quot; N</td>
<td>73° 45' 25.787&quot; E</td>
</tr>
<tr>
<td>4</td>
<td>15° 32' 11.235&quot; N</td>
<td>73° 45' 27.595&quot; E</td>
</tr>
<tr>
<td>5</td>
<td>15° 32' 03.863&quot; N</td>
<td>73° 45' 29.842&quot; E</td>
</tr>
</tbody>
</table>

DIRECTOR, IRS

Director
Institute of Remote Sensing
Anna University,
Chennai - 600 025.
ANNEXURE II

FIELD PHOTOGRAPHS

Project site for proposed Resort Development

Beach adjacent to proposed Project Site