

**DEMARCATION OF HIGH TIDE LINE, LOW TIDE LINE AND
PREPARATION OF COASTAL LANDUSE MAP FOR THE
PROPOSED DESALINATION PLANT IN NEMMELI VILLAGE,
CHENGALPATTU TALUK, KANCHEEPURAM DISTRICT,
TAMILNADU**

SPONSORED BY

**M/s AECOM INDIA PRIVATE LIMITED
Building No. 10
DLF Cyber City, DLF Phase-II
Gurgaon, Haryana, India**



**INSTITUTE OF REMOTE SENSING
ANNA UNIVERSITY, CHENNAI-25**

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ABSTRACT

At the request of the M/s AECOM India Private Limited, Gurgaon, Haryana, India a survey was carried out to demarcate the High Tide Line (HTL), Low Tide Line (LTL) and Preparation of Coastal Landuse Map for 7Km radius around proposed desalination plant in survey no. 208 Part of Nemmeli Village, Chengalpattu Taluk, Kancheepuram District of Tamil Nadu. The satellite data of the study area were interpreted for landuse and geomorphic features. A landuse map for an area of 7 Km radius around proposed desalination plant was prepared at 1:25,000. The proposed site has predominantly flat topography. Bay of Bengal lies along eastern boundary and Buckingham canal runs away from western boundary of site. The cadastral map of the Nemmeli Village provided by Survey and Land Records was used as the Base Map. Based on the topography, HTL, LTL has been identified and traced in the field by Kinematic GPS survey. The HTL, LTL was superimposed on to georeferenced cadastral map to prepare a local level HTL map. 200m, 500m buffer lines for HTL of Bay of Bengal and 100m buffer, buffer for creek width for HTL of creek were drawn in the vicinity of project site. The proposed project boundary as provided by the client were superimposed on to local level HTL map and enclosed. The spherical co-ordinates of the High Tide Line in WGS84 system are presented in the Annexure.

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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 500mts from HTL on the landward side, in case of seafront and between the hazard line and 100mts 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

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1. INTRODUCTION

The coastal zone is the area of interaction between land and sea. The coastal Zone in Tamil Nadu has a very high concentration of population along with ecologically sensitive areas like mangroves, fish culture zones. There is a spurt of developmental activities arising from 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.

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

- (i) The land area from High Tide Line (HTL) to 500mts 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

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 Lr. 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 and Forests, Government of India.

2. BACKGROUND OF THE STUDY

M/s M/s AECOM India Private Limited, Gurgaon, Haryana has requested Institute of Remote Sensing, Anna University for demarcation of HTL, LTL and landuse map for an area with 7Km radius around proposed desalination plant in Nemmeli Village, Chengalpattu Taluk, Kancheepuram District. The Project site is located near Bay of Bengal and Buckingham canal which carry tidal water; hence this study was carried out to demarcate the HTL for Bay of Bengal and Buckingham canal in the vicinity of the project site.

3. STUDY AREA AND EXTENT

The site falls inside the Coastal Regulation Zone of Bay of Bengal in Nemmeli Village. The project area is covered in survey no. 208 of Nemmeli Village, Chengalpattu Taluk, Kancheepuram District. The study area has flat topography with vegetation. The project site lies between East Coast Road and Bay of Bengal.

4. NEED FOR THE STUDY

The proposed site has proximity to Bay of Bengal and Buckingham Canal. It is in this context, the proposed site needs to be evaluated to assess whether the proposed project site is affected under provisions of CRZ Notification, 2011. The objective of the present study is to examine the site with reference to Coastal Regulation Zone 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:

- To demarcate HTL for Bay of Bengal and Buckingham Canal within the vicinity of proposed site as per the procedures defined by Ministry of Environment and Forest, Government of India
- To demarcate 200m, 500m buffer lines from HTL for Bay of Bengal 100m buffer line from HTL for Buckingham Canal and Creeks for identification of Coastal Regulation Zone as per the provisions of CRZ Notification, 2011

5. DEMARCATON OF HTL ON THE LOCAL LEVEL MAP

5.1 Methodology adopted

The cadastral map of Nemmeli Village 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 1:5,000 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.

The tide level observations were collected from the Tide Tables. 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.

In case of inland waters such as creeks and backwaters, the CRZ guidelines indicates that the development along rivers, creeks 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). Insitu observations of the salinity were used to delineate the HTL for backwaters.

Landuse features were also interpreted from Satellite Imagery as per the guidelines provided by National Remote Sensing Agency, Hyderabad covering an area of 7Km around proposed desalination plant.

6. GPS SURVEYING

The Trimble 5700 and 4000 SSE (Geodetic Surveyor Series) GPS 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.

6.1 Establishing Base Station

The survey involves establishing one base station for each project site using Static Survey. The base stations were identified on stable locations with clear view of sky for uninterrupted access to GPS satellite signals. The control point with known elevation was used as initial reference station. The base station for the project site was established on a culvert and observed with static GPS 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.

6.2 Static Survey

The conduct of Static Survey using GPS requires two GPS

receivers, one to be setup over the control point (with known co-

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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.

6.3 Control Survey for Georeferencing Village Maps

The village map pertaining to the project sites provided by the client were obtained from Tamilnadu Survey and Land Records Office. These hard copy village map were scanned and need to be georeferenced for the preparation of local level HTL Maps. In order to georeference these village maps, control points (village bi-junction and tri-junction points) are acquired from the field.

The control points were acquired using Static Survey with Trimble 5700 receivers. Required numbers of control points were obtained and the village maps were georeferenced in WGS 84 datum using the control points for mapping purposes.

6.4 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 GPS 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.

7. DEMARCATON OF HTL

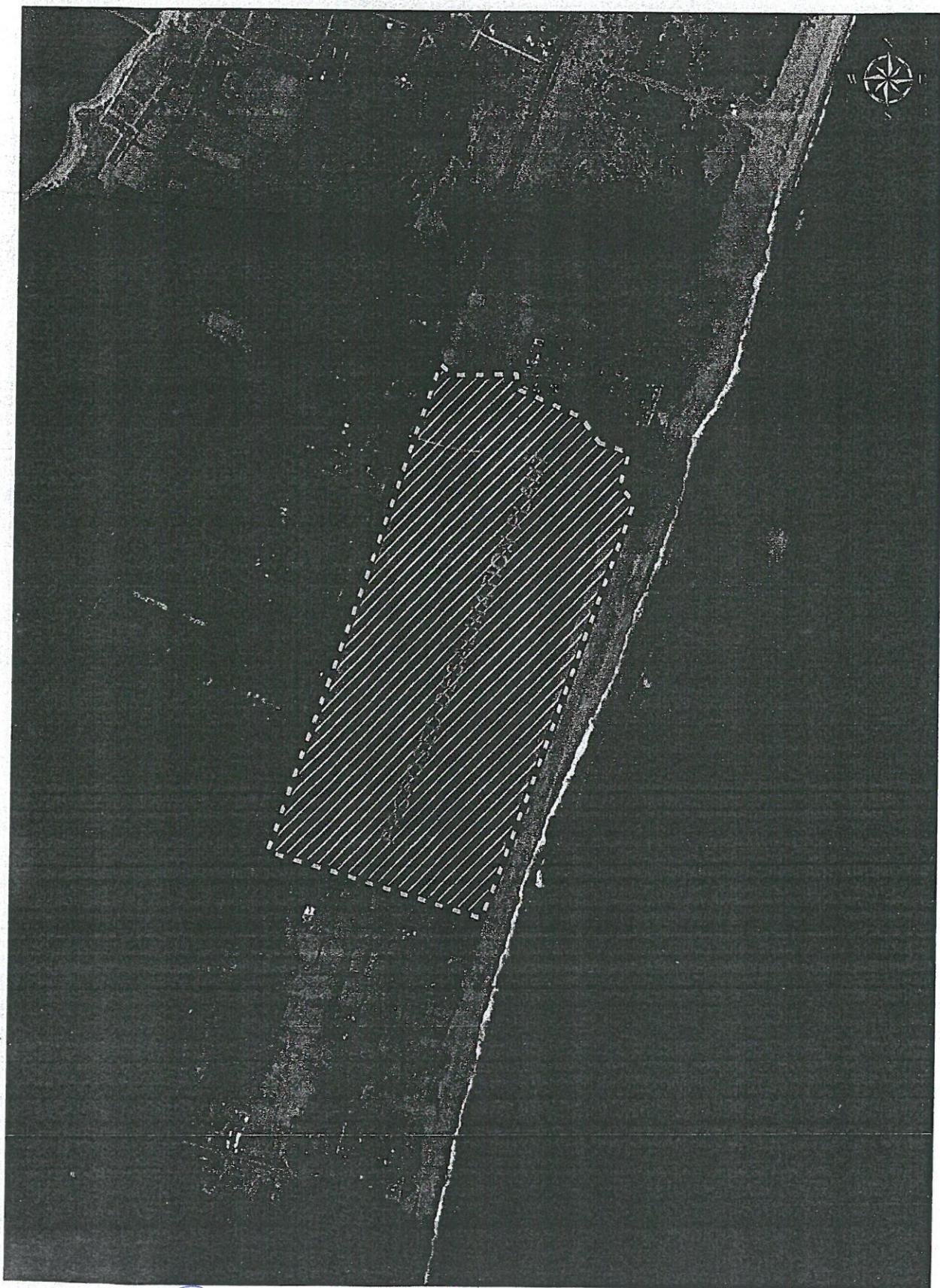
Surrogate data such as Coastal Geomorphologic features identified from the satellite imagery, indicators available on the ground and Tidal data obtained from Survey of India were used to verify the HTL demarcated by Kinematic Survey. Kinematic GPS receivers used for determination of High Tide Line on the ground was integrated with base station observations to result in baselines.

8. OUTPUT

The observed baselines were processed using TGO software. The same were plotted at large scale using the ArcGIS 9.3 software and the same was superimposed in the georeferenced cadastral map. In the cadastral map of 1:4,000 scale, the HTL for Bay of Bengal and Buckingham Canal, Creeks and buffer lines for 200m and 500m from HTL for Bay of Bengal, 100m from HTL for Buckingham Canal, Creeks are marked (Map enclosed). A landuse map at 1:25,000 was prepared with standard colour codes defined by NRSC, Hyderabad (Map Enclosed). The processed HTL co-ordinates in WGS 84 system are presented in annexure. The satellite imagery of project site is presented below for reference.

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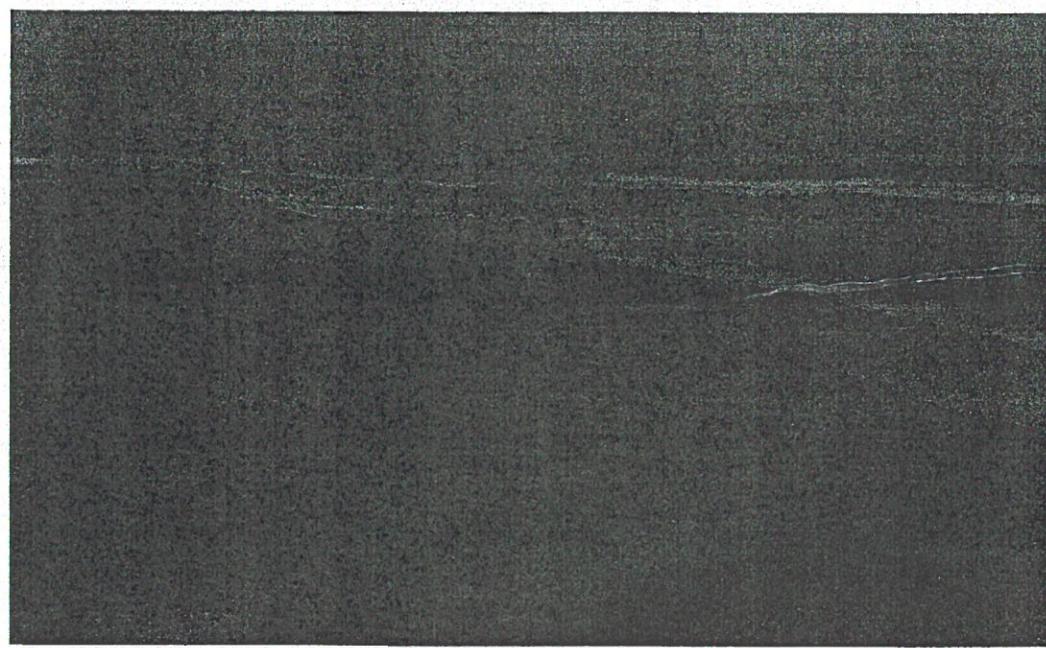


Photo 1 Beach South of Proposed Desalination Project

REDACTED



Photo 2 Eroded and Accreted coast near existing desalination plant


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ANNEXURE I

**DEMARCATION OF HIGH TIDE LINE, LOW TIDE LINE AND
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COORDINATES OF HTL POINTS

Point No	Latitude	Longitude
C1310	12° 42' 14.826" N	80° 13' 00.927" E
C1311	12° 42' 15.689" N	80° 12' 56.098" E
C1312	12° 42' 21.644" N	80° 12' 52.881" E
C1317	12° 42' 49.466" N	80° 12' 53.089" E
C1318	12° 42' 53.120" N	80° 12' 56.922" E
C1319	12° 42' 54.778" N	80° 13' 01.252" E
C1320	12° 43' 01.566" N	80° 13' 04.404" E
C1321	12° 43' 05.745" N	80° 13' 07.766" E
C1322	12° 43' 10.694" N	80° 13' 12.355" E
C1323	12° 43' 13.307" N	80° 13' 13.017" E
C1324	12° 43' 16.854" N	80° 13' 17.923" E
C1325	12° 43' 20.260" N	80° 13' 19.790" E
C1427	12° 43' 08.912" N	80° 13' 56.280" E
C1428	12° 43' 07.614" N	80° 13' 56.274" E
C1429	12° 43' 00.635" N	80° 13' 53.292" E
C1430	12° 42' 59.214" N	80° 13' 52.903" E
H138	12° 43' 19.891" N	80° 14' 02.531" E
H139	12° 43' 14.205" N	80° 14' 00.214" E
H140	12° 43' 09.387" N	80° 13' 58.251" E
H141	12° 43' 07.464" N	80° 13' 57.471" E
H142A	12° 43' 03.652" N	80° 13' 56.148" E
H143A	12° 43' 00.348" N	80° 13' 54.897" E
H144A	12° 42' 58.191" N	80° 13' 53.841" E
H145A	12° 42' 51.975" N	80° 13' 50.910" E
H146A	12° 42' 46.701" N	80° 13' 48.701" E
H147A	12° 42' 43.759" N	80° 13' 47.488" E
H148A	12° 42' 38.211" N	80° 13' 44.751" E
H149A	12° 42' 33.935" N	80° 13' 43.235" E
H149B	12° 42' 31.025" N	80° 13' 43.665" E
H150	12° 42' 26.101" N	80° 13' 42.268" E
H151	12° 42' 21.049" N	80° 13' 40.141" E
H152	12° 42' 17.800" N	80° 13' 39.750" E
H153	12° 42' 15.877" N	80° 13' 38.646" E

M. S. Murthy
DIRECTOR, IRS
 Director
 Institute of Remote Sensing
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27 March 2014

The Chief Engineer, PMC, RRWS, & FMP (Nagaur),
PHED, Qtr. No. AW 1/1, PHED Colony,
Vaishali Nagar, Ajmer-305004,
Rajasthan, India.

Sub. : Project undertaken by AECOM Asia Company Limited.

Project Name : Project Monitoring and Supervision Consultants for Rajasthan Rural Water Supply and Fluorosis Mitigation Project (Nagaur)

Dear Sir,

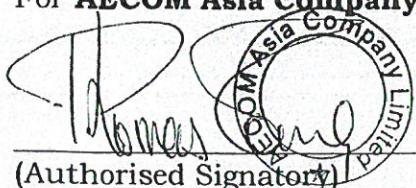
This has reference to the above project. We hereby submit that AECOM Asia Company Limited is registered in Hong Kong. Its registered office address is 8/F, Grand Central Plaza, Tower 2, Grand Shatin Rural Committee Road, Shatin, N.T. Hong Kong. The Company is doing the above project in Nagaur, Rajasthan (India) from its registered branch office in India at 9th Floor, Infinity Tower C, DLF Cyber City, DLF Phase II, Gurgaon-122002. The Company's Gurgaon office will deploy its staff, makes all expenditures for the execution of the Project and will receive all its payment in Indian component and Foreign component in its Current Account No. 054-393244-002 maintained in Indian currency with The Hongkong & Shanghai Banking Corporation Ltd., JMD Regent Square, DLF Phase II, Mehrauli-Gurgaon Road, Gurgaon-122002 branch in Haryana (India).

This is for your information and records.

Thanking you,

Yours sincerely,

For **AECOM Asia Company Limited**


(Authorised Signatory)

Registered Office in HK: 8/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin N.T. Hong Kong


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Annexure-6

LFP & Offshore Co-ordinates for Intake & Outfall Pipe

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