BEFORE THE NATIONAL GREEN TRIBUNAL SOUTH ZONE AT CHENNAI

MEMORANDUM OF APPLICATION

(Under Sections 14 read with 18(1) of the National Green Tribunal Act, 2010)

Application No. 67 of 2022

Kumaresan .. Applicant

Vs

Tantrasnco & ors .. Respondents

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Through

A. Yogeshwaran

Counsel for the Applicants

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MEMORANDUM OF APPLICATION

(Under Sections 14 read with 18(1) of the National Green Tribunal Act, 2010)

Application No. 67 & 93 of 2022

MEMO FILED ON BEHALF OF THE APPLICANTS

The applicants submit as follows:

1. Despite the fact that in OA 76 of 2022, notice was issued by this Hon'ble Tribunal on 31.05.2022, TANTRANSCO ("PP") has only now filed a counter affidavit dated 08.10.2022, which was served on the counsel this morning around 10.30 am. The portal was checked over the weekend and no reply was found uploaded.
2. The filing of the counter affidavit on the date the matter is listed for hearing is only an attempt to delay the matter further. However, despite paucity of time, the present memo is filed in response to the counter affidavit filed by TANTRANSCO.
3. The contents of para 1-4 are not germane to the present issue. In para 5 (h) a tabulation of the status of the project has been provided.
4. The contention in para i-k that roads and infrastructure are removed as and when the tower is erected is false. The roads laid and debris dumped have not been cleared from any of the locations. Photographs and google earth imagery are produced as part of this memo. In OA No. 67 of 2022 (SZ), page number 115 shows a map of the sample of encroached segments with photos, the non removal of construction debris- 'the temporary roads'. The pictures in Page number 207, 210, 211, 212, 213, 215 and 216 shows the non- removal of construction debris.

5. In so far as L is concerned, it has been contented that no mangroves have been destroyed till date for this project. This assertion is false. Photographs and google earth imageries are filed. In fact, illegally, towers have been laid in CRZ I A areas where none were permitted. Detailed tabulation with GPS coordinates and maps are provided below. The statement in the clearance (made by the PP) regarding replantation of mangroves is not in the context of all towers but those listed under (ix) at page 3 of the clearance. However, the PP has stated that no mangroves have been disturbed till date and this assertion is false.
6. In M, PP appears to be aware that deviation from the alignment is a clear violation of permissions and has asserted that no such deviation has taken place. This assertion is untrue as can be seen from the following submissions and evidence already produced.
7. The other assertions in the memo pertain to the PP's vehement contention that they have not deviated from the alignment approved and that they are aware that deviation is a serious violation, which has been dealt with above. The PP has not responded to several other contentions raised in the OAs. The applicant reserves the right to respond to the counter affidavit.

Groundtruthing of CRZ violations of TANTRANSCO

Methodology

Understanding of difference in Appearance of 765kV and 400kV towers:

8. The line drawings of tower structures in the EIA of TANTRANSCO was referred to understand the difference in appearance between 765kV and 400kV towers. The drawings in the EIA were not corresponding to the current project of transmission lines. However, other transmission line projects' drawings marked as 765kV(types: DBS, DCS, DDS) and

400kV(types: DA, DB, DC, DD, QB, QC and QD) towers were used as reference to infer the difference in their appearance. The difference in appearance is as follows:

9. **Appearance of 765kV Tower**

765kV towers have 3 cross arms and V shaped peak (top structure)

10. **Appearance of 400kV Tower**

400kV towers have 3 cross arms and flat shaped peak

Data Collection:

11. GPS co-ordinates of the towers on- ground were taken using GPS Essentials app by walking at the centre point beneath the towers. At instances wherein, the towers were not accessible (within watebodies / between vegetation) , a nearby GPS point was taken for reference and the exact centre point was marked using Google Earth satellite imagery.

12. **Comparison of Approved location and on- ground location of towers:**

- GPS co-ordinates collected from ground truthing were superimposed on the map submitted by TANTRANSCO for CRZ Clearance.
- When any deviation in location of the on- ground tower GPS co-ordinates from that of the approved location was encountered, its respective CRZ classification was noted.
- A fully constructed tower until its peak(top structure) was only noted for comparison as otherwise it is not possible to differentiate whether it is 765/400 kV tower.
- When even one leg of the transmission tower is in CRZ classification IA(mangrove buffer area), it was considered to be in CRZ IA area as no 765/400 kV towers were permitted in CRZ IA area at all.
- The number of towers in deviation of the approved locations and its respective co-ordinates and CRZ classification were noted against the approved number of towers and CRZ classification.
- The site locations leading from ETPS to NCPS has not groundtruthed yet and are not part of the submissions below. However, the egregious violations committed are clear from the following facts.

Findings
Extract from CRZ Clearance dated - 01/11/2019

13. **Table showing total number of approved 765 kV towers -**

(b) The total length of 765 kV transmission line is 31,673.78 m out of which 22,597.75 m is proposed under CRZ area. The details are given below:

S.No.	Description	CRZ-Classification	Length in Meter (m)	No. of Towers
1	Proposed 765 KV Transmission Line	CRZ-I A	2,591.83	-
2		CRZ-I B	220.66	1
3		CRZ-II	974.97	7
4		CRZ-IV B	858.90	5
	Total	CRZ Area (A)	4646.36	13
5		Non- CRZ Area (B)	2,748.24	10
		Grand Total (A+B)	**7,394.60**	**23**

Please see TANTRANSCO CRZ Clearance dt/01/11/2019

14. Findings from Ground Truthing of 765 kV towers-

CRZ Classification	**Number of 765kV Transmission Towers in CRZ clearance**	**Number of 765kV Transmission Towers On-ground**	**Location of 765kV Transmission Towers on-ground in line with approved alignment**

		(NCPS to NCTPS III**)**	
CRZ IA	**0**	**16**	
CRZ IB	1	1	
CRZ II	7	2	**0**
CRZ IVB	5	2	
Total	**13**	**21**	

15. From the above table, it can be seen that there are a total of 0 (zero) towers on ground that are in line with the approved alignments / number of towers approved in each CRZ zone. Notably, a total of 16 towers have been constructed within CRZ 1-A area, where not even one tower has been approved. The total number of 765KV towers extend further north to areas that have not been approved. Additionally, a total of 8 extra towers have been constructed as opposed to a total of 13 towers approved.

16. **Location of 765kV Transmission Towers on-ground in violation of CRZ clearance**

On- Ground 765kV towers					**Approved 765kV towers**		
S. No	**SITE LOCATION**	**LATITUDE**	**LONGITUDE**	**CRZ-CLASSIFICATION**	**LATITUDE**	**LONGITUDE**	**CRZ-CLASSIFICATION**
1	NCPS to NCTPS III	13°12'38.45"N	80°18'17.44"E	CRZ 1A	13° 12' 35.561" N	80° 18' 27.824" E	CRZ - II
2		13°12'46.39"N	80°18'31.18"E		13° 12' 47.835" **N**	80° 18' 31.957" E	CRZ-II
3		13°12'53.92"N	80°18'33.08"E		13° 12' 51.7	80° 18'	CRZ-II

					20" **N**	33.150" E	
4		13°13'7.73"N	80°18'32.82"E		13° 13' 2.373" **N**	80° 18' 33.165" E	CRZ- IVB
5		13°13'20.18"N	80°18'36.08"E		13° 13' 11.243" **N**	80° 18' 33.432" E	CRZ - 1B
6		13°13'30.71"N	80°18'39.96"E		13° 13' 27.082" **N**	80° 18' 39.096" E	CRZ-II
7		13°13'40.68"N	80°18'49.91"E		13° 13' 33.922" **N**	80° 18' 52.010" E	CRZ-II
8		13°14'2.38"N	80°18'59.51"E		13° 13' 38.282" **N**	80° 18' 58.365" E	CRZ-II
9		13°14'16.23"N	80°19'0.01"E		13° 13' 43.411" **N**	80° 18' 57.931" E	CRZ- IVB
10		13°14'41.88"N	80°18'56.76"E		13° 13' 54.026" N	80° 18' 59.264" E	CRZ- IVB

11		13°14'47.12"N	80°19'2.10"E		13° 14' 5.999" N	80° 19' 0.684" E	CRZ-II
12		13°15'7.20"N	80°19'5.00"E		13° 14' 23.110" N	80° 18' 59.589" E	CRZ- IVB
13		13°15'7.54"N	80°19'7.42"E		13° 14' 36.475" N	80° 18' 58.553" E	CRZ- IVB
14		13°15'17.81"N	80°19'4.47"E				
15		13°15'18.42"N	80°19'7.12"E				
16		13°15'30.54"N	80°19'9.06"E				
17		13°15'38.48"N	80°19'13.79"E	CRZ IB			
18		13°15'29.86"N	80°19'11.33"E	CRZ II			
19		13°15'37.22"N	80°19'15.43"E				
20		13°13'46.65"N	80°18'58.11"E	CRZ IVB			
21		13°14'28.85"N	80°18'58.82"E				

17. The exact location where 765 KV towers have been constructed is marked on the approved CZMP. It is seen that these locations are falling in CRZ I A where admittedly no towers could be located.

400 KV towers

18. Table showing total number of approved 400 kV towers -

S.No.	Description	CRZ-Classification	Length in Meter(m)	No. of Towers
1	Proposed 400 KV Transmission Line	CRZ-I A	5,383.90	-
2		CRZ-I B	7,589.89	25
3		CRZ-II	5,322.52	23
4		CRZ-IV B	2,109.57	3
5		No Development Zone (CRZ-III)	2,191.87	7
	Total	CRZ Area (A)	22,597.75	58
6		Non- CRZ Area(B)	9,076.03	43
		Grand Total (A+B)	**31,673.78**	**101**

Findings from Ground Truthing of 400 kV towers- (NCPS to SEZ)

CRZ Classification	Number of 400kV Transmission Towers in CRZ clearance	Number of 400kV Transmission Towers On-ground (NCPS to SEZ)	Location of 400kV Transmission Towers on-ground in line with approved alignment
CRZ IA	**0**	**7**	

			0
CRZ IB	25	5	3
CRZ II	23	8	6
CRZ IVB	**3**	**2**	**0**
CRZ III	7	0	0
Total	58	22	9

Location of 400kV Transmission Towers on-ground in violation of CRZ clearance

On- Ground 400kV towers				
S. No	**SITE LOCATION**	**LATITUDE**	**LONGITUDE**	**CRZ-CLASSIFICATION**
1	NCPS to SEZ	13°12'17.28"N	80°18'12.58"E	CRZ 1A
2		13°12'52.44"N	80°18'41.70"E	
3		13°14'15.61"N	80°19'1.41"E	
4		13°14'39.16"N	80°19'1.07"E	
5		13°16'27.27"N	80°19'32.49"E	
6		13°16'36.94"N	80°19'31.33"E	
7		13°17'5.55"N	80°19'38.16"E	
8		13°17'58.20"N	80°19'20.71"E	CRZ IB
9		13°17'43.41"N	80°19'21.96"E	
10		13°14'2.69"N	80°19'1.64"E	CRZ II
11		13°12'15.98"N	80°17'59.58"E	
12		13°16'48.56"N	80°19'36.31"E	CRZ IVB
13		13°14'26.84"N	80°19'1.21"E	

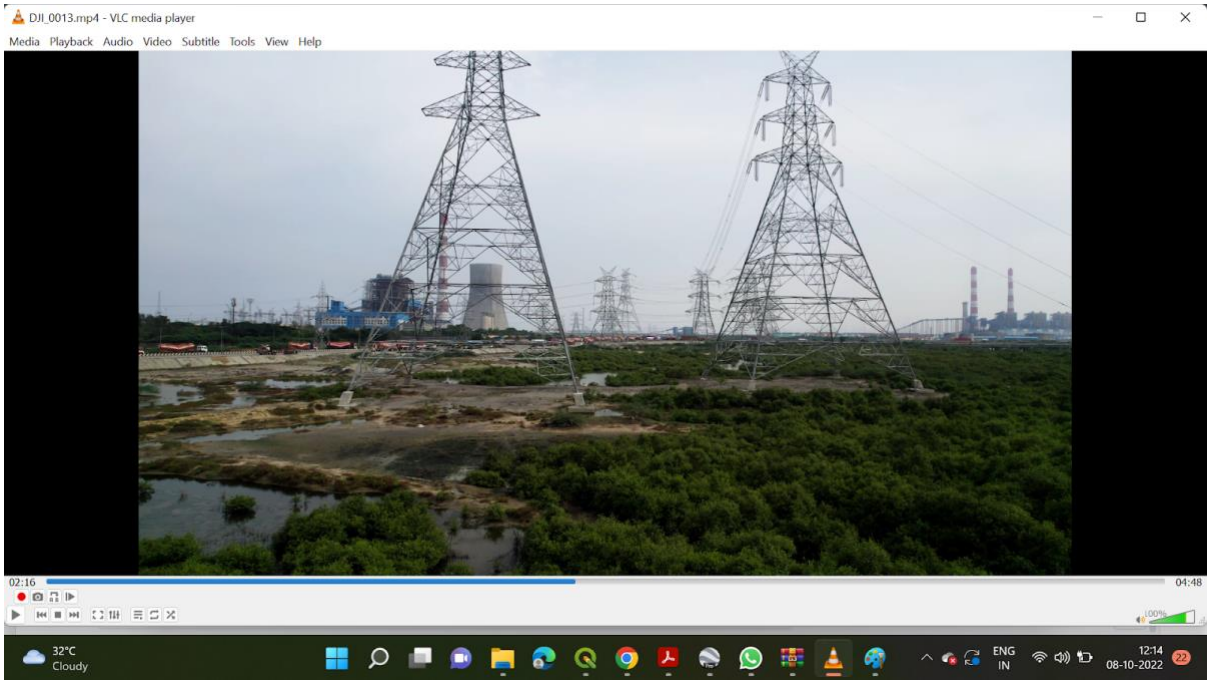
19. From the above table, it can be seen that a total of 7 numbers of 400kV towers have been constructed in CRZ IA where none are approved. Even among those towers approved in CRZ IVB areas, the two towers that have been constructed are in violation of the approved location.

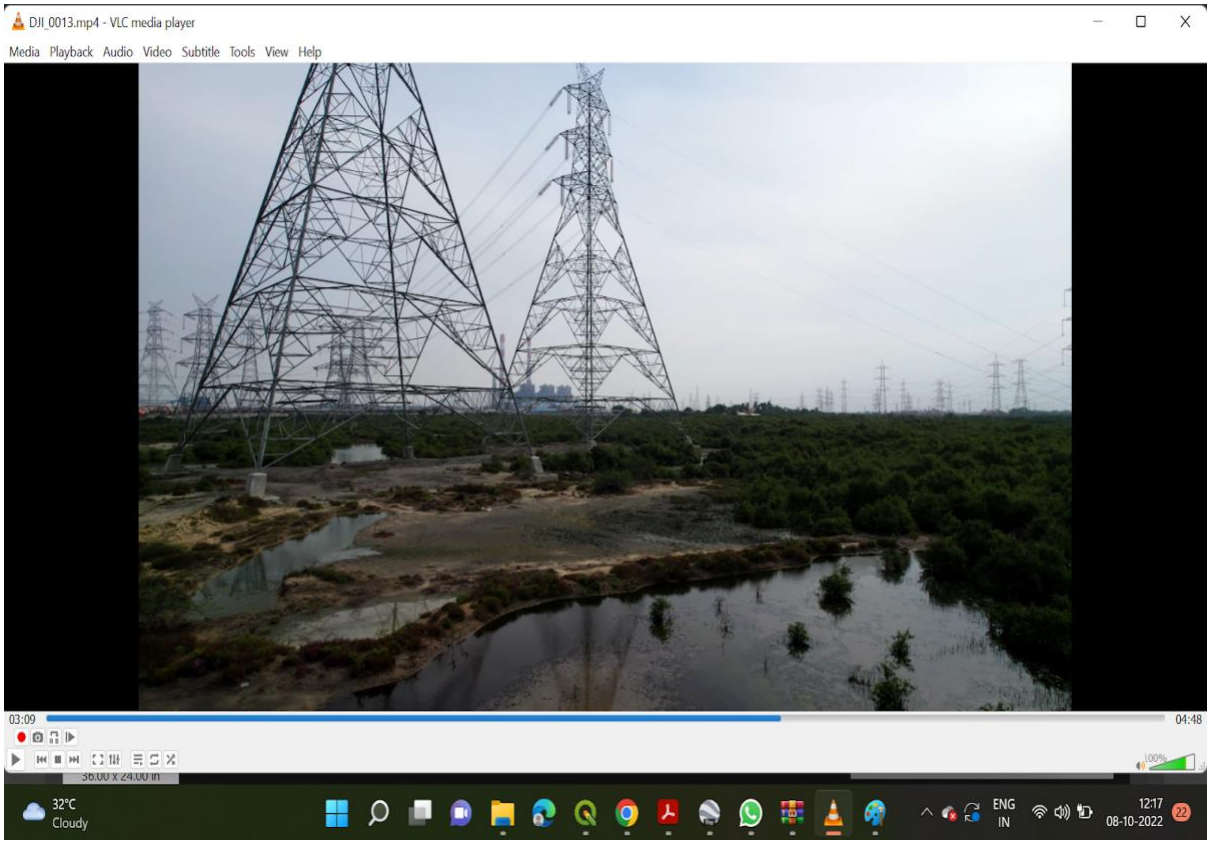
Damage caused by TANTRANSCO's encroachment to Ennore wetlands

- More than 40 acres of ecologically sensitive wetlands are encroached
- Destruction of mangroves (At- least 17 acres)
- Reclamation of waterbody
- Blockage of tidal flow
- Disrupting fishing livelihoods by encroaching Paadu- the fishing grounds
- Obstruction for movement of boats due to non-removal of temporary roads/construction debris
- Compromised flood carrying capacity of Kosathalaiyar

Destruction of Mangroves:

20. 24 towers in total are constructed in CRZ IA areas as opposed to zero towers permitted in CRZ IA according to CRZ clearance.

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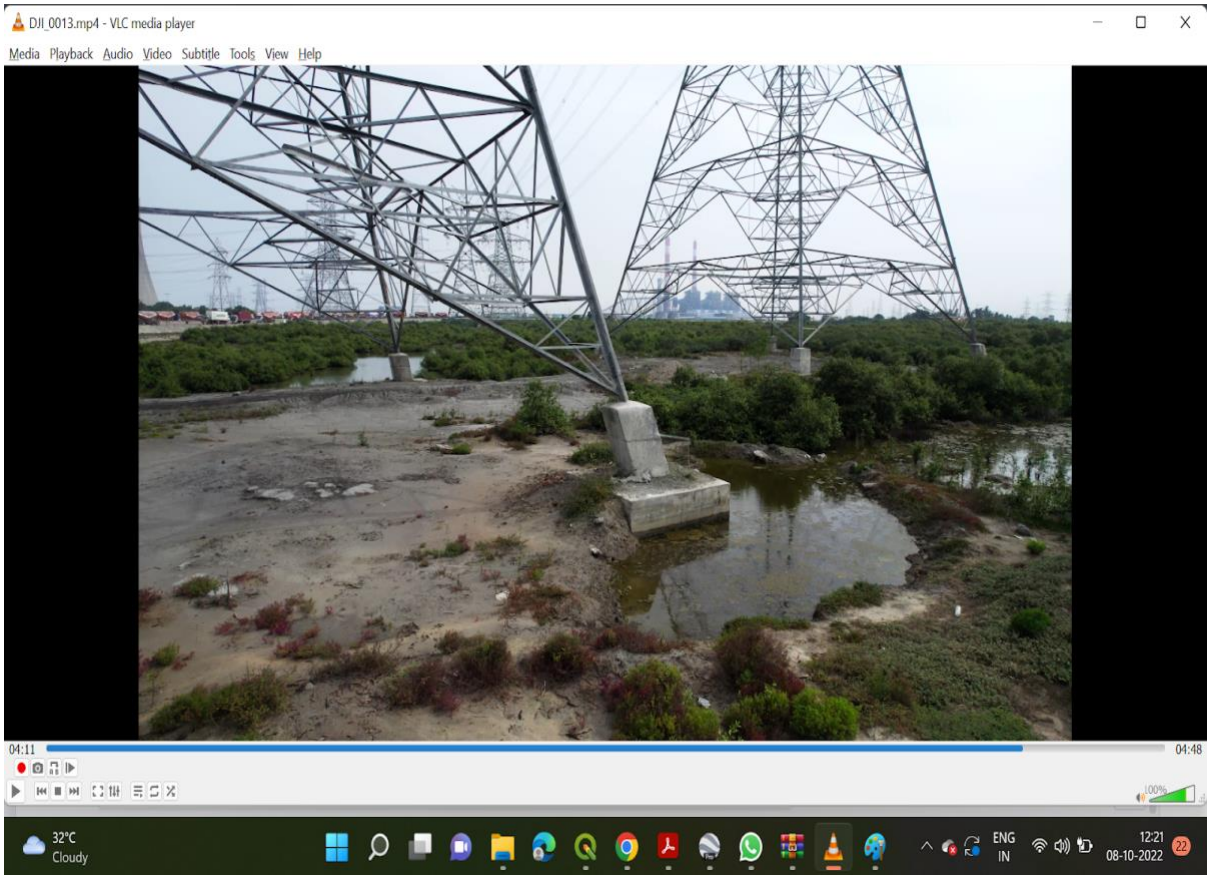
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Physical Impact of encroachment inside waterbody:

21. The encroachment inside Kosasthalayar opposite to the NCTPS III plant was carried out by dumping construction debris, dredged sea sand which is loose in nature. A 10 m road visible above water level will have a base of at least 20 metres on the river bed. Moreover, as more sand is dumped, the coarse particles of sand settle down and the finer particles are suspended and move with the tide and spread over a much larger proximal area. The riverbed here is altered by the deposit of fine sand. The non-removal of construction debris blocks the tidal flow and obstructs the movement of boats.

Obliteration of fishing ground:

22. The exact location where the sand and debris has been dumped is Vettukal Kondai & Vettukal Kodai Paadu. Paadus are distinct and static locations along the river which are fishing grounds demarcated by the fishers. Each Paadu may be allocated to either 1 or 2 persons/village each day for the two villages of Mugatwarakuppam and Kattukuppam. Paadu fishing is done on alternate days by each village. On the day of fishing for a village, each fisher goes to his designated paadu.

23. Fishing on a paadu is done by setting encircling stake nets. To do this, the fisher has to stand in the water to set the net and to remove it. If the water is too deep or the current too swift, the net cannot be set.

24. Ennore fishers have submitted detailed maps identifying their paadus to the Fishery Department and the State Coastal Zone Management Authority/Department of Environment seeking incorporation of these details in the Coastal Zone Management Plans. CRZ 2011 and 2019 mandate the inclusion of fishing grounds in the CZMPs.

25. According to this map, all fishing grounds of at least two paadus- Vettukal Kondai & Vettukal Kodai and Munkal Munai are directly affected by the encroachment.

26. Both paadus are now obliterated by dredged sand, construction debris directly eliminating the livelihoods of two sets of fishers a day. Infact, the fishers who depend on Vettukal Kondai & Vettukal Kodai are staying at home without fishing as the same has been degraded.

27. The river bed's natural sediments have been degraded destroying the breeding habitats for prawns. Samples from a few areas wherw towers have been constructed was collected and analysed. Due to dumping of ash and other materials, the quality of sediment has been severely affected. Expert opinion of an ecologist Mr. Jayashree Vencatesan who was part of the expert committee appointed by this Hon'ble Tribunal in OA 08 of 2016 and previously a member of the TNSCZMA and hence familiar with the ennore wetlands is also annexed along with this memo.

Alteration of Tidal Flow

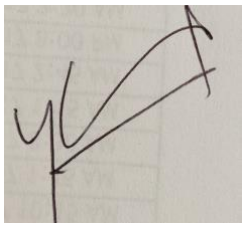
28. The encroachment is a road of sand, debris running perpendicularly from eastern embankment of the river to its west until about half the river's width.

29. With the encroachment in place, the tidal flow from south is blocked by the road. This resulted in the inadequate tidal flow to the fishing grounds. Only when there is adequate tidal inflow, fishers will be able to set fishing nets and pursue fishing.

765kvTower in violation of CRZ clearance obstructing the fishing ground.

30. It is submitted that the PP has clearly violated the permisisons issued – it cannot be contented that the deviation is only by a few hundred meters or less and hence it is not significant. The entire are regulated under CRZ is only 500 meters and deviation means that the CRZ zone classification itself changes, as has been seen from the above instances.

Dated this the 10th day of October, 2022 at Chennai



Counsel for the Applicant

On- Ground Locations of 765kV Transmission Towers in violation of CRZ clearance overlaid on map submitted by TANTRANSCO for CRZ Clearance

CRZ Classification	Number of 765kV Transmission Towers in CRZ clearance	Number of 765kV Transmission Towers On- ground (NCPS to NCTPS III)	Location of 765kV Transmission Towers on-ground in line with approved alignment
CRZ IA	0	16	0
CRZ IB	1	1	
CRZ II	7	2	
CRZ IVB	5	2	
Total	13	21	

Location of 765kV Transmission Towers On-ground in violation of CRZ clearance

S.no	LATITIUDE	LONGITUDE
1	13°12'38.45"N	80°18'17.44"E
2	13°12'46.39"N	80°18'31.18"E
3	13°12'53.92"N	80°18'33.08"E
4	13°13'7.73"N	80°18'32.82"E
5	13°13'20.18"N	80°18'36.08"E
6	13°13'30.71"N	80°18'39.96"E
7	13°13'40.68"N	80°18'49.91"E
8	13°14'2.38"N	80°18'59.51"E
9	13°14'16.23"N	80°19'0.01"E
10	13°14'41.88"N	80°18'56.76"E
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15	13°15'18.42"N	80°19'7.12"E
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17	13°15'38.48"N	80°19'13.79"E
18	13°15'29.86"N	80°19'11.33"E
19	13°15'37.22"N	80°19'15.43"E
20	13°13'46.65"N	80°18'58.11"E
21	13°14'28.85"N	80°18'58.82"E

0 250 500 m

Ennur

NCTPS-III

GANTRY

GANTRY AT POOLING STATION

Legend

- On-ground Location of 765kV towers in CRZ IA
- On-ground Location of 765kV towers in CRZ IVB
- On-ground Location of 765kV towers in CRZ IB
- On-ground Location of 765kV towers in CRZ II

LEGEND

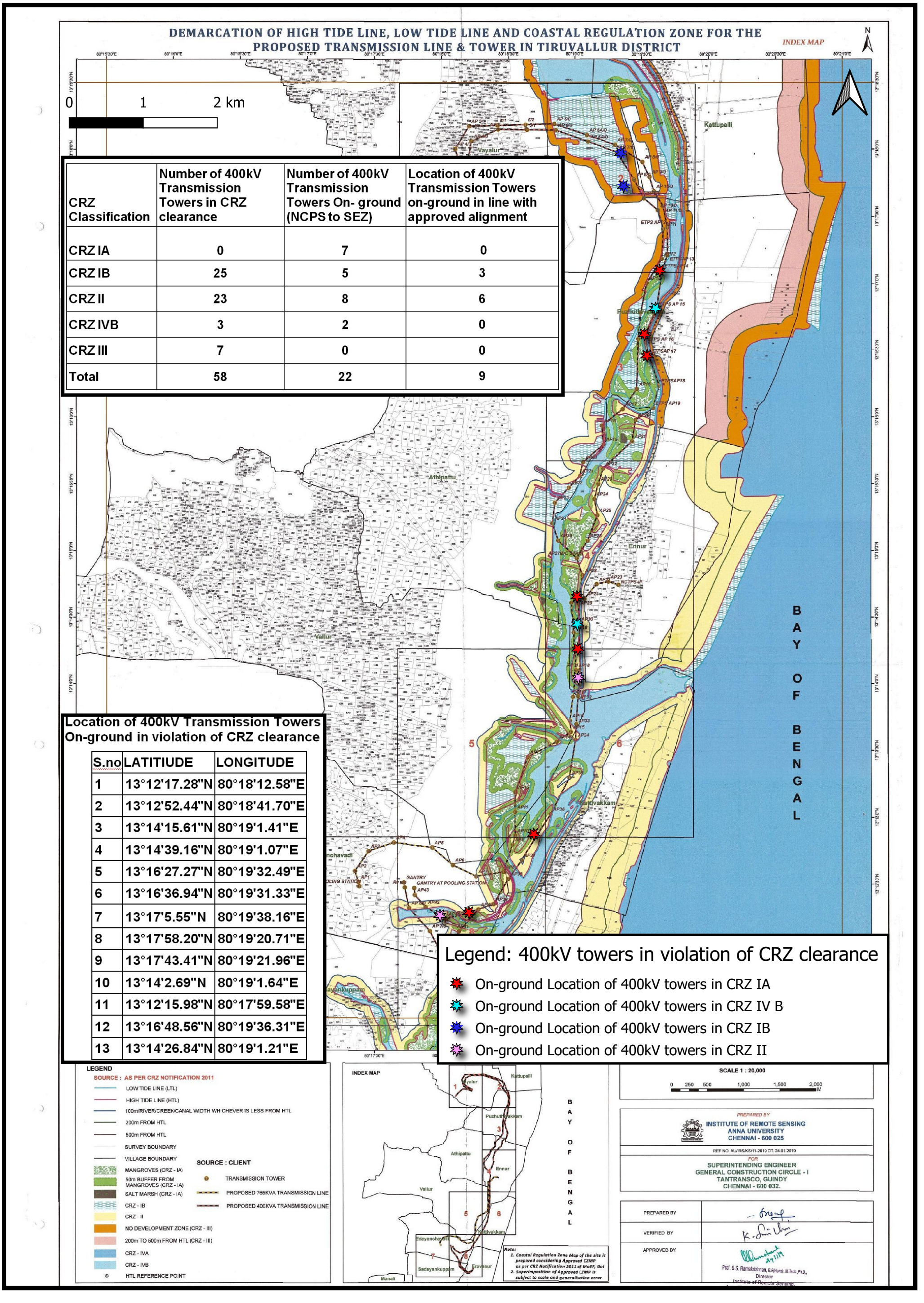
SOURCE : AS PER CRZ NOTIFICATION 2011

- LOW TIDE LINE (LTL)
- HIGH TIDE LINE (HTL)
- 100m/RIVER/CREEK/CANAL WIDTH WHICHEVER IS LESS FROM HTL
- 200m FROM HTL
- 500m FROM HTL
- SURVEY BOUNDARY
- VILLAGE BOUNDARY
- MANGROVES (CRZ - IA)
- 50m BUFFER FROM MANGROVES (CRZ - IA)
- SALT MARSH (CRZ - IA)
- CRZ - IB
- CRZ II
- NO DEVELOPMENT ZONE (CRZ - III)
- 200m TO 500m FROM HTL (CRZ - III)
- CRZ - IVA
- CRZ - IVB
- HTL REFERENCE POINT

SOURCE : CLIENT

- TRANSMISSION TOWER
- PROPOSED 765KVA TRANSMISSION LINE
- PROPOSED 400KVA TRANSMISSION LINE

On- Ground Locations of 400kV Transmission Towers in violation of CRZ clearance overlaid on map submitted by TANTRANSCO for CRZ Clearance



CRZ Classification	Number of 400kV Transmission Towers in CRZ clearance	Number of 400kV Transmission Towers On- ground (NCPS to SEZ)	Location of 400kV Transmission Towers on-ground in line with approved alignment
CRZ IA	0	7	0
CRZ IB	25	5	3
CRZ II	23	8	6
CRZ IVB	3	2	0
CRZ III	7	0	0
Total	58	22	9

Location of 400kV Transmission Towers On-ground in violation of CRZ clearance

S.no	LATITIUDE	LONGITUDE
1	13°12'17.28"N	80°18'12.58"E
2	13°12'52.44"N	80°18'41.70"E
3	13°14'15.61"N	80°19'1.41"E
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11	13°12'15.98"N	80°17'59.58"E
12	13°16'48.56"N	80°19'36.31"E
13	13°14'26.84"N	80°19'1.21"E

Legend: 400kV towers in violation of CRZ clearance

- On-ground Location of 400kV towers in CRZ IA
- On-ground Location of 400kV towers in CRZ IV B
- On-ground Location of 400kV towers in CRZ IB
- On-ground Location of 400kV towers in CRZ II

LEGEND

SOURCE : AS PER CRZ NOTIFICATION 2011

- LOW TIDE LINE (LTL)
- HIGH TIDE LINE (HTL)
- 100m/RIVER/CREEK/CANAL WIDTH WHICHEVER IS LESS FROM HTL
- 200m FROM HTL
- 500m FROM HTL
- SURVEY BOUNDARY
- VILLAGE BOUNDARY
- MANGROVES (CRZ - IA)
- 50m BUFFER FROM MANGROVES (CRZ - IA)
- SALT MARSH (CRZ - IA)
- CRZ - IB
- CRZ - II
- NO DEVELOPMENT ZONE (CRZ - III)
- 200m TO 500m FROM HTL (CRZ - III)
- CRZ - IVA
- CRZ - IVB
- HTL REFERENCE POINT

SOURCE : CLIENT

- TRANSMISSION TOWER
- PROPOSED 765KVA TRANSMISSION LINE
- PROPOSED 400KVA TRANSMISSION LINE

SCALE 1 : 20,000

0 250 500 1,000 1,500 2,000 M

PREPARED BY

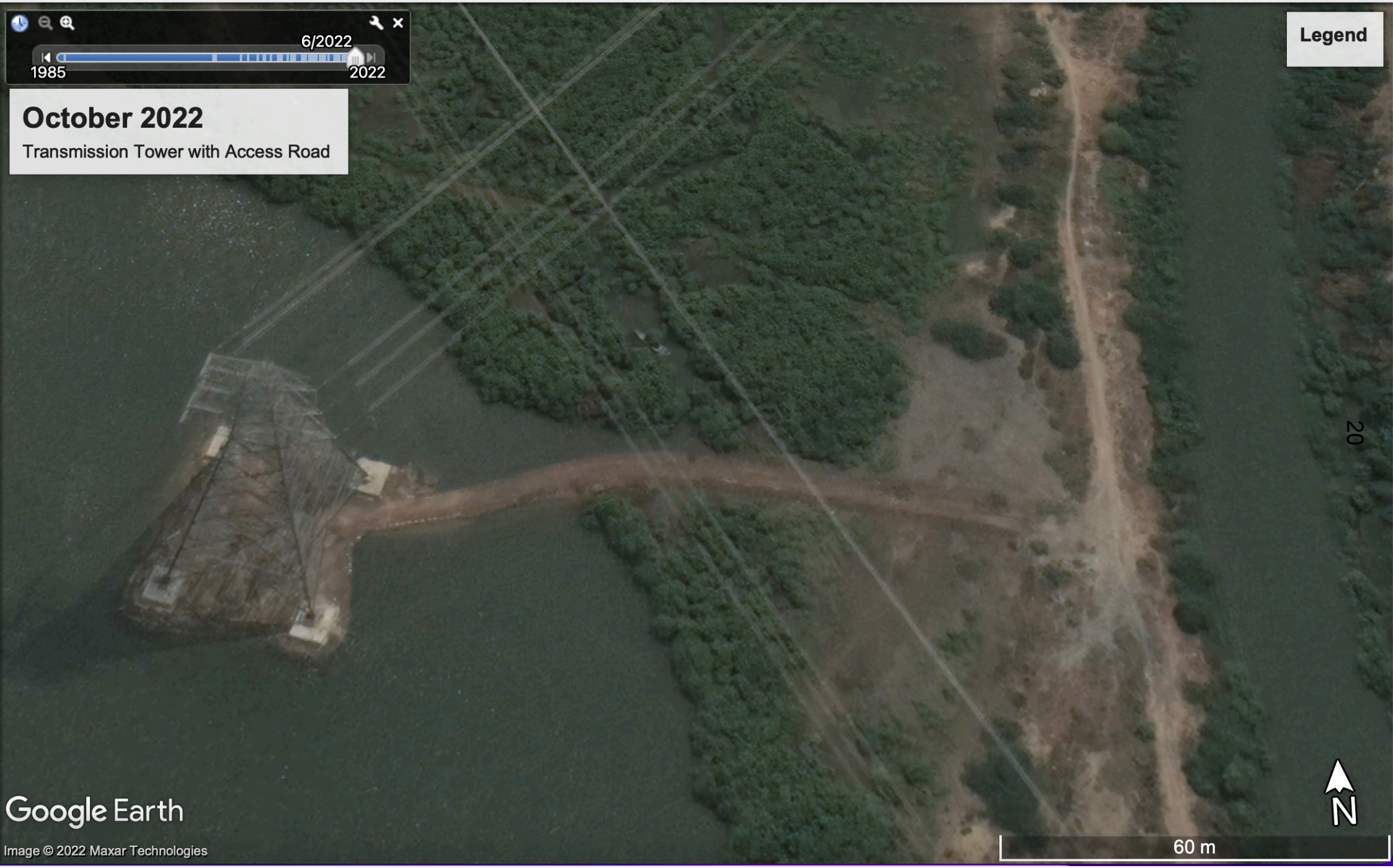
INSTITUTE OF REMOTE SENSING
ANNA UNIVERSITY
CHENNAI - 600 025

REF NO. AU/IRS/KS/11-2019 DT. 24.01.2019

FOR

SUPERINTENDING ENGINEER
GENERAL CONSTRUCTION CIRCLE - I
TANTRANSCO, GUINDY
CHENNAI - 600 032.

PREPARED BY	
VERIFIED BY	
APPROVED BY	Prof. S.S. Ramakrishnan, B.E(Hons), M.Tech., Ph.D., Director, Institute of Remote Sensing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1985
2022
October 2022
Transmission Tower with Access Road
Legend
20
Google Earth
Image © 2022 Maxar Technologies
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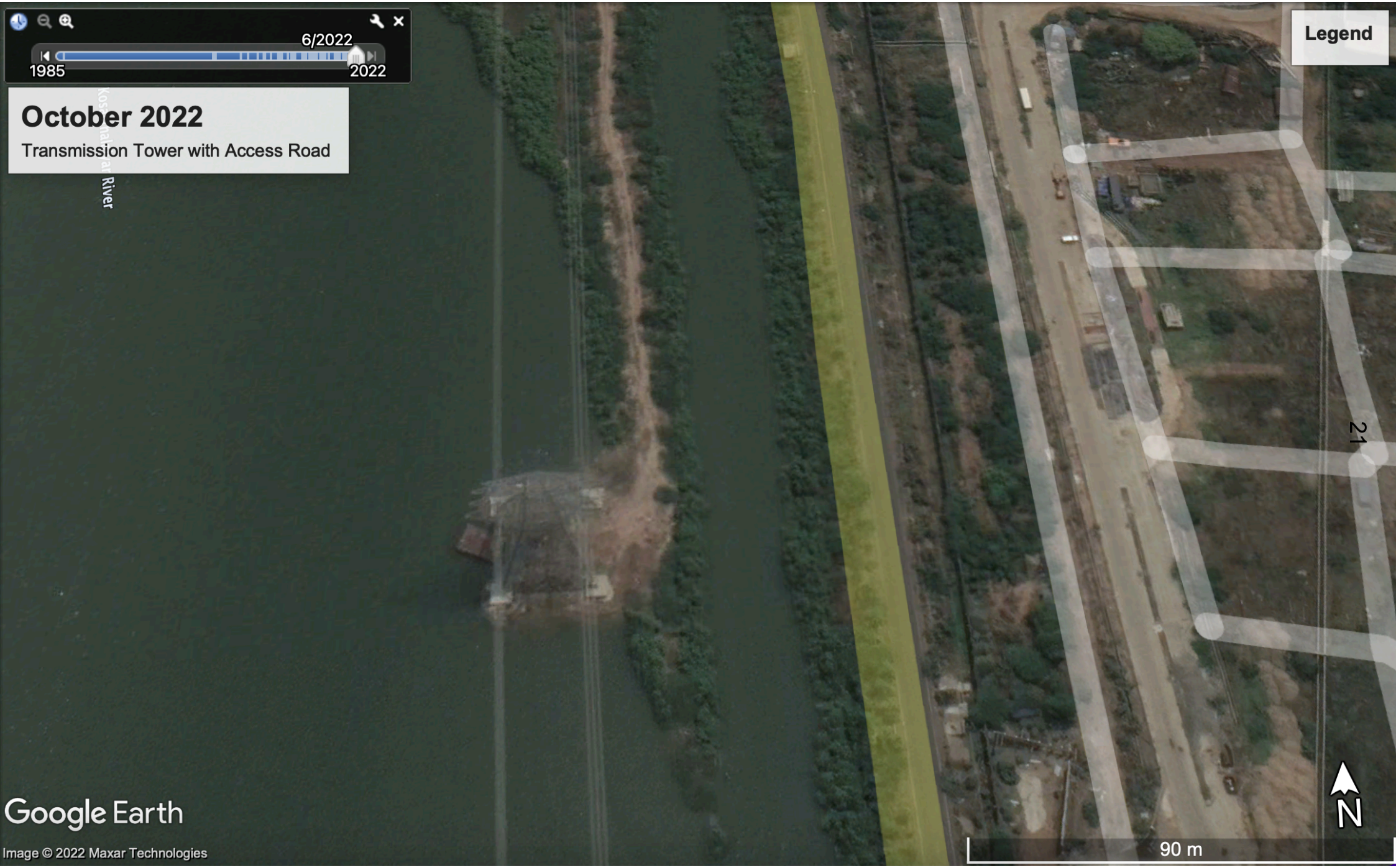
60 m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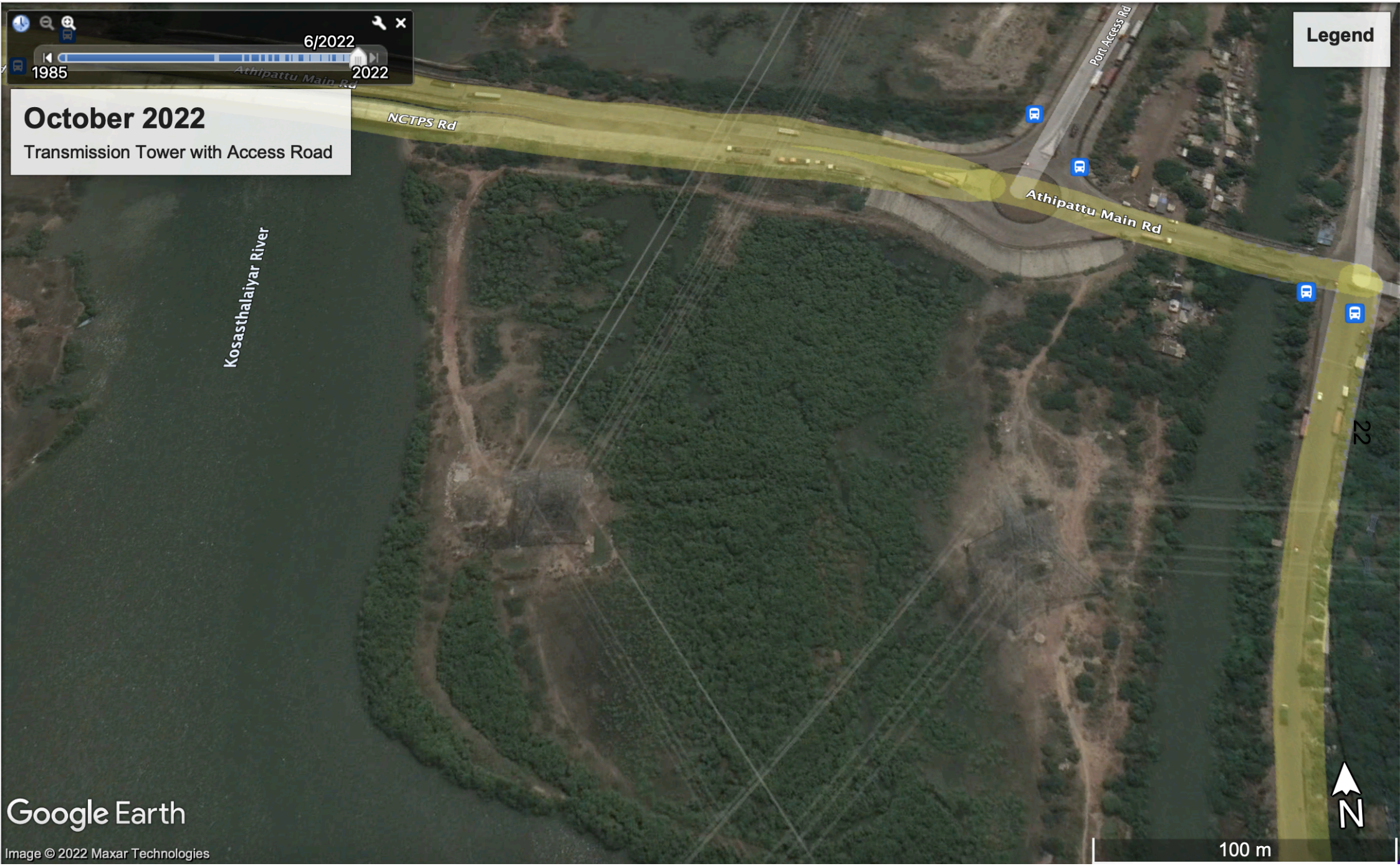
1985
2022
October 2022
Transmission Tower with Access Road
Legend
21
N
90 m
Google Earth
Image © 2022 Maxar Technologies


6/2022
1985
2022
October 2022
Transmission Tower with Access Road
Legend
NCTPS Rd
Athipattu Main Rd
Port Access Rd
Kosasthalaiyar River
22
N
100 m
Google Earth
Image © 2022 Maxar Technologies

S. No.	Sample Sites	Sample No.	Kind of Sediments	Coordinate	
1	Location 1: Between Kattupalli Turn Paadu and Aruva Paadu	**S1**	Healthy Sediments	13°18.645'N	80°19.452"E
2	Location 2: East of Kattu Bridge Flood plain	**S4**	Sediments having Construction debries and Flyash	13°15.128'N	80°19.127"E


Sample 2- Sediments having Construction debries and Flyash
Sample 2-Location 4- East of kattu bridge
N
Legend
100 m
Google Earth
Image © 2022 Maxar Technologies

TAMILNADU TEST HOUSE PRIVATE LIMITED

www.tamilnadutesthouse.com

TEST REPORT

TEST REPORT NO: TNTH/M-3601/2022-23	DATE:05.10.2022

SAMPLE SUBMITTED BY CUSTOMER

COMPANY NAME	**M/s The Other Media**
ADDRESS	No:92, 3rd Cross, Thiruvalluvar Nagar, Besant Nagar, Chennai-600 090 Tamil Nadu
SAMPLE DESCRIPTION	Sediment(Location 4)
BATCH NUMBER	NA
SAMPLE QUANTITY	2 Nos.
PACKING	In Packed Condition
SAMPLE RECEIVED ON	29.09.2022
ANALYSIS STARTED ON	30.09.2022
ANALYSIS COMPLETED ON	05.10.2022

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TAMILNADU TEST HOUSE PRIVATE LIMITED

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TEST REPORT

TEST REPORT NO: TNTH/M-3601/2022-23	DATE:05.10.2022

SAMPLE SUBMITTED BY CUSTOMER

SAMPLE DESCRIPTION Sediment(Location 4)

ANALYSIS STARTED ON 30.09.2022

ANALYSIS COMPLETED ON 05.10.2022

S. NO	PARAMETERS	METHOD	UNIT	RESULT
1	N2 Fixing Bacteria	TNTH/SOP/SOIL/232	cfu/g	Nil
2	Total microbial biomass	TNTH/SOP/SOIL/121	mg PLFAs/kg dry wt)	1.89
3	Soil respiration	TNTH/SOP/SOIL/317	Mg C (CO2)/Kg	38
4	Dehydrogenase activity	TNTH/SOP/SOIL/128	µg TPF/g	0.41
5	Humification	TNTH/SOP/SOIL/219	%	5.02
6	Soil microorganisms	TNTH/SOP/SOIL/141	cfu/g	1.85×10^3
7	**Particle size characterisation and composition**			
7.1	Proportion of ash	TNTH/SOP/SOIL/012	%	74.9
7.2	Proportion of Silt		%	Nil
7.3	Proportion of Clay		%	25.1
7.4	Proportion of Sand		%	Nil

******* END OF THE REPORT*******

For Tamilnadu Test House Private Limited

Verified By **Authorized Signatory**

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TEST REPORT

TEST REPORT NO: TNTH/M-3598/2022-23	DATE:05.10.2022

SAMPLE SUBMITTED BY CUSTOMER

COMPANY NAME	**M/s The Other Media**
ADDRESS	No:92, 3rd Cross, Thiruvalluvar Nagar, Besant Nagar, Chennai-600 090 Tamil Nadu
SAMPLE DESCRIPTION	Sediment(Location 1)
BATCH NUMBER	NA
SAMPLE QUANTITY	2 Nos.
PACKING	In Packed Condition
SAMPLE RECEIVED ON	29.09.2022
ANALYSIS STARTED ON	30.09.2022
ANALYSIS COMPLETED ON	05.10.2022

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TAMILNADU TEST HOUSE PRIVATE LIMITED

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TEST REPORT

TEST REPORT NO: TNTH/M-3598/2022-23	DATE:05.10.2022

SAMPLE SUBMITTED BY CUSTOMER

SAMPLE DESCRIPTION Sediment(Location 1)

ANALYSIS STARTED ON 30.09.2022

ANALYSIS COMPLETED ON 05.10.2022

S. NO	PARAMETERS	METHOD	UNIT	RESULT
1	N2 Fixing Bacteria	TNTH/SOP/SOIL/232	cfu/g	0.51×10^3
2	Total microbial biomass	TNTH/SOP/SOIL/121	mg PLFAs/kg dry wt)	6.85
3	Soil respiration	TNTH/SOP/SOIL/317	Mg C (CO2)/Kg	156
4	dehydrogenase activity	TNTH/SOP/SOIL/128	µg TPF/g	1.28
5	Humification	TNTH/SOP/SOIL/219	%	1.26
6	soil microorganisms	TNTH/SOP/SOIL/141	cfu/g	1.23×10^6
7	**Particle size characterisation and composition**			
7.1	Proportion of ash	TNTH/SOP/SOIL/012	%	38.4
7.2	Proportion of Silt		%	0.5
7.3	Proportion of Clay		%	61.2
7.4	Proportion of Sand		%	Nil

******* END OF THE REPORT*******

For Tamilnadu Test House Private Limited

Verified By **Authorized Signatory**

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Habitat Assessment of Ennore Wetland Complex with specific reference to introduction of alien material

Jayshree Vencatesan
Care Earth Trust

The following document is an analytical summary of impacts of a series of intermittent and chronic anthropogenic activities on the Ennore Wetland Complex. At this point of time, the analysis is based on the results of two sediment samples collected from within the Complex.

The Complex, hereinafter referred to as EWC, is the estuarine part of River Kosasthalaiar which runs West to East on the northern periphery of Tamilnadu. A substantial part of the EWC has been either converted or transitioned into industrial zone, of which the most serious and contentious outcome has been the deposition of flyash into the EWC. The second corollary is the use of a range of external materials for the reclamation of the wetlands. A recent assessment by a committee appointed by the Hon'ble NGT has estimated that approximately 1000 acres have been denuded within the EWC.

Estuarine ecosystem functioning varies over space and time, and is strongly influenced by both terrestrial and aquatic drivers of change or disturbances. Despite being flagged as an issue of serious concern, the differentiated response of the ecosystem and its inhabitants (including nonhuman) to the sustained interference has not received attention. One possible reason could be that while traditional environmental monitoring techniques are well suited to resolving acute exposure effects, they lack resolution in determining subtle shifts in ecosystem functions resulting from chronic exposure(s). In recent times, there is a growing demand for surveillance with sensitive omics-based technologies to bridge this gap (Maloney2019). Omics-based techniques have advanced our understanding of microbial physiology (Pinu et al., 2019; Beale et al., 2013), organism-environment interactions and organism function/health (Bundy et al., 2008) based on the premise that the metabolome is effectively one step removed from an organism's phenotype (Beale et al., 2018a). This metabolomic-phenotypic link has further expanded our knowledge of specific organismal responses to abiotic stressors (Álvarez-Muñoz and

Farré, 2020) and for exploring both physical and anthropogenic contaminants (Hillyer et al., 2017). Technologically, we are now entering an era with the potential for developing ecosystem-scale, multi-omic enabled blueprints for sensitive eco surveillance strategies which could determine critical drivers of ecosystem functions within pristine and impacted environments. Till date, most omics-based environmental studies have focused on previously degraded environments, identifying key metabolic differences resulting from anthropogenic perturbations (Hilliyer et al, 2021).

It is also a matter of concern, especially in EWC that while the apparent change of the system, by way of loss of habitat, loss of species etc, commonly referred to as horizontal zonation has received some attention, vertical zonation which largely pertains to sediment typology has been totally ignored. It is well known that vertical zonation within estuarine ecosystems can strongly influence microbial diversity and function by regulating competition, predation, and environmental stability. Further, the degree to which microbial communities exhibit horizontal patterns through the EWC has also not been given any attention.

Sediments play an important role in sustaining the macro fauna of estuarine ecosystems as well. Many species of aquatic invertebrates live in the sediments of estuaries. Crustaceans, molluscans and annelids are some of the more important sediment-dwelling invertebrates. These organisms are vital to estuarine food webs that include fish and birds. Replacing the natural estuarine sediments with fly ash, alien soil and debris such as construction wastes destroys the fragile balance of the ecosystem. Such material leads to compaction of the benthos making it impossible for sediment-dwelling invertebrates to survive. Sediment-dwelling annelids such as Bristle Worms (Neries) provide livelihood opportunities to the local poor who collect and supply these worms as feed to aquaculture. Migratory birds that visit estuaries are entirely dependent on sediment-dwelling invertebrates. Further, alien material dumped into estuaries change the salinity and temperature of water making it unsuitable for fish and other pelagic organisms such as crabs and prawns. These materials cloud the water and interfere with the penetration of light resulting in low primary productivity. Many species of estuarine fish like the Mullets, Mud Crab and Tiger Prawns are economically important sustaining local livelihoods. Natural sediments are also important for the restoration of mangroves and other estuarine vegetation.

Two sediment samples from the EWC were analysed for a select biological and physical parameters. Sample 1 from “Location 1” is from a section of the EWC described by fishers as Aruva Padu, and represents what local fishers consider to be a relatively healthy and productive fishing ground. Sample 2 from “Location 4” has been taken from the base of a 765KVA transmission tower in a section of the EWC opposite the main gate of North Chennai Thermal Power Station. The sample location reportedly falls within the mangrove buffer area (CRZ 1A) in the approved Coastal Zone Management Plan.

Of the two samples, Location 1 compares better to Location 4 which is highly degraded due to the heavy load of fly ash (75%). Consequently, the associated biological parameters also vary with Sample 2 from “Location 4” reporting lower soil microorganisms, Total microbial mass, soil respiration and dehydrogenase activity and nil presence of N2 fixing bacteria, which aid plants by converting atmospheric nitrogen into a forms that plants can use. The exact impact on the ecosystem cannot be conclusively stated in the absence of the microbes being identified. It is quite evident though that the impact on the EWC would be negative. As a step ahead, it is recommended that the volume of chlorophyll in the sediments is calculated so that the productivity of the EWC can be categorically ascertained.

Table: Test Report of Sediment Samples from EWC

Parameters	Unit	Sample 1 (Location 1)	Sample 2 (Location 4)
N2 fixing bacteria	cfu/g	0.51 x 10e3	Nil
Total microbial mass	Mg PLFAs/kg dry wt	6.85	1.89
Soil Respiration	Mg C (CO2)/kg	156	38
Dehydrogenase activity	Ug TPF/g	1.28	0.41
Humification	%	1.26	5.02
Soil microorganisms	cfu/g	1.23 x 10e6	1.85 x 10e3
Proportion of Ash	%	38.4	74.9
Proportion of silt	%	0.5	Nil

Proportion of clay	%	61.2	25.1
Proportion of sand	%	Nil	Nil

Microbial communities provide vital goods and services with far reaching consequences for critical ecosystem function. Due to the substantial range of key ecosystem services that microbial communities provide, determining system wide impacts upon this component would efficiently provide key monitoring approaches for assessing ecosystem status and the impacts of environmental perturbation.

Conclusion

Location 4 has a higher percentage of ash and foreign material – in comparison with Location 1 – and this has impacted sediment quality and biological integrity of the river sediment in this location.

References

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