

**BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI**

Original Application No. 119 of 2021

Tribunal on its own motion Suo Motu
based on the newspaper items published
in Dinamlar Tamil Newspaper, Chennai Edition,
Dt.14.04.2021 under the caption "All over the
villages is dust Land, it deforms the villages along with lives"

Versus

The Chief Secretary to Govt. of
Tamil Nadu, Govt Secretariat, Chennai
and Ors.

...Respondent(s)

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**Advocate
Thiru.S. Sai Sathya Jith,
Advocate, Chennai.**

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,
SOUTHERN ZONE, CHENNAI.**

Original Application No. 119 of 2021

Tribunal on its own motion Suo Motu
based on the newspaper items published
in Dinamlar Tamil Newspaper, Chennai Edition,
Dt14.04.2021 under the caption "All over the
villages is dust Land, it deforms the villages
along with lives".

Vs

The Chief Secretary to Govt. of Tamil Nadu,
Govt. Secretariat, Chennai
and
Others.

...Respondents

**REPORT FILED ON BEHALF OF THE FOURTH RESPONDENT -
TAMIL NADU POLLUTION CONTROL BOARD.**

I, S.Malarvizhi, Daughter of Thiru.Subburam, aged about 56 years,
having office at No.76, Mount Salai, Guindy, Chennai-600032, do hereby
solemnly affirm and sincerely state as follows:-

1. I submit that I am working as the Joint Chief Environmental Engineer, Tamil Nadu Pollution Control Board, Chennai and I am authorized to file this report on behalf of the fourth Respondent-Board and as such I am well acquainted with the facts of the case from the records available in our office.
2. It is respectfully submitted that the Hon'ble Tribunal has taken a Suo Motu on its own motion, based on the newspaper items published in Dinamalar Tamil Newspaper, Chennai Edition, dated:14.04.2021 under the caption "All over the villages is dust Land, it deforms the villages along with lives" in the Thadagam Region of Coimbatore District.
3. It is respectfully submitted that the report filed by the fourth respondent (TNPCB) on 17.07.2024 may be read as part and parcel of this report.
4. It is respectfully submitted that, the TNPC Board has imposed environmental compensation for 185 brick kiln units located in Thadagam region of Coimbatore district for causing damage to the environment. Subsequently,

S. Malarvizhi
22/11/2024

JOINT CHIEF ENVIRONMENTAL ENGINEER
TAMIL NADU POLLUTION CONTROL BOARD
No.76, MOUNT SALAI, GUINDY,
CHENNAI-600 032.

aggrieved by the same, the Brick Kiln units filed writ petitions against the Board's proceeding before the Hon'ble High Court of Madras and the Hon'ble High of Madras vide order dated 27.04.2023 has stayed the impugned proceedings and directed the TNPCB to strictly follow the methodology given by the CPCB's In-house Committee for assessing environmental compensation and action plan in particular, as per Guidelines 1.3.2.

5. It is respectfully submitted that, in compliance of the said orders, the Board vide Order dated 22.12.2023 allotted the work for carrying out "Assessment of Environmental Compensation for the brick kilns located in Thadagam region" to the Energy and Resource Institute (TERI) with certain ToR, at a total cost of Rs. 1,21,70,349 /- inclusive of GST & Overheads.
6. It is respectfully submitted that, further, an agreement was executed on 25.01.2024 between the TNPCB and TERI, New Delhi for the said study and vide proceeding dated 04.04.2024, 30% of the total cost i.e. Rs. 36, 51,104.70 /- has been released to the TERI as per the agreement. The TERI has officially started the work in the month of April and as per the ToR, the duration of the said assessment is 10 months.
7. It is respectfully submitted that, subsequently, the TERI vide mail dated 26.09.2024 & 05.10.2024 submitted progress / inception report and in this regard, on 04.11.2024 the Board convened a virtual meeting with the TERI and the members of the Committee (Members: Officials from NPC, CPCB and JCEE (M), Coimbatore) constituted by the Board vide proc. dated 29.01.2024, wherein TERI reported that the following preliminary survey in the Thadagam region were completed:
 - a. 183 brick kilns in Thadagam valley are mapped based on the TNPCB data.
 - b. Ambient PM concentrations were measured at Chinna Thadagam, Madathur, Kalainur and Mangarai of Thadagam region, Coimbatore.
 - c. Field Survey, Primary control point survey, Ground control points survey have been completed.
 - d. UAV survey at Thadagam valley to assess the environmental degradation, etc.


22/11/2024
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8. It is respectfully submitted that, also, TERI showed the location of 185 brick kilns, locations where the earth was excavated and the water channels passing through the brick kilns, which were mapped using GIS. With this the meeting was concluded and the TERI was requested to submit the final report within the stipulated time as per the ToR.
9. It is respectfully submitted that as per the direction of the Hon'ble NGT (SZ), Chennai dated 05.09.2024, the interim progress report submitted by the TERI is enclosed as Annexure.

Therefore, it is humbly prayed that this Hon'ble National Green Tribunal (Southern Zone) may be pleased to pass such order or further order or other orders as this Hon'ble Tribunal may deem fit and proper in the facts and circumstances of this case and thus render justice.

Suealath
22/11/2024

JOINT CHIEF ENVIRONMENTAL ENGINEER
TAMIL NADU POLLUTION CONTROL BOARD
No.76, MOUNT SALAI, GUINDY,
CHENNAI-600 032.

VERIFICATION

I, S.Malarvizhi, Daughter of Thiru.Subburam, working as Joint Chief Environmental Engineer, having my office at No.76, Mount Salai, Guindy, Chennai-600032, do hereby verify that the contents of above reply are true to the best of my knowledge through records.

Suealath
22/11/2024

JOINT CHIEF ENVIRONMENTAL ENGINEER
TAMIL NADU POLLUTION CONTROL BOARD
No.76, MOUNT SALAI, GUINDY,
CHENNAI-600 032.

4 0253

Assessment of Environmental Compensation for the Brick Kiln Units Located in Thadagam valley

*as per the orders of the Hon'ble High Court of Madras dated 27.04.2023 in WP No.
34793 of 2022*

Submitted to
Tamil Nadu Pollution Control Board
*Ref. Letter No.: T1/TNPCB/F.024093 /2023, dated: 19.09.2023
& TNPCB email dated 13 October 2023*

The Energy and Resources Institute
New Delhi



ENERGY



AGRICULTURE



ENVIRONMENT



HABITAT



RESOURCE
SECURITY



CLIMATE



HEALTH
& NUTRITION

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Background

The Tamil Nadu Pollution Control Board (TNPCB) has imposed environmental compensation for 185 brick kiln units located in the Thadagam region of Coimbatore district for causing damage to the environment. Subsequently, aggrieved by the same the Brick Kiln units filed writ petitions against the Board's proceeding before the Hon'ble High Court of Madras.

The Hon'ble High Court of Madras vide order dated 27.04.2023 in WP No. 34793 of 2022 has directed the following among others;

".....(2) The Chairman, of Tamil Nadu Pollution Control Board, before fixing damages, shall strictly follow the methodology given by the Central Pollution Control Board's In-house Committee for assessing environmental compensation and action plan in particular, as per Guidelines 1.3.2.

.....(6) The period of damage shall be from the date of commencement of the operation by the individual brick kiln which can be found out from the Annual Brick Fee paid by them or from such material as the Chairman/ the Committee so decides and shall conclude with the date of the closure passed by the District Collector, Coimbatore i.e.. 13.06.2021....."

Whereas, the CPCB In-house Committee report on "Methodology for Assessing Environmental Compensation and Action Plan" under section 1.3.2 has stated the following;

"1.3.2 In other instances i.e. d, e, and f, the environmental compensation may contain two parts - one requires providing immediate relief and other long-term measures such as remediation.

In all these cases, detailed investigations are required from expert institutions/organizations based on which environmental compensation will be decided. CPCB shall list the expert institutions for this purpose. In such cases, a comprehensive plan for remediation of environmental pollution may be prepared and executed under the supervision of a committee with representatives of SPCB, CPCB, and expert institutions/organizations."

With this background, the TNPCB had approached the Energy and Resources Institute (TERI), New Delhi to submit a proposal to assess the environmental compensation to all the brick kiln units (185 Nos.) located in the Thadagam region of Coimbatore district. In response to that, TERI as a research institute, submitted the proposal to assess the environmental compensation for the brick kiln units located in the Thadagam region of Coimbatore district. The study was assigned to TERI in March 2023 after a review of the proposal by the TNPCB. TERI initiated the initial reconnaissance survey of the Thadagam Valley area in April 2023.

Objective of the study

Assessment of imposed environmental compensation by the TNPCB to brick kiln units located in the Thadagam region of Coimbatore district.

Prepare a comprehensive plan for the remediation of environmental damages caused by the brick kiln operation in the Tandagam region.

Scope of the study

- Assess the Environmental Compensation for 185 brick kiln units located in the Thadagam region of Coimbatore district as per the Hon'ble Court of Madras order dated 27.04.2023 in WP No. 34793 of 2022 following the section 1.3.2 of "Report of the CPCB In-house Committee on methodology for Assessing Environmental Compensation and Action Plan to utilize the fund".
- Assess Damage and Loss caused due to illegal mining of earth based on data available with Geology and Mining, Government of Tamil Nadu
- Assess the pollution caused during the operation of the brick kilns without the consent of the Pollution control board.
- Prepare a comprehensive plan for the remediation of environmental pollution caused by the brick kiln units Thadagam region of the Coimbatore district.
- Furnish detailed report on the assessment of environmental compensation to be paid by the Brick kiln units (185 Nos) in the Thadagam region of Coimbatore district.

Activities undertaken during the study at Thadagam revenue village area

The scope of the study was divided into four major tasks – 1. Collate required information related to brick kiln units located in the Thadagam region of Coimbatore district; 2. Assessment of Environmental degradation due to the operation of brick kilns; 3. Assessment of environmental compensation for brick kiln units located in the Thadagam region of Coimbatore district and 4. Preparing a road map for remediation of environmental pollution caused by brick kiln units located in the Thadagam region.

Collate required information related to brick kiln units located in the Thadagam region of Coimbatore district

183 brick kilns in the Thadagam valley area were mapped based on the survey data of the TNPCB.

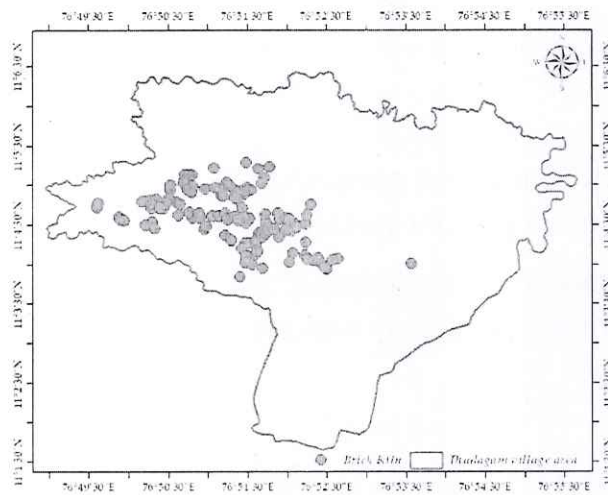


Figure 1 Brick kilns in Thadagam village area.

TERI has initiated a questionnaire-based survey of the brick kilns, to prepare a dataset on production, fuel use, and left-over soft bricks at the brick kilns. Initially, it was found that the brick kilns mainly used *Prosopis Juliflora* as the fuel to prepare the bricks and soft bricks used to produce from the soil extracted from the Thadagam Valley area.

Assessment of Environmental degradation due to the operation of brick kilns

The environmental degradation in the Thadagam valley was proposed to estimate through the assessment of i) the impact of brick kilns on the local air quality during their operation, ii) the impact of brick kiln operation on the local ecosystem, and iii) the impact of brick kilns on the soil quality of the area.

Measurement of ambient PM_{10} and $PM_{2.5}$ concentration

The atmospheric particulate matter (PM_{10} and $PM_{2.5}$) concentrations in the Thadagam area, during the operation of the brick kilns were proposed to be simulated with the dispersion model. However, it is important to validate the dispersion model simulated concentrations with the on-ground air quality data set. Atmospheric particulate matter concentrations at the Thadagam Valley during the present situation were measured following a standard protocol to validate the simulated particulate matter concentrations in the area with the dispersion model.

Four locations namely i) Chinna Thadagam (L1), ii) Madathur (L2), iii) Mangrai (L3) and iv) Kalainur (L4) were selected to measure the air quality (PM_{10} and $PM_{2.5}$) of the Thadagam valley area. These locations were selected based on the prevailing wind directions, landuse pattern, and feasibility of operating the instruments.

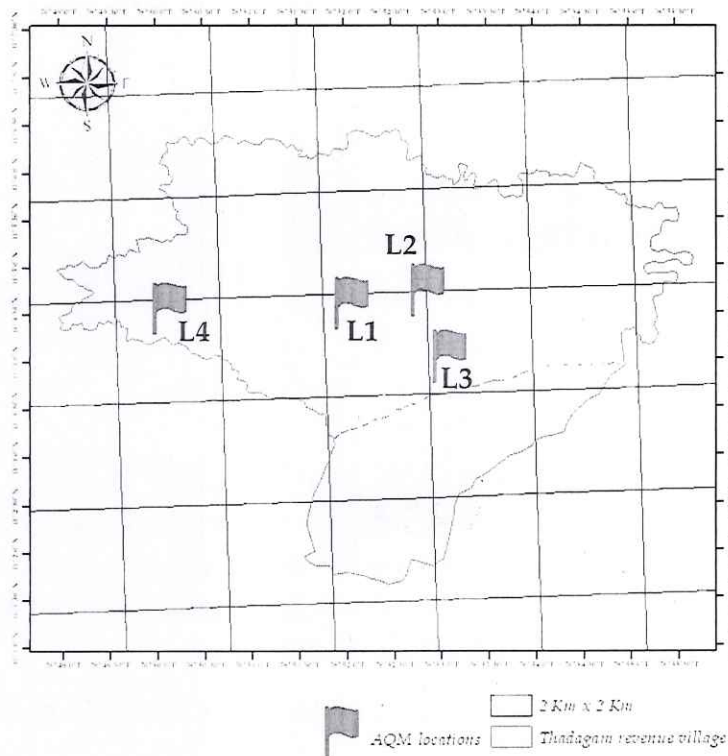


Figure 2 AQM locations in Thadagam revenue village area.

L1: Chinna Thadagam; L2: Madathur; L3: Kalainur; L4: Mangarai

PM₁₀/PM_{2.5} sampler (Make: Envirotech Model: APM 550M) was used to collect air samples at an average flow rate of 16.67 L/minute. Preconditioned and pre-weighed microfibre filter papers (Whatman, UK) were used for particulate sampling during ambient air quality monitoring. Monitoring and sampling followed the guidelines set by the Central Pollution Control Board (CPCB) and the Bureau of Indian Standards (BIS). A 15-day measurement was conducted to collect air quality samples using Whatman microfibre filter papers to determine the PM mass. PM₁₀ and PM_{2.5} samples collected on the Teflon filter media were used to calculate the atmospheric PM₁₀ and PM_{2.5} concentrations in the Thadagam region following the gravimetric method.

24-hour mean atmospheric PM₁₀ concentration varied between 5 and 62 µg/m³ across the air quality measurement locations at the Thadagam Valley. The highest mean PM₁₀ concentration (27 µg/m³) was recorded at the L2 (Madathur) location and the lowest mean PM₁₀ concentration was recorded at L1: Chinna Thadagam (17 µg/m³) during the measurement period. The daily average PM₁₀ concentration was recorded well within the 24-hour average NAAQS limit of 100 µg/m³ for ecologically sensitive areas.

Again, the 24-hour average ambient PM_{2.5} concentration varied between 5 and 51 µg/m³ across the air quality measurement locations. The highest mean PM_{2.5} concentration was recorded at L2: Madathur (15 µg/m³) and L3: Mangarai (15 µg/m³) during the monitoring period. The daily average PM_{2.5} concentration was recorded well within the 24-hour average NAAQS limit of 60 µg/m³ for ecologically sensitive areas (Figure 2).

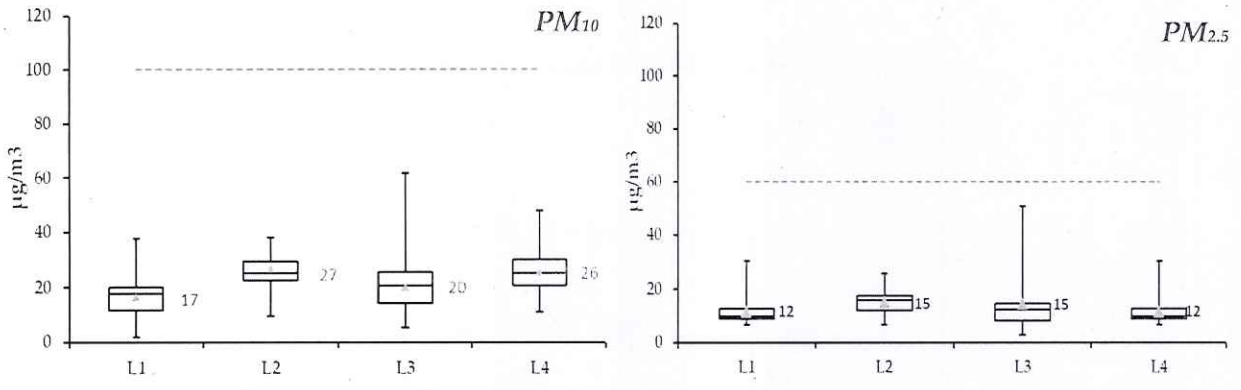


Figure 3 15-days atmospheric PM_{10} and $PM_{2.5}$ concentrations at the AQM locations.
 L1: Chinna Thadagam; L2: Madathur; L3: Kalainur; L4: Mangarai

The ratio of $PM_{2.5}/PM_{10}$ varied from 0.46 to 0.75 (Table 2) across the air quality measurement locations. A higher $PM_{2.5}/PM_{10}$ ratio indicates that the contribution from combustion sources is more prevalent than the dusty sources in the study area. This can be attributed to the release of fine particulate fractions from locally polluting activities such as tailpipe emission, biomass burning, etc.

Table 2: Mean ambient PM_{10} and $PM_{2.5}$ concentration at selected air quality measurement locations in the Thadagam study area

Location	PM_{10} ($\mu\text{g}/\text{m}^3$)	$PM_{2.5}$ ($\mu\text{g}/\text{m}^3$)	$PM_{2.5}/PM_{10}$
L1	17 ±7	12 ±6	0.71
L2	27 ±8	15 ±5	0.56
L3	20 ±9	15 ±12	0.75
L4	26 ±10	12 ±6	0.46

L1: Chinna Thadagam; L2: Madathur; L3: Kalainur; L4: Mangarai

UAV survey at Thadagam valley

A drone-based survey of the Thadagam revenue village area was undertaken to assess the environmental degradation due to illegal mining of earth and brick kiln activities in complementary to the data available with Geology and Mining, Government of Tamil Nadu.

The survey was conducted following the methodology flow chart below,

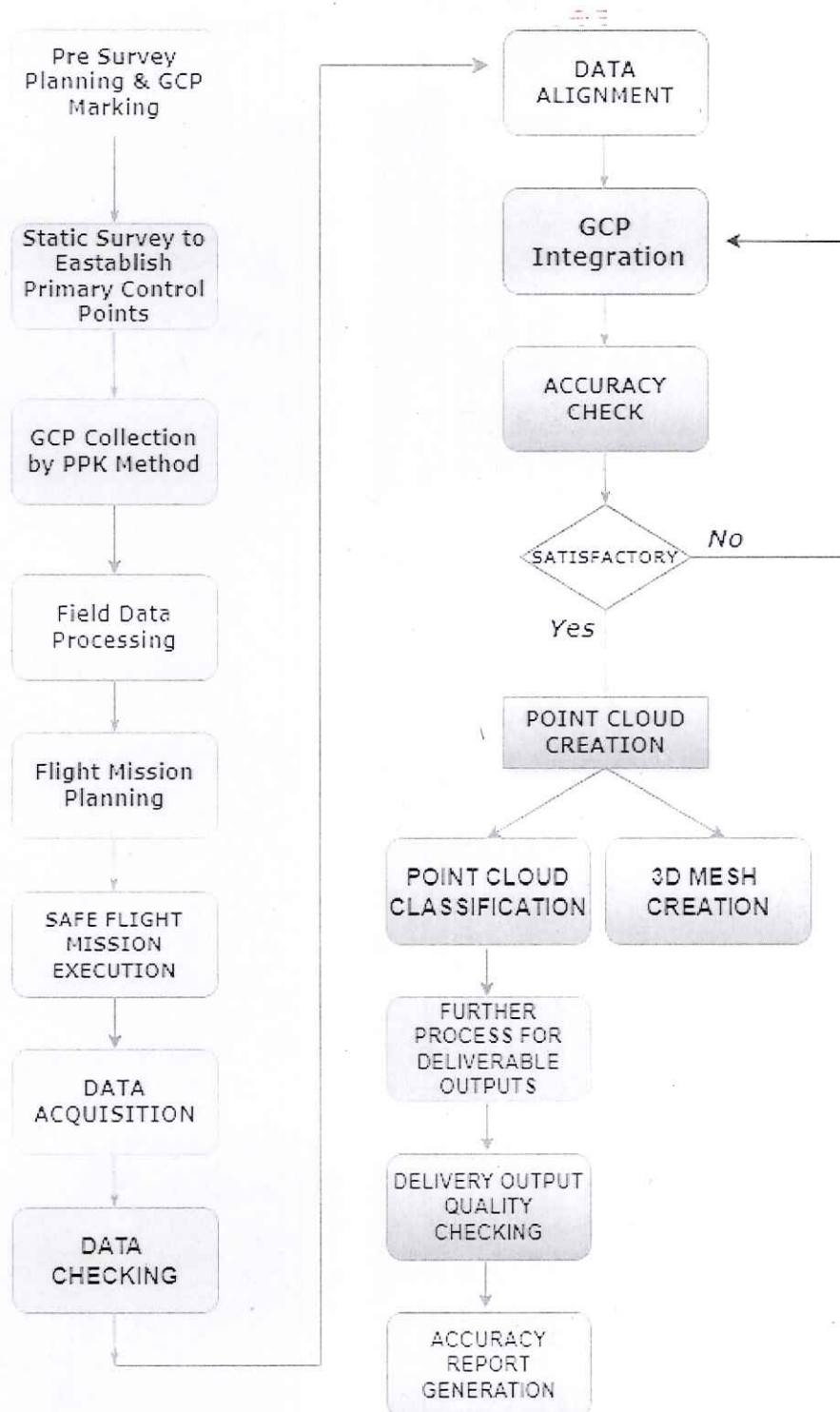
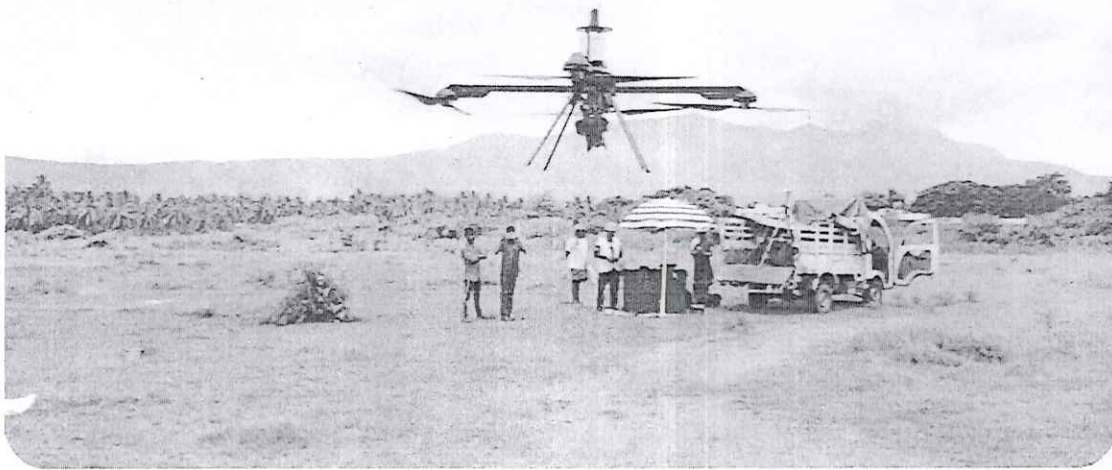


Figure 4 Flow chart of methodology of the UAV survey at Thadagam revenue village area.

Field Survey

A Field Survey was conducted spanning two days. Seventy-two Ground Control

Points (GCP) were surveyed along with UAV image-capturing flights.



Primary Control Point Survey

The base was established at 02 suitable locations. Trimble R12i GNSS receiver (S/N: 6407714596) was connected in rover mode and observations were taken in Static Survey Style for 04 hours & 06 hours 35 minutes respectively. The resulting files were uploaded to Trimble Inc's online post-processing service (Trimble CenterPoint RTX Post Processing) and the global co-ordinates were extracted



Table 1.1 Geographic coordinates of primary control Establishment of a base station point

ITRF2014 at Epoch 2024.41		
Coordinate	Value	<i>a</i>
x	1419805.586 m	0.008 m
y	6097328.596 m	0.017 m
z	1217596.710 m	0.006 m
Latitude	11° 04' 42.27329" N	0.005 m
Longitude	76° 53' 30.70919" E	0.006 m
El. Height	404.887 m	0.019 m

ITRF2014 at Epoch 2024.41		
Coordinate	Value	<i>a</i>
x	1424444.816 m	0.009 m
y	6096207.205 m	0.019 m
z	1218073.248 m	0.007 m
Latitude	11° 04' 57.73125" N	0.006 m
Longitude	76° 53' 53.46182" E	0.007 m
El. Height	458.961 m	0.020 m

The global co-ordinates which were given in geographic co-ordinate system were then converted to projected co-ordinate system. The resulting UTM co-ordinates are given in the table below,

Table 2 UTM co-ordinates of PCP

NAME	Northing (m)	Easting (m)	Elevation (m)
PCP 01	1225304.962	706654.656	404.887
PCP 02	1225750.028	701878.854	458.961

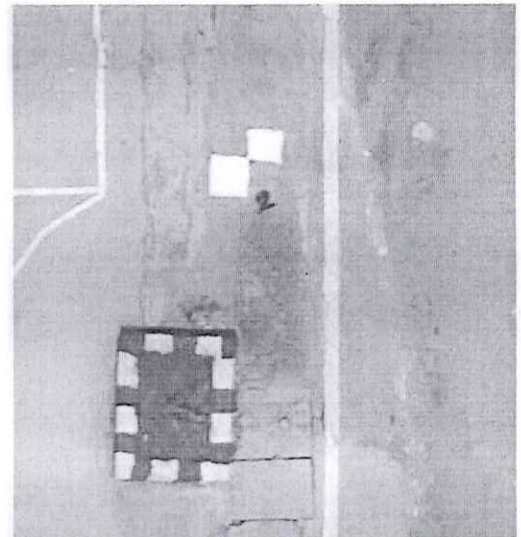
After completion of the above-mentioned surveys, seventy-two Ground Control Points were marked in such a way that they are well distributed over the study area.

The markings were done in such a way that they were visible in the images captured by the UAV

Ground Control Points Survey

To conduct a Ground Control Point (GCP) survey, both the Trimble receivers were used. The point collected on the previous day was used as base and the receiver with s/n 6407714596 was connected with the TSC5 Controller and started in the base mode.

Next receiver bearing s/n 6408714873 was connected with the controller in rover mode and the ground control points were observed. For each point, a minimum of 05 minutes of observation time was used (Figure 5). The global UTM co-ordinates of the points are listed in the table below.



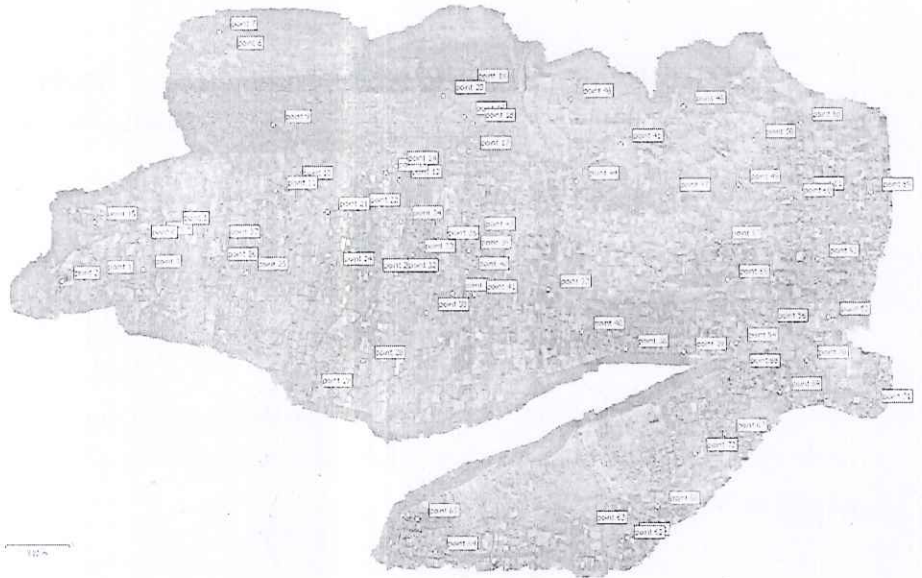


Figure 5 GCP marking in the Thadagam revenew village area.

Flight Planning & Execution

A thorough inspection of the site was conducted to determine the presence of any obstacles on the UAV's flight path. Minor adjustments were made to the flight area. The polygon thus created was used to plan flying missions. The flight planning software, BlueFire Touch (ideaForge Technology Ltd., India) was used to generate the flight plan. ideaForge Q6 UAV with a 24MP Daylight Camera was used for the UAV survey.

Parameters used for flight planning:

Altitude: 100 m

Side Overlap: 70%

Frontal Overlap: 80%

Photo Mode: Distance Interval

By using such flight parameters, a flight plan was generated. The image accusation phase was completed in a span of several weeks.

Intermittent checks were carried out to see whether the GCPs that were painted on the ground were still visible or not. Re-painting was done as and when needed.

The GNSS base receiver (s/n 6407714596) was again used as a point of reference for the UAV for carrying out Post post-processed kinematics corrections.

The actual position of the receiver was not changed from the position that was used during the Primary Control Point (PCP) Survey as well as the Ground Control Point (GCP) survey. A total of 64088 images were captured during the UAV survey. After completion of each flight, the images were geotagged using the Geotagging software MapAssist (ideaForge Technology Ltd., India) by incorporating data from the base receiver and the UAV.

A Digital Elevation Model (DEM) is the simulation of the bare ground (bare earth) topographic surface of the Earth excluding trees, buildings, & any other surface objects. It is often used in geographic information systems (GIS) and other geospatial analysis applications such as land use planning, environmental assessment, disaster management, & urban planning.

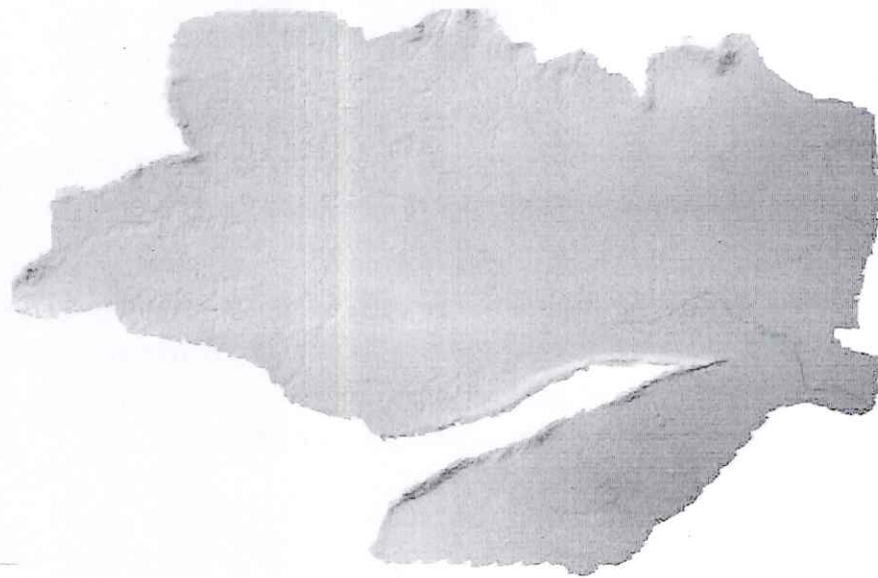


Figure 6 Digital elevation model of Thdagam village area

A Digital Surface Model (DSM) is a digital representation of the Earth's surface, including all objects on it, such as trees, buildings, & other structures. DSMs are created by processing drone images & generating a point cloud that includes all surface features.

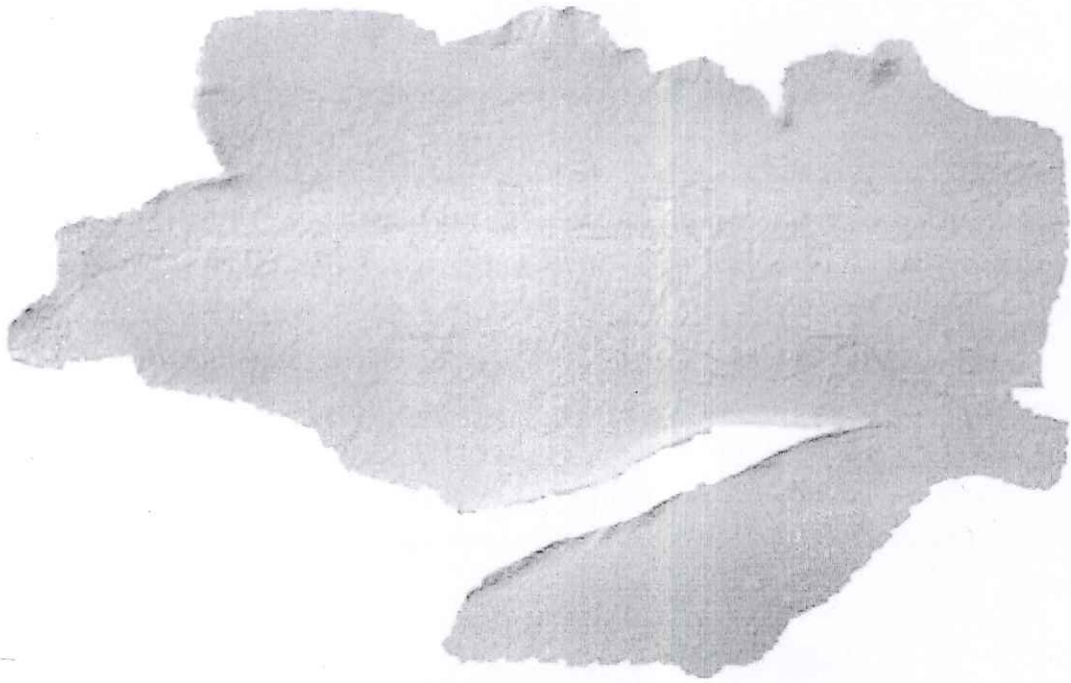


Figure 7 Digital surface model of Thadagam village area

The DEM and the DSM were used for the contour analysis and analysis of the earth mining in the Thadagam revenue village area.

An ortho-mosaic is an image that is orthographically corrected. An orthoimage can be generated based on either DEM or DSM; DSM-based orthoimage is called a true orthoimage which is geometrically corrected, all distortion removed (e.g., tangential scale distortion, elevation displacement, etc.) images in which scale is uniform.



Figure 8 Orthomosaic model of the Thadagam village area.

The analysis of the contour map suggests that the average elevation of the surveyed area of the Thadagam revenue villages is 532 m with a range between 456m and 758m (MSL).

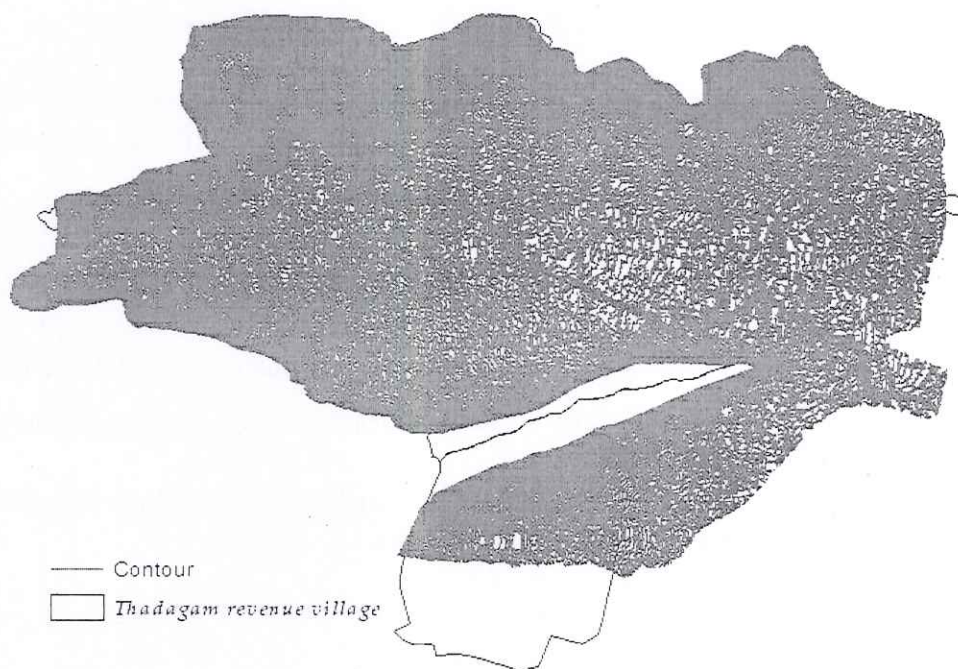


Figure 9 Contour mapping of Thadagam revenue village area.

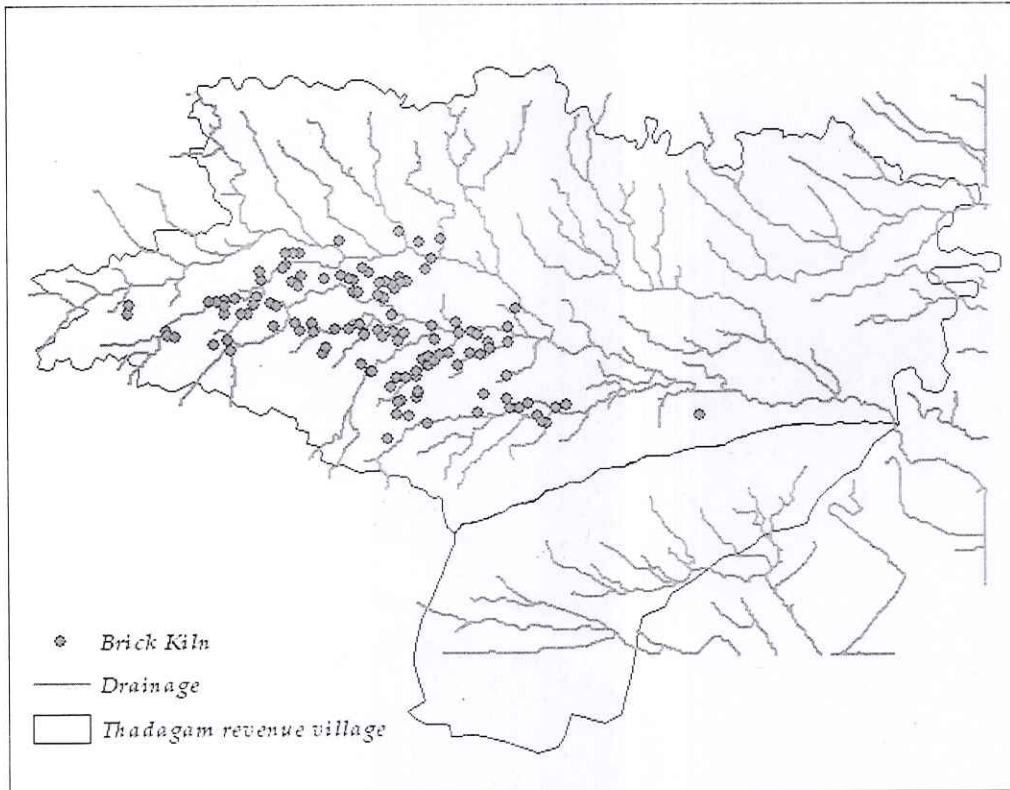


Figure 10 Drainage mapping and brick kilns in the Thadagam revenue village area

The analysis of the drainage network and the location of brick kilns indicates that the brick kilns were mostly built up at the side of the river channels. However, part of the brick kiln area might have overlapped the drainage channels in some cases.

Activities to be undertaken at Thadagam revenue village area

- Soil samples to be collected from selected locations in the Thadagam Valley area to analyze the C, N, P, and K losses due to the operation of brick kilns and earth mining activities.
- Biomass carbon loss will be estimated through a sample survey at the Thadagam revenue village area.
- The earth mining areas will be identified through the analysis of the UAV survey dataset and the total amount of soil extraction will be estimated through the DEM.
- After completion of Task 1 and Task 2, these datasets will be used to estimate the environmental compensation
- Finally a road map for rejuvenation of the Thadagam revenue village area will be undertaken in consultation with major stakeholders.

Timeline

TERI will complete the assessment in Eight months following the monthly activities as specified below;

Activities	Month							
	1	2	3	4	5	6	7	8
Activity: 1	■							
Activity: 2	■	■	■	■				
Activity: 3				■	■	■		
Activity: 4						■	■	
Submission of Report								■

About TERI

TERI, established in 1974, is a unique country institution, deeply committed to every aspect of sustainable development. All activities in TERI move from formulating local and national level strategies to suggesting global solutions to critical urban development and infrastructure related issues. It is with this purpose that TERI has established regional centres in Bangalore, Goa, and Guwahati and a presence in Japan, Malaysia, Russia, and the United Arab Emirates. It has also set up affiliate institutes: TERI-NA; Washington DC, USA and TERI Europe, London, U K and on the Asian continent in Japan, Malaysia, and the Gulf.

TERI has been active in assisting the central and the state governments in developing policies and strategies for provision of basic services and transport systems that achieve social, environmental (local and global), and economic goals. As the issues in the development sector are multifaceted and require several interventions in an integrated manner, TERI seeks to develop potential solutions in collaboration with internal and external groups. TERI has built its work philosophy around quality, flexibility, and attention to the implementation issues. This has been demonstrated in several assignments with central and state governments in India, utilities, including public and private sector and multilateral organizations.

TERI has been endorsed as the Regional Water Knowledge Hub for water and climate change adaptation in South Asia by the Asia-Pacific Water Forum's Governing Council. TERI focuses on suggesting global solutions to formulating local and national level strategies on natural resources, critical rural & urban development and infrastructure related issues.



The Energy and Resources Institute

www.teriin.org

**THE HON'BLE NATIONAL GREEN
TRIBUNAL SOUTHERN ZONE,
CHENNAI.**

Original Application No.119 of 2021

Suo Motu based on the News Item published in Dinamalar Tamil Newspaper, Chennai edition dt. 14.04.2021 under the caption "All over the village is dust land. It deforms the village along with lives".

Vs

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**REPORT OF FILED ON BEHALF OF
THE FOURTH RESPONDENT -
TAMIL NADU POLLUTION
CONTROL BOARD IN THE MATTER
OF O.A.NO.119 OF 2021**

**Advocate for Respondent: - TNPCB
Thiru.C. Kasirajan,
Advocate, Chennai.**

Date:22.11.2024.

Next date of hearing on:06.12.2024

