IN THE HIGH COURT OF JUDICATURE AT MADRAS

(SPECIAL ORIGINAL JURISDICTION)

W.P.No.18888 of 1997

and

W.P.No.13105 of 2008

Sri Sai Nagar Residents Welfare Association (Regd. No.414/97) Thoraipakkam, Chennai-600 096 and 98 others .... Petitioners

Vs

The State of Tamil Nadu, represented by its Secretary to Government, Environment and Forest Dept., Fort St. George, Chennai-600 009 and 7 others .... Respondents

W.P.Nos.24067 & 24068 of 2008

M/s California Software Company Limited & another .... Petitioners

Vs

Union of India rep by its Secretary to Government, Ministry of Environment and Forest and others .... Respondents

THIRD REPORT SUBMITTED BY THE COMMITTEE OF EXPERTS CONSTITUTED BY THE HON'BLE HIGH COURT

☞ **TERMS OF REFERENCE**: By order dated 25th March 2008 in the above writ Petitions this Hon'ble Court, constituted a Committee of Experts to submit a report -

(i) as to the suitability of the present site for usage and the continuance thereof as a municipal solid waste ground and location of the sewerage treatment plant;

(ii) to review compliance of the various legislations, guidelines, rules and regulations in relation to dumping of solid waste and discharge of sewage;

(iii) to review the earlier studies done by various agencies including M/s. ERM consultants, Tahal Consulting Engineers, the National Productivity Council and other consultants and institutions.

(iv) to review the measures undertaken and proposed to protect the Pallikaranai Marsh and render requisite suggestions for restoration and protection of the marsh.

(v) to suggest measures for remediation of the land and the ground water, flora and fauna in Pallikaranai Marsh and the four villages, viz. Seevaram, Pallikaranai, Thoraipakkam and Perungudi in the light of the dumping of Municipal Solid Waste (MSW) effected and discharge of sewerage.

(vi) to consider the cumulative aspects of dumping of MSW, discharge of sewerage and conversion of the marsh lands to other use and to suggest scientific alternative methods of dumping of MSW and discharge of sewage in the light of the methods adopted in other countries in this regard.

(vii) to recommend the steps to be taken and measures to be adopted for protection and restoration of Pallikaranai Marsh.

(viii) to conduct public hearing to ascertain the views of the residents of the four villages, viz. Seevaram, Pallikaranai, Thoraipakkam and Perungudi.

(ix) to ascertain the life of Perungudi dumping ground and suggest long-term suitable measures for the extension of life of the dumping ground.

INTERIM REPORT: The Committee of six (6) members after holding a series of meetings and consultations, in addition to public meetings and public hearing, submitted the Second Interim Report to this Hon'ble Court on 19.10.2008 covering issue numbers i) to iv) and vii):

i) On the issues as to the suitability of the present site for usage and the continuance as a municipal solid waste ground and *on compliance of the various legislations, guidelines, rules and regulations in relation to dumping of solid waste and discharge of sewage*, the Committee after holding a public hearings and consultations with experts, review of

earlier reports and site inspections came to the conclusion that the present site **is not suitable for dumping of municipal solid waste, as also not suitable for building a sanitary land fill or for any other activity, and that it needs remediation and that the siting of the dump yard and the handling of waste is in violation of the Municipal Solid Waste (Management and Handling) Rules 2000 framed under Environment Protection Act and The Ramsar Convention on Wetlands (1971)**.

ii) On the issue of the measures undertaken and proposed to protect the Pallikaranai marsh and render requisite suggestions for restoration and protection of the marsh, the committee reviewed the proposal of the Corporation of Chennai for an integrated Municipal Solid Waste facility comprising of for in situ composting, making fuel brickets out of waste so as to derive Refuse-Derived Fuel (RDF) for generation of electricity and came to the conclusion **that the proposal is environmentally unsound, is a cause for great concern to public health and cannot be legally sited within in the Pallikaranai marsh**

This report will focus on the remaining issues:

(i) Suitability of the present site for the Sewage treatment Plant discharge of sewage and legal compliance;

(ii) Suggesting measures for remediation of the land and the ground water, flora and fauna in Pallikaranai marsh and the four villages, viz. Seevaram, Pallikaranai, Thoraipakkam and Perungudi in the light of the dumping of Municipal Solid Waste (MSW) effected and discharge of sewerage;

(iii) The cumulative aspects of dumping of MSW, discharge of sewerage and conversion of the marsh lands to other use and to suggest scientific alternative methods of dumping of MSW and discharge of sewage in the light of the methods adopted in other countries in this regard;

(iv) Recommending the steps to be taken and measures to be adopted for protection and restoration of Pallikaranai marsh.

BACKGROUND OF THE MARSH:

a) The Pallikaranai Marsh falls within Perungudi and Pallikaranai villages of Kancheepuram district. The wetland runs along the old Mahabalipuram road parallel to the Buckingham Canal throughout its length. The marsh is situated adjacent to Velachery also known as Vedashreni. While Velachery is located towards northwest of this marsh, Taramani is towards north, Perungudi to northeast, Madipakkam to the west, Perumbakkam to the southwest and Sholinganallur towards the southeast. Pallikaranai is an extensive low lying area, covered by mosaic of aquatic grass species, scrub, marsh, and water-filled depressions. The wetland adjoins the south Chennai aquifer that runs parallel to the old Mahabalipuram Road. The aquifer originating from the south of Thruvanmiyur extends upto the Kovalam Creek on the South (Patnaik, 2002). The general terrain of the area is plain with an average altitude of about 5 m above mean sea level. The substrate in the entire region is made up of the weathered Charnokite rock bed (Patnaik, 2002), covered with a layer of alluvial soil of varying thickness.

b) The Pallikarnai Marsh is amongst the few and last remaining natural wetlands of south India. Till about 30 years ago the Marsh spread over an area of more than 5000ha (50km^2). Lack of understanding of the importance of a marsh in an urban environment as a flood regulator, lung space and environmentally a high productive habitat has resulted in the marsh being reduced to around one-tenth of its original extent on account of ill-planned urbanization, destructive reclamation, dumping of solid and liquid waste generated by the urban Society. Locally known as **Kaiveli** (a generic Tamil name for marshes and swamps), the Pallikaranai marsh drained about 250 sq km. The numerous smaller wetlands that surrounded the

marsh served as the only source of irrigation for the area, which thrived on paddy cultivation. This gave the marsh a legendary status since the villages did not need wells or dug out ponds for irrigation which is the norm in the northern districts of Tamil Nadu[1].

Flow chart of City suburban tanks in Thambaram draining into Pallikaranai Marsh

(Source: Role of public governance in the conservation of urban wetland system:

[1] Vencatesan, J (2008) Protecting Wetlands. *Current Science, Vol93:3August, 2007 p 288-290*

c) **Despite the onslaught of ill planned urbanisation, the Marsh has survived due to its unique ecology – it being partly saline and largely freshwater**. This more or less flat low-lying land has sustained an ecosystem by draining the storm water from large areas of southeast Chennai into the Bay of Bengal. The most important link – in fact the aorta of the ecosystem, is the narrow canal at Okkiyanmadavu that takes the Marsh's water into the sea. Despite the flow being interrupted by the Buckingham Canal during the past 100-150 years, the Okkiyanmadavu has been vital to the sustenance of the Pallikarnai Marsh by allowing the storm water to drain into the sea during the monsoons and letting the seawater enrich the ecosystem during the non-rainy months. In a nutshell, it may be said that the Okkiyanmadavu canal is not only the aorta, but also the pulmonary vein of the Pallikarnai Marsh.

d) The entire ecology of the Marsh is sustained by the seasonal hydrology in general and the mixing of sea and freshwater in particular. As is well-known, freshwater wetlands that are in the stage of marshes are unstable as they eventually transform to grasslands and then to scrub and forests due to the semi-aquatic and terrestrial plants that over-run the habitat. It is only the mixing of seawater that sustains marshes as very few plants are adapted to living in saltwater systems and as they cannot survive elsewhere have evolved 'life-styles' that mutually sustain the ecosystem and the living communities of plants and animals that depend on them. In other words, the freshwater-salt marsh ecosystem is one that is delicately balanced in nature and is sustained by a set of equally fragile ecological communities. Relentless large-scale onslaught on the marsh by reclamation and dumping of Municipal Waste resulting in fragmentation of the wetland, compounded by discharge of sewage will result in collapse of this sensitive ecosystem and its function as an important flood sink.

Suitability of the present site for the Sewage treatment Plant, discharge of sewage into the marsh and legal compliance:

a) The original Sewage Treatment Plant (STP) of the Chennai Metropolitan Water Supply and Sewerage Board (Metrowater) at Perungudi, located adjacent to existing municipal dumpsite was not working properly for a number of years and was discontinued in the year 1996, resulting in discharge of sewage onto the garbage dumpsite, which finally joined the Pallikarnai Marsh. Subsequently some units were replaced except sludge digesters and the modified (upgraded) STP is functioning since 2006. Earlier, sewage from South Chennai was piped to Nesappakkam STP. This has now been partly diverted to Perungudi (STP). A separate STP of the Alandur Municipality built along side Metrowater's STP is used for treating sewage from Alandur.

b) Details of the STP design and functioning as furnished by Metrowater are annexed as **Annexure A** to this report. As per the details furnished, The STP has an inflow of 2.25 ML/hr (million liters of sewage per hour), with a maximum flow of 5.30 ML/hr. The installed capacity of the plant is 54 Million Liters per day (MLD) with the peak inflow of 135 MLD. There is a proposal to establish another STP of 60 MLD. The data furnished by Metrowater regarding the functioning of the STP was referred to an independent expert Dr.T.Swaminathan, Professor, Chemical Engineering Department, Indian Institute of Technology, Chennai who gave the following opinion regarding the veracity of the data:

> "I've gone through the documents you'd sent. On the face of it, the plant appears to be running OK. But what puzzles me is the consistency of the data. Since there is no equalization tank, the raw sewage must be pumped directly from the pumping station, but it seems to have a constant quality. It's known that STPs usually have a lot of variation in daily performance due to several factors. But without any control mechanism this plant seems to have a very stable operation.
>
> We'ld also get more details on the gas production rate in the digesters and the power generation from the gas engine. I believe

the gas is directly used in the gas turbine for power generation. What happens to it after that? What is the H_2S level in the gas produced? How is the treated effluent discharged?"

Dr.V.N.Raydu, former, Tamil Nadu Pollution Control Board was also of a similar view

"I went through the Perungudi STP plant details. As pointed out by Dr. T Swaminathan, I too have the same doubts. On top I have a feeling that the Sewage being pumped is in excess as the plant is designed for 54 MLD where as the peak flow is 135 MLD and the plant has no stabilization tank."

c) Members of the public have vehemently opposed the continuance of the two STPs at the public hearing and at other interactions with members of the committee during site visits on the grounds that -

i) The original treatment facility on the site was to supply treated sewage for agriculture but that it had failed and was in disuse for more than a decade, during which time sewage was discharged untreated into the marsh;

ii) While renovating and expanding the STP in 2006, Metorwater had represented to the local residents that the plant was being modernized, that there will be no smell due to the operation of the STP, that treatment of sewage will be of a high standard and that the treated water would be piped and discharged into the Buckingham Canal, thus sparing the marsh of pollution;

iii) That the siting of the STP would have no ill effects on the local residents;

iv) This assurance was not kept up and that the sewage is not properly treated, untreated and poorly treated sewage overflows onto the Marsh;

v) That foul smell from the STP constant permeates the vicinity and makes it unbearable for the local residents and that

vi) the MSW dump and sewage treatment plant are a serious ecological threat to the Pallikaranai Marsh.

The local residents had submitted photos and video clips showing overflow of sewage from the STPs.

d) Several visits to the STPs were done and in particular, Mr. R. Swaminathan (former NEERI) and Mr. A. Krishnamurthy (TNPCB), Members of the Committee, accompanied by Mrs. Jaishree Vencatesan, Scientist and Special Invitee visited the Sewage Treatment Plant of CMWSSB and Alundur Municipality at Perungudi on 2nd June 2009 between 0900 hrs and 1100 hrs. The over all observations were that

   i) The installed capacity of the STP is 54 MLD (2.25 ML/hr) with a peak flow rate of ~~to~~ 5.3 ML/hr.

   ii) Generally, collection or balancing tank are provided to take care of shock load during the peak flow period. This helps to provide uniform quantity of sewage to all treatment units. However in this case no such collection tank has been provided. In view of the increased flow for a few hours during peak flow period, there is lowering in retention or detention time which is the minimum time required for reactions to complete (physically, chemically or biologically). The end result is the presence of high organic matter in the final effluent as expressed in terms of BOD – Biological Oxygen Demand and COD – Chemical Oxygen Demand).

   iii) The excess Sludge from the Secondary clarifier, (which is aerobic in nature), instead of being taken to drying beds, is being drained into channel that connects the primary settling tank. This increases the solid load in the primary clarifier; reducing its efficiency and possibly also reducing gas production in the bio digester.

   iv) The all-pervading foul odour in the vicinity of the STP cannot be totally eliminated, putting that local residents at a great risk of being constantly exposed to the harmful effects of Methane, and other noxious gases such as hydrogen sulphide. a neurotoxin, particularly detrimental to children,

v) The maturation ponds for final polishing treatment are located on the Pallikarnai Marsh. During heavy rains, water level in the Marsh land increases and mixes with the sewage of these ponds thus contaminating water in Marsh land.

vi) During the site visit on 2nd June 2009, it was observed that the effluent after passing through the polishing pond, was not discharged into the pipeline leading to the Buckingham Canal as was the stipulation prior to construction, but on to the Marsh, through the Chennai Corporation's solid waste dumpsite due to breakage of the chamber connecting the pipeline. It was reported that the MSW was deposited over the pipeline and chamber and that the chamber could not withstand the load and collapsed. Thus the effluent is not being discharged into the pipeline. The final sump is also full and the effluent overflows from the drain (connecting the polishing pond to the sump) to the adjoining area. It was observed that the adjacent area looks like a lagoon. This may lead to contamination of ground water and odour problem in addition to aesthetic values.

vii) The members could not approach the collapsed chamber due to heat generated by garbage dump fire, which is continuing inspite of specific orders against burning by this Honorouble Court.

viii) Analytical data of output sewage quality made available by the Contractor does not have much variation in quality which is highly improbable. This raises a question over the integrity of analytical results.

ix) During the visit on 2nd June 2009, the condition of BOD bottles kept in the incubator was observed. All the bottles had air bubbles inside as the sample had either dried out or not fully filled. The air bubbles will aid aeration giving low BOD values. This is against the standard practice. This clearly shows that the staff in the laboratory do not follow standard protocols.

e) <u>Sewage Treatment Plant of Alandur Municipality</u>

The STP belonging to Alandur Municipality is located adjacent to CMWSSB, Perungudi. The STP consists of only aeration tank and clarifier. During the visit, on 2nd June around 10 AM, the final effluent looked like untreated raw sewage. A lot of floating matters were present in the final effluent indicating none of the unit was functioning i.e what is entering was coming out. When contacted the Plant Manager informed that this happens during the peak flow. However, even during peak flow time, atleast the solid floating matter should get filtered, which was not so in this case. Clearly the functioning of the plant is most unsatisfactory.

f) A detailed report of their visit and analysis of the functioning of the STP is annexed as **Annexure B**. The conclusion of the Committee is that:

i) The overall operational conditions of both the STPs are not satisfactory and insufficiently treated sewage is being discharged, polluting the Marsh. In view of the uncertainties in the sampling and analytical protocols adopted by the contractor WABAGAG for the Metrowater plant, it is recommended that an outside agency should conduct the performance evaluation of STP at least once a year.

ii) The location of Maturation ponds is in the vicinity of Pallikarnai wet land will lead to flooding and effluent after passing through the polishing pond following into the wet land, while still containing pathogenic bacteria. Humans and animals will be affected with bacterial infection when exposed to polluted Pallikarnai water. Thus Maturation ponds have to be replaced with other technologies having least impact.

iii) The gas analysis before and after digestion is not monitored. If the gas is not properly utilized the exhaust gas may contain green house gases.

iv) No emergency preparedness plan (EPP) exists, which will lead to pollution of the marsh and ground water contamination, as is currently happening due to collapse of the inspection Chamber.

v) The part of Pallikarnai wet land is already a reserve forest and the rest are likely to be declared as Reserved Area, which needs to be protected.

The Draft Regulatory Framework for Wetlands Conservation issued by the Ministry of Environment and Forest prohibits

(1) Conversion of wetland to non-wetland use.

(2) Reclamation of wetlands

(3) Solid waste dumping and discharge of untreated effluents.

(4) Any other activity to be specified in writing, which according to the Committee constituted in accordance with section 9,10 and 11 of the Rules, may have adverse impact on the ecosystem of the wetland.

Thus sewage even if it is said to be treated cannot be permitted to mix with Pallikaranai wet land either directly or indirectly.

The committee therefore recommends that:

a) The existing Sewage Treatment Plants of both Metro water and Alandur Municipality be shifted elsewhere since the present in close proximity to residential area coupled with insufficient treatment is resulting in

i) local residents being constantly exposed to the harmful effects of Methane, and other noxious gases such as hydrogen sulphide, a neurotoxin, particularly detrimental to children;

ii) obnoxious odor (which cannot be totally eliminated with the best of treatment) and consequent health hazard to local residents;

iii) Contamination of the entire marsh and the Ground water table;

iv) the sensitive marsh ecosystem is being adversely effected, which may lead to collapse of the ecosystem over a period of time;

v) the total Lack of emergency protocol for the STPs will exasperate the current stress on the marsh, contaminating the entire marsh land

b) **The proposed 60 MLD Sewage Treatment Plant, adjacent to the existing 54 MLD pland** should not be allowed for the following reasons:

i) In light of the sensitive nature of the neighbouring ecosystem, and the flood proneness of the current sites of the two STPs, any further expansion adversely affect the marsh and its ecosystem.

ii) **Total Lack of Emergency Protocol:** As discussed about**,** effluent from the polishing ponds could not be discharged into the pipeline leading to the Buckingham Canal due to collapse of the chamber, which could not be repaired even after a lapse of 3 months. If the proposed 60 MLD STP is established, the situation would be become severe and damage to Marsh area may become irrepairable.

iii) No approval from the TNPCB has been obtained and no Environment Impact Assessment study has been one, which are pre-requisites for such a plant. However, work appears to have started without such clearances.

iv) No STP should be allowed in the present location unless, zero discharge (not possible for sewage) is achieved from the existing and proposed STPs. It is therefore preferable to shift the STP elsewhere so that there is no impact on the neighbourhood environment including odour, release of Methane, and Hydrogen sulphide, resulting in health hazards.

☞ **Suggesting measures for remediation of the land and the ground water, flora and fauna in Pallikaranai marsh and the four villages, viz. Seevaram, Pallikaranai, Thoraipakkam and Perungudi in the light of the dumping of Municipal Solid Waste (MSW) effected and discharge of sewerage;**

The Committee recommends the following steps to be taken and measures to be adopted for protection and restoration of Pallikaranai marsh.

a) **Restoration Plan for Pallikaranai Marsh:** A detailed Restoration plan has been worked out in consultation with the Forest Department, Tamil Nadu Pollution Control Board, CARE EARTH, a research organization and ecologists, which is annexed as Annexure C along with detailed maps. The status of biodiversity suggests that there is still scope for restoration of the marsh. The following table presents a consolidation of the number of species of plants and animals found in the marsh, although it is to be

stated that the diversity continues to increase with two-three new records every year.

Plant/Animal groups	Number of species
Plants	114
Butterflies	7
Crustaceans (crabs and prawns)	5
Mollusks (snails and clams)	9
Fishes	46
Amphibians (frogs and toads)	10
Reptiles	21
Birds	115
Mammals	10
Total	337

b) Recommendations: The continued survival and functioning of the Pallikarnai Marsh ecosystem rests entirely on its hydrology. It is imperative that the mixing of sea water and the storm water continues without any interference. When the inflow of sea water is curtailed, the Marsh would transform itself into a freshwater system (highly contaminated) which is unstable and eventually will be over-run with terrestrial plants. The following action is recommended for the restoration and conservation of the Pallikaranai Marsh:

Sl. No.	Entity	Survey Nos.	Suggested actions for restoration
1	Pallikaranai Forest Block	657/3E	It is understood that Construction of the Interpretation Centre and the Viewing Decks in 657/3E has been planned by the Forest Department Critical that the southern part of 657/1B3 be also included in the RF so that cleaning operations, removal of silt and garbage in and around the culverts, removal of water hyacinth and other aquatic weeds, deepening of the mid portion of the marsh can be taken up. Also important to

Sl. No.	Entity	Survey Nos.	Suggested actions for restoration
			enable access to the proposed interpretation centre and viewing decks for monitoring purposes. **Action required: S.No.657/1B to be handed over to the Forest Department by the Government of Tamil Nadu**
		657/3F, 657/3G, 657/3H, 657/3I, 657/3J, 657/3K,	Enforcing proper disposal of sewage from the adjacent residential complexes; to include punitive action against offenders. **Action required: TN Forest Department to take action against offenders.** Essential to maintain the depth of water in the zone. **Action required: TN Forest Department to maintain depth of water by preventing human and other activities that interfere with the integrity of the marsh as a Reserve Forest.**
		657/3C, 657/3D	On the Pallikarnai village side: marginal encroachment **Action required: TN Forest Department to take action against offenders.**
		657/3A3	Core area of the marsh: no intervention **Action required: No action required**
		453/2C	Creation of a minimal number of mounds – as bird perches; no planting of trees outside the mound – area abundant with 29 grass species **Action required: TN Forest Department to take action on the basis of the Management Plan developed for Pallikaranai Marsh as well as the advise of experts**
		432/1, 429/2, 433/1A, 433/1B, 433/1C, 433/1D, 433/1E, 433/1F, 433/1G, 4331H, 433/2A, 433/2B, 433/2C, 433/2D, 433/2E, 433/2F,	No measures to mitigate seasonal flooding: the exchange of water is critical to the sustenance of the marsh. **Action required: Joint operation by the TN Forest Department and Public Works**

Sl. No.	Entity	Survey Nos.	Suggested actions for restoration
			Department
		434/3, 430, 431	Area to be utilized for the planting of native or indigenous species of shrubs, herbs and trees: planting to be sparse and mixed, and not restricted to trees. **Action required: TN Forest Department to take action on the basis of the Management Plan developed for Pallikaranai Marsh as well as the advise of experts** First part faces the OMR: can function as the start up point of the proposed nature trail: 430 and 431 can be developed as the nature trail. **Action required: TN Forest Department**
2	Areas recommended for inclusion – vacant areas that constitute the marsh / floodplain	657/1A1 657/4A3, 657/4c, 657/3A1, 657/1B3,	Marsh immediately adjacent to the Velachery Tambaram Road – earlier notification included this zone as RF. Marsh that is critical to ensure the flow of water from the western suburbs of south Chennai. **Action required: Government of Tamil Nadu. This zone was inadvertently excluded in the declaration of the RF area. The TN Forest Department is to pursue the inclusion of this zone as RF**
		658/1A, 658/1C, 658/2	Northern most segment of the marsh: parts under encroachment; critical for connectivity to the wetlands of Velachery and Tarmani and also to ensure flow of water. **Action required: Government of Tamil Nadu to include this zone as Reserve Forest; the concerned departments being TNFD, Revenue Department and PWD**
		453/2B, 453/2A1	Eastern boundary of Pallikaranai village: partly under encroachment – critical to mitigate flooding of the Pallikaranai wetlands

Sl. No.	Entity	Survey Nos.	Suggested actions for restoration
			Action required: Government of Tamil Nadu to include this zone as Reserve Forest; the concerned departments being TNFD, Revenue Department and PWD
3	Perungudi – Seevaram (North-East)	658/1B, 721, 720, 719, 718, 717, 716, 715, 714, 713, 712, 711, 710, 709, 707, 706, 705, 704, 701 (part of KT Link Road)	Patta lands on the periphery of the Pallikaranai Marsh **Action required: In view of the criticality of the issue and the situation, the Chennai Metropolitan Development Authority should not permit any reclassification of land from agriculture or common lands to any other category. Should consider the land unsatisfactory for habitat development and discourage construction including residences or residential complexes.** **The Commissioner of Survey will immediately initiate a survey to mark the boundaries of the RF**
4	Mylai Balaji Nagar, Madipakkam (under Pallikaranai Village) (North-West)	660, 661, 664,689,690,680,681,691	
5	Thoraipakkam – Okkiyamthoraipakkam (South-East)	700,703, 440,452,692, 694,695,696,701	
6	Sholinganallur (South – East)	434/2c, 434/1E, 435/2A, 436, 437 and 680	
7	Pallikaranai Main Village (South)	638, 648, 650, 652, 655,654,655,656,395,396,453/1A, 453/1B, 453, 397, 398, 481, 482, 483, 484, 428, 427, 429/2A1, 429/2A2, 429/2A3, 429/1A3A, 429/1A3B, 429/1B, 429/1C	

The cumulative aspects of dumping of MSW, discharge of sewerage and conversion of the marsh lands to other use and to suggest scientific alternative methods of dumping of MSW and discharge of sewage in the light of the methods adopted in other countries in this regard;

a) The committee has already filed an interim report pointing out that the present site is not suitable for dumping of municipal solid waste, building of sanitary land fill, establishing STPs or use as a composting yard as it would destroy the Marsh and its eco system and is in total violation of the Municipal Solid Waste (Management and Handling) Rules 2000. The committee has also recommended that the marsh needs remediation, in consultation with the Department of Environment and Forest.

b) The Committee has also inspected the dump yard of the Alandur Municipality. This is situate on the Velacheri-Tambaram Road and right on the Marsh. The western portion of the Dump yard continues to have

standing water, which makes the site unsuitable for use as garbage dump as per the MSWM Rules 2000. Images of the dump site are annexed to this report. Inspite of specific orders of this Hon'ble Court against burning of waste, the burning continues and numerous complaints have been received by this committee from the public.

c) The committee has given detailed recommendations against the Corporation of Chennai's proposal for an integrated Municipal Solid Waste Facility to be setup by M/s. Hydroair Tectonics (PCD) Ltd. (HTPL) of Navi Mumbai in association with M/s. Shriram Energy Systems Ltd., on environmental and public health grounds. The committee has examined the application of M/s. Hydroair Tectonics (PCD) Ltd., made to the State Environment Impact Assessment Authority for environmental clearance for setting up the facility which is to include a sanitary land fill, composting and a plant to make fuel bricks from waste (Refuse Derived Fuel or RDF) to be use for generating electricity, all of which this committee has found to be unsuitable for establishing on a wetland. The committee had also come to the conclusion that RDF is environmentally unsound. A detailed review of the proposal of HTL to the State Environmental Impact Assessment Authority in Form No.1 is given in Annexure D. The proposed site in Survey No. 657/1-B1 appears to be right in the middle of the marsh, part of which is still garbage free. Total land requirement is stated to be around 35 acres. Out of which 25 acres is to be for the Power plant. The balance 10 acres is earmarked for landfill, compost yard, roads etc. The plant is to have

   i) Bio remediation of old accumulated waste
   ii) Composting or organic waste
   iii) RDF & Power plant
   iv) Recovery of plastics etc.,
   v) Inert into bricks
   vi) Landfill for rejects and not suitable for other processes
   vii) Life of the Landfill is expected to be 20 years and it is to be provided with leachate management, daily covers etc.,

d) The proposal is totally flawed for the following reasons:

(i) Any construction on this spot will severely fragment the marsh, obstruct free flow of water and negate all attempts to restore the marsh. As detailed in the II Interim Report, The Municipal Solid Waste (Management & Handling) Rules 2000 prohibits establishment of compost yard or land fill in any water body or wetland.

(ii) Leachate management will be myth since the site is right in the middle of the marsh and the compost yard is to be built on the garbage already dumped there. Leachate from the dump is continuously contaminating the marsh. Unless the present is remediated, leachate will continue from the past disposal activity. Without removal of the existing garbage dump, there can be no “Leachate management”.

(iii) For the land fill, earth excavation will have to be done. Under the MSWM Rules 2000, a minimum distance has to be maintained between the landfill bottom and ground water table. This will not be possible since there is standing water around the site and the bottom of the land fill will be below the standing water. Further, Leachate management will not be possible in standing water.

(iv) The application filed by HTL with the State Environmental Impact Assessment Authority in Form No.1 is devoid of details **on the** technology and the company’s experience in such technology. There is no mention on the success of this technology adopted elsewhere in India. As quoted from technical paper published :

> Reference : Municipal Solid Waste Management (MSWM) in India : A critical Review by Sudha Goel., Page 319 – 329
>
> “ Page 325 – At least 5-6 Urban Local Bodies (ULBs) in India had set up Waste-to-Energy (WTE) facilities like incineration, or pelletization without long term success. Several ULBs continue to plan and setup WTE projects underterred by the lack of success of other WTEs. At this stage in India, it is worthwhile for policy makers to review the deficiencies in the existing WTEs system (defunct and

functioning) and publish or make these reviews available in the public or at least practitioners in the field."

(v) There is a wide variation in composition of Municipal Waste in the report of ERM, NPC and HTL as tabulated below :

	Organic waste composition (%)	Inert for landfill (%)
ERM	55.94	26.72
NPC	40	34.65
HTL	26.72	8

If ERM and NPC values are correct, then RDF may not be economical. This needs to be addressed for evaluating the viability of the project.

v) The estimation of land requirement for the sanitary land fill, with is to last for 20 years seems to far less than what will be required and this will result in expansion rather than contraction of the land fill.

vi) The report does not contain any data specific to Chennai including the characteristics of MSW. The whole report is vague and material balance in each technology is not presented.

vii) The chapter on Solid waste management in the CMDA Master Plan recognizes that the present dump yard at Perungudi is not suitable. The Master Plan recommends EIA before the site is considered for any future activities and upgradation or remediation of the present.

viii) K.Balasundaram S.E. (Solid Waste Management Dept), Corporation of Chennai and a member of the committee clarified that the Corporation's initial proposal to generate power at the site has been dropped. **However, even if there is no incineration on site, there will be no change in this committee's recommendations against the proposed integrated waste management plant**.

ix) An Amicus statement of **Dr. Mark L. Chernaik, Ph.D,** of the Environmental Law Alliance Worldwide and Statement of concern

from the Global Alliance for Incineration Alternatives against the proposal of RDF and landfilling are annexed as Annexure E to G.

c) This committee has already given detailed recommendations in the Second Interim Report that waste management in the city should take the route of maximum decentralization and resource recovery from the waste so that the maximum possible waste can be diverted from landfills to composting and recycling in accordance with the mandate under the MSWM Rules 2000 as well as various direction of the Apex Court in the Almitra Patel case. In support of this recommendation the committee has found that the global trend is also towards

i. diversion of waste from land fills to recycling and resource recovery

ii. zero waste management both at the community level and at the city/national level, which would involve the components of

(1) Segregation of solid waste at source;

(2) Door step collection to ensure that segregated waste stays segregated and handled in separate streams;

(3) Composting of organic waste, preferably at household/community level and if necessary at city level also;

(4) Recycling of recyclable waste;

(5) Progressive elimination of use of disposable plastic packaging and non recyclable material by encouraging durable material so as to overload on the Municipal waste stream;

(6) Introducing Extended Producer Responsibility on Manufacturers and Distributors to take back products at the end of the product's life cycle; (Under Extended Producer Responsibility schemes, the manufacturers or suppliers of goods are required to take responsibility for the collection and disposal of waste generated by their products. Producers may also be asked to meet certain recycling targets.)

(7) Establishing quantitative targets for progressive diversion of waste from garbage dumps/land fills so as to progress towards Zero Waste Management.

Crescent Engineering College and Anna University in their study[2] have stated:

> "In order to handle growing volumes of wastes in developing countries and to prevent environmental pollution, proper policies need to be enacted and implemented. Integrated waste management approach consisting of a hierarchical and coordinated set of actions that reduces pollution has to be enforced (Martin Medina 2002). Integrated waste management consists of the waste minimization techniques, waste prevention, reuse and recycling. Waste prevention seeks to reduce the amount of waste that individuals, businesses and other organizations generate. Once the waste prevention program has been implemented, the next priority in an integrated waste management approach, is promoting the reuse of products and materials. After the reuse of materials and products, recycling comes next in the integrated waste management hierarchy. Recycling is the recovery of materials for melting them, re-pulping them and reincorporating them as raw materials. It is technically feasible to recycle a large amount of materials, such as plastics, wood, metals, glass, textiles, paper, cardboard, rubber, ceramics, and leather. These waste minimization techniques would reduce the load in the landfills and also extend the life of the landfills."
>
> "Composting, incineration: Considering the high proportion of organic matter in the waste generated in third world cities composting can also be an option to reduce the amount of wastes that are land filled, thus extending their lifespan. In an Integrated waste management

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[2] See Annexure II - Vasanthi, P. et al. (August 2008) "Impact of poor solid waste management on ground water," Environmental Monitoring and Assessment, 143(1-3):227-238

approach, incineration occupies the next to last priority, after waste prevention, reuse, recycling and composting have been undertaken."

☜ Numerous local statutes and regulations in U.S and around the world require segregation of waste at its source and impose numerical targets for the diversion of reusable or recyclable waste from the amount of waste that requires disposal. For example, in the Philippines, under the Ecological Solid Waste Management Act of 2000, there is mandatory segregation and recycling of solid waste at the Barangay (municipal) level. According to recent report, segregation and recycling of solid waste at the municipal level in the Philippines is beginning to benefit the environment and the finances of local governments. According to Dr. Mark L. Chernaik:

> "Barangay Bagumbuhay in Quezon City, Metro Manila (population 7,400) has successfully implemented the 2000 Act. It started in 2001, using a small budget of 45,000 pesos (£450) to start practising ecological waste management. A resident allowed the Barangay to use his vacant lot to build a material recovery facility. To increase awareness and momentum in the first instance, the Barangay Tanods (village auxiliary security) were dispatched to collect segregated waste from households. Successful solid waste management in the barangay resulted in a decrease in the number of trips a truck makes collecting waste from 10 to 4.5 a week in 2002. Two years later, waste collection fell further to 1.5 trips a week when the barangay acquired additional composting drums for composting. Aside from requiring basic segregated collection, composting, and recycling, the ordinance requires business establishments to undergo solid waste management training as a requisite for receiving an operating permit. The barangay now diverts over 65 per cent of its waste from landfill and the money that was normally spent on waste collection and landfill is now spent on schools, sports activities and gardens."

i) **United States**

- King County, Washington State, has implemented numerous zero waste type programs over the last 10 years, recently characterizing all programs under one "Zero Waste of Resources" umbrella. (King County 's web site for information on KC's ZWR 2030 programs).
- SWANA 2002 (California State - October 29, 2002):California, San Francisco has adopted a Zero Waste Resolution on March 6, 2003)

- Oregon Department of Environmental Quality has come up with a Strategic Plan 2000 - Vision includes Zero Waste: "Work is done with non-polluting technologies and with materials that are either fully recovered or fully returned to a natural state at the end of their product life cycle; there will be "zero waste" in our lives.".
- California, Del Norte County adopted Zero Waste Plan in 2000
- Zero Waste Communities of San Bernadino County, California.
- California, Santa Cruz County adopted Zero Waste Resolution in 1999
- Washington, City of Seattle adopted Zero Waste goal in Seattles's Solid Waste Plan in 1998)
- North Carolina, Carrboro passed Zero Waste Resolution 1998
- Georgia introduced the First state Zero Waste goal legislation in 1997
- **Non-Governmental** organization involved in zero waste management
    - GrassRoots Recycling Network
    - California Resource Recovery Association
    - Agenda for a New Millennium
    - Zero Waste America
    - Zero Waste Alliance
    - The Natural Step USA

- **Canada**
    - Nova Scotia is one of the leading provinces in waste diversion in Canada, having achieved 50% in 2000 by official calculations. They have the most extensive set of disposal bans in North America, beverage container deposits that reward refillables, and other progressive programs.
    - Regional groups have embraced the concept of Zero Waste and adopted it as a policy. The new strategy, called "Bringing Zero Waste to Kootenay Boundary – A Strategy for a Waste Free Future" provides a blueprint for moving from concept to implementation. It consists of eight initiatives to be pursued at the local level and ten initiatives involving local government efforts to influence change at the provincial

level. The strategy is broad-based, targeting increased materials efficiencies in businesses, local economic development through "resource recovery" and public policy renewal to facilitate the development of a zero waste economy.

- Zero Waste Working Group - a committee of the Recycling Council of British Columbia has come up with
  - Zero Waste Toolkit for Local Government designed to assist local governments in evaluating the benefits and feasibility of using zero waste as a framework for resource management planning.
  - Discussion paper (Zero Waste One Step at a Time - Benefits and Applications for Retail Businesses) introducing the concept of zero waste as a tool to assist retail and other types of businesses to increase their economic efficiency and move towards long term sustainability.
  - Zero Waste North - Information on how zero waste can benefit the local economy and provide new jobs.
  - Nova Costa - As a result of community participation, Nova Scotia has achieved 50% waste diversion within five years, and leads all other Canadian provinces.

- **Australia**
  - **Governmental**
    - Canberra: Australian Capital Territory: No Waste by 2010 - (Plan - adopted 1996)
    - West Australia State Government: Towards Zero Waste - Report and Recommendations of the WAste 2020 TaskForce - (Report - January 2001)
  - **Non-Governmental**

- Nature Conservation Council of New South Wales: Zero Waste by 2010 - An Integrated Waste Elimination Strategy for New South Wales - (Report - November 2000)

- **New Zealand**
  - **Governmental**
    - Councils Aim For 0 Waste
    - 33* New Zealand Councils (Website - August 2000)
      - 45% of local governments have adopted 'zero waste from landfill' policy
      - Number of involved New Zealand councils has grown! - Nov 2001
      - Target Zero - New Zealand (Website - Sept 2001) - a Christchurch City Council waste minimisation initiative

- **Asia** – Several countries have national legislations on Zero waste management: However, the moving force is **Non-Governmental** Organisations such as –
  - Waste Not Asia - (Launched July 2000)
  - An alliance of Asia-Pacific Nations for promotion of Clean Production and a Zero-Waste oriented society.
  - Zero Waste Kovalam (Keraa, India) – a partnership between Kerala Tourism and Thanal, NGO.
  - Zero Garbage Management an initiative of Exnora (launcher 1989) in several urban and rural centres across India – nearby examples: Pammal at Chennai and Vellore,

b) To progress towards a regime of Zero Waste Management and land fill diversion, the Corporation and other local bodies should also implement sectoral decentralization of waste management and get the following categories of waste generators to follow the Zero Waste Management norms laid down in the MSWM Rules 2000:

ι) Colleges / Schools /Universities /other Educational Institution Campuses.

ιι) Hostels

ιιι) Government Offices (Secretariat, Collectorate, Court, Taluk Office

campuses etc)

ιϖ) Private office complexes and industrial establishments.

ϖ) Airports

ϖι) Bus termini.

ϖιι) Prison campuses

ϖιιι) Milk Society campuses.

ιξ) Parks

ξ) Dairy Farms / Goshalaas.

ξι) Residential Quarters (Armed Forces /Government of India /State Government etc).

ξιι) Hotels, Restaurants and eating establishments

ξιιι) Wholesale markets

ξιϖ) Hospital (for Municipal Waste)

ξϖ) Marriage Halls.

ξϖι) Shopping Malls

ξϖιι) Temples / Churches / Mosques and other religious campuses

Note: This is an illustrative list and not exhaustive

After many discussions and deliberations with the various agencies and stakeholders, the Expert Committee has firmed the following conclusions and recommendations.

a) The existing method of handling municipal solid waste at Perungudi is not scientific and violates many provisions of MSW Rules 2000. The indiscriminate dumping of waste results in degradation of environmental quality not only in the vicinity of dump site but also in the neighbourhood areas.

b) The fire in the dumpsite, close to the STP continues despite specific orders of this Hon'ble court. The smoke contains many toxic gases known as Products of Incomplete Combustion (PICs) that are carcinogenic.

c) The dump site at Perungudi does not comply with the Siting Criteria of MSW Rules.

d) The dumping area is progressively increasing. No source segregation is being adopted, exasperating the existing problem.

e) The RDF proposal of the Corporation has been proved nonviable both technically and economically The proposed MSW handling violates MSW Rules especially on source segregation, recycle and reuse and siting criteria.

f) If power generation from RFD is considered at this site, the air emission would undoubtedly affect humans. Further thermal process units cannot be established as per siting criteria. If power generation is not considered and if the stage is only upto manufacture of pellets, end use of pellets has to be established. This will not be economical as the transportation cost would be prohibitive.

g) The Committee Members strongly advocating of discontinuance of any activities in any form at Perungudi considering the Marsh land and habitants

h) The final effluent of sewage treatment plant (STP) of CMWSSB is just meeting the standards prescribed by TNPCB. In the absence of equalization or balancing tank, the units are likely to function at low efficiency rates. The Committee Members do not agree with the letting of sludge from secondary clarifier into primary settling tank inlet in stead of disposing into sludge drying beds. The flow measurements are manually recorded. Automatic recorders should be installed.

i) During the visit on 2nd June 2009, due to collapse of chamber in the outfall pipeline, the treated sewage was overflowing from the sump and the entire area is lagooned (since 16th March 2009). CMWSSB could not complete this small repair even after 75 days. This leads to severe environmental degradation of ground water, mosquito breeding and odour problem

j) Standard Operating Procedures (SOPs) are insufficient for meeting any emergencies

k) The analytical data furnished by the operating agency are questionable as there is not much variation in the values. From the BOD bottles conditions, it is concluded that the agency do not follow the standard protocols.

l) There is no analysis on gases produced. In case of any failure in digestion process, how the gases will be handled needs to be addressed. This is very much essential in view of habitat areas within 200 m.

m) The STP of Alandur Municipality does not function properly. Coarse particles are seen in the final effluent indicating the screen chamber is not functioning.

🗁🗁🖋 **To sum up, the recommendation of the Committee are as follows**:

a) The Corporation of Chennai and all local bodies in the proximity of the Pallikaranai Marsh should implement a regime of Zero Waste Management within the next 4 years in accordance with the Municipal Solid Waste (Management and Handling) Rules 2000 and the emerging practice across the world. At a conservative estimate, implementing Zero Waste Management would reduce the need for landfills to about 25% of the present requirement. Zero Waste Management which should comprise:

   i) Mandatory Segregation of solid waste at source within a specific time frame;
   ii) Door step collection of segregated waste, preferably through separate collection streams so as to facility recycling;
   iii) Composting of organic waste, preferably at household/community level and if necessary at city level also;
   iv) Channelising recyclable waste to recyclers;
   v) Progressive elimination of use of disposable plastic packaging and non recyclable material by encouraging durable material so as to avoid overloading on the Municipal waste stream within a specific time frame;

vi) To achieve the above object, the Government may consider enacting the Tamil Nadu Throwaway Plastic Articles (Prohibtion of Sale, Storage Distribution and Transport) Bill of 2003, which had been considered by a Select Committee available with the Department of Environment and Forests. (Similar legislation have since been enacted by Himachal Pradesh, West Bengal, Union Territory of Chandigarh, Union Territory of New Delhi, Bangladesh and Pakistan.

vii) Introducing Extended Producer Responsibility on Manufacturers and Distributors making them responsible for the collection and disposal of waste generated by their products;

viii) Producers should be asked to meet certain recycling targets to be fixed by the Government at the state level;

ix) Establishing quantitative targets for progressive diversion of waste from garbage dumps/land fills so as to progress towards Zero Waste Management;

b) As an interim measure, the Corporation of Chennai should earmark a limited area outside the marsh for sanitary land fill/managing MSW for the next 4 years but no un-segregated waste should be dumped in such site.

c) The Alandur Municipality has stated that an alternate site is under development for handing solid waste. Pending such relocation, the Municipality should ensure full segregation of waste. Further

d) The Perungudi site is not suitable for the Integrated MSW Plant.

e) No activities should be carried out at Perungudi after 4 years.

f) Corporation of Chennai should immediately initiate steps for remediation of the dump site or reclamation whichever feasible.

g) Corporation of Chennai should ensure that no outsiders are allowed inside for metal recovery. This will eliminate the dump fires.

h) CMWSSB should shift the STP to a suitable area where the sewage outfall during emergencies do not create any adverse environmental

condition including aesthetic aspects. The proposed 60 MLD STP adjacent to the present STP should not come up. Pending relocation, equalization or balancing tank has to be constructed. The excess secondary sludge should be taken to sludge drying bed. The dried sludge can be used as manure.

i) Standard Operating Procedure for operation needs to be addressed for emergency conditions and Automatic recorders are to be installed for flow measurements.

Dated at Chennai on this July 2008

Dr.R.Annamalai IFS **Director Environment** **Member Secretary** **EIA Authority**	**Sheela Rani Chunkath, IAS** **Chairperson & Managing Director** **TIIC Ltd.,** **Convenor, Expert Committee**	**R. Swaminathan** **Former Senior Scientist** **NEERI**
T.K.Ramkumar **Advocate**	**K.Balasundaram** **S.E. (Solid Waste Management Dept)** **Corporation of Chennai**	**A. Krishnamoorthy** **Environmental Eng** **TNPCB**