

Filed on: 03.08.2021

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
(SZ), CHENNAI**

MEMORANDUM OF APPEAL

[Under Section 18(1) read with Section 16 of the National Green Tribunal
Act, 2010]

APPEAL No. 3 OF 2019

BETWEEN

SHAJI A.K**APPELLANT**

Versus

MINISTRY OF ENVIRONMENT, FOREST AND
CLIMATE CHANGE & ORS**RESPONDENTS**

ARGUMENT NOTE FILED BY THE APPELLANT.

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II Floor, Chundanal Monarch,
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[Under Section 18(1) read with Section 16 of the National Green Tribunal Act, 2010]

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1. The scope of the filing an appeal against any EC granted is a settled legal principle. The appellant presently working at Ernakulam is aggrieved by the grant of Annex-A1 in many ways as stated in Appeal. The locus standi has not be questioned by the 1st respondent in any manner. The NGT, in **OP No. 12/2011** had held the scope 'person aggrieved' in favour of the appellant herein. In **Appeal No. 14/2014**, the NGT (West Zone) Pune had held the scope of 'person aggrieved' in favour of the appellant herein. The Delhi High Court in *Prafulla Samanthra V Ministry of Environment and Forests 159 (2009) DLT 604* held that the expression 'person aggrieved' has to be given a pan optic import and be understood to include persons who display interest in social and environment causes. The observations made in the said Judgment regarding the wider locus standi of the appellant is squarely applicable in this appeal. Hence the appellant has locus standi to maintain the appeal in view law laid down by the Tribunal.

A –Category Project

2. Annex-A2 at Page 31 & 44 reveals that this is a **Category 'A'** Project as per MoEF & CC notification vide no. SO.3999 dated 09.12.2016 and the same is admitted by the proponent in Form-1. Annexure A3 was issued without treating this project as A-category as per SO.3999 dated



09.12.2016, which was in force on the issuance of Annexure A3. Annexure A3 was issued as if the project is in B Category. This itself is illegal. Annexure A1 and A3 treating this project as B category is therefore illegal. It is a settled position of law that the law as on the date of decision making is applicable. As on issuance of Annexure A3, SO.3999 dated 09.12.2016 was in force on the date of issuance of Annexure A3. If not, Annexure A2 ought to have been returned to the applicant on that ground and direct the proponent to submit a proper application.

Deliberate Concealment of facts.

3. The site in which Annex-A1 is granted is very close to a junction in which two National highways are meeting. This is the only meeting point of two National Highways in the State of Kerala. By approving one of the biggest construction project in Kerala was without consideration about the criteria of site selection as mandated in Manual of Norms and Standards for Environmental Clearance for construction projects. (relevant pages are attached herewith.) The project proponents deliberately concealed this aspect in the Form-I application and this was not properly considered when Annex-A3 ToR was issued. As evident from page 43 of the Appeal, Annex-A2, the project proponent has deliberately suppressed material facts related environmental sensitivity of the area. The statutory duty to reveal about the environmental sensitivity within 15km from the proposed project location is deliberately concealed and material facts have been suppressed and false data has been submitted.
4. Annex-A9 dated 11.01.2016 would reveal that Edappally Junction near to Lulu Mall is already suffering from severe traffic jam and the situation is so bad that even ambulances rushing to hospitals were unable to reach the destination on time (page 26 in the rejoinder). It is also reported that senior officials in Traffic Police Station expressed their helplessness in controlling the traffic because of the grand of permissions of such projects without considering the carrying capacity. Annex-A9 clearly states that Edappaly region has exceeded the limit of its carrying capacity. This aspect has been totally suppressed in Annex-A2. This was not all considered by

the EAC while issuing Annexure A3 and while appraising the Project in Annexure A5. Annexure A1 is illegal on that ground alone.

5. Annex-A8 reveals that Edappally canal is already suffering from large encroachment and is also facing pollution due to domestic sewage. Project proponent has concealed the same in Form-I application. Entry No. 11 Annex-A2 (Page 44) specifically demands the proponent to reveal about areas already subjected to pollution or environmental damage within 15 km from project site. The answer was *No*, which misleading and false. The answer "No Critically polluted area is located within 15km from the project site" is totally misleading. The specific information sought is not "critically polluted" but only "areas already subject to pollution or environmental damage".

This Tribunal in OA 264/2017(SZ) has directed PCB to file status report regarding the pollution in Edappally Thodu in an order dated 18.11.2020 and based on the same, the State PCB has filed report on 14.12.2020. The report of Chief Environment Engineer Ernakulam (para 6) clearly states that the Edappally thodu is an area which is polluted.

In another case OA No.27 of 2021(SZ), this Tribunal has constituted a committee to examine the pollution in Kochi municipal Corporation area and to mitigate the same. An action plan has been suggested by the joint committee and Kochin Corporation for the rejuvenation of Edappally canal, which is already found polluted. (a copy is attached herewith)

As evident from these records that Edappally canal / thodu, which is an area already polluted, and causing water drain issue and flood in the area, situates adjacent to the project site. This aspect is deliberately suppressed by the Project Proponent in Form-1 application.

6. Annex-A7 is detailed study regarding the development of canals in Kochi for future generations and the same would reveal fact that the Section-IV, left bank of Puravankara Bridge to Pipeline Bridge is vacant and marshy land. This is the project site and further conversion of marshy land in the strength of Annex-A1 would create contribute to the flooding in the area.



4

Any construction above the Edappaly Thodu would curtail the most environmental friendly water transportation aspirations in the area. This aspect was also deliberately concealed in Form-I application.

7. Whether 'routes or facilities used by the public for access to recreation or other tourist or pilgrim areas' is present within 15Km of the proposed project location is a deliberate fact to be revealed by the project proponent in Form-I application. This has been answered as 'No and none within the area' in Annex-A2. The project area is adjacent to a main road connecting Vyttila to Edappally is an admitted fact. This route is specifically used by the public for Sabarimala Pilgrimage and several other pilgrimages like Malayattoor, Guruvayoor etc. The people from Southern Kerala relies on this route to visit tourist places like Athirapally, Munnar etc. They have misled the Tribunal by suppressing the above material facts and providing false / misleading data.
8. There many sensitive man-made land uses like hospitals, schools, place of worship, community facilities etc within 15km of the project site. The project proponent causally submitted that such facilities are present but deliberately concealed the number of hospitals, schools, places of worship within the close proximity. The project proponent admits in their EMP that there are such man-made sensitive structures which will be affected in the construction time (Para 8,9, & 10 of the rejoinder). However it is seen absent in Annex-A2. The mandatory statutory requirement to reveal all necessary facts within 15km project site was deliberately. Therefore the 1st respondent was literally handicapped in prescribing any specific study regarding the same while issuing Annex-A3 ToR.
9. Annex-A2 at page 44 of the Appeal would reveal that the project proponent is well aware about the natural consequences of submitting false or misleading data or any part of the data before the 1st respondent. As per EIA notification, the project will be rejected and the clearance will be revoked at the risk and cost of the proponent. This alone is sufficient for setting aside Annex-A1 EC. The project proponent is barred from raising any justification in suppressing material facts or giving false/misleading statement in Annex-A2.



10. In Annex-A11, serial number 1.8, the project proponent answered that no low lying area and wet land gets altered by this project. However the project site is a low lying area and marshy land. The construction will have a negative impact on the said land. This was concealed by the proponent and the same was not considered by the Expert Appraisal Committee.

11. In **Hanuman Lakshman Aroskar & Anr V. Union of India & Ors** reported **2009 (15) SCC 401** at Para 67, 68, 77, 97 & 114, the Apex Court has held that the project proponent cannot profess and ignorance in the study area. The project proponent is bound by the highest duty of transparency and rectitude in making the disclosures in Form-I. Therefore, in view of the EIA notification and the judgment Annex-A1 is to be set aside.

Data collection was prior to ToR and is illegal.

12. Annex-A2 was submitted on 05.02.2018. Annex-A3 ToR was granted on 24.05.2018. Annex-A4 EMP was submitted on 07.06.2018. There were only 14 days to prepare Annex-A4, after specific ToR is issued. As admitted by the proponent, the data collection for Annex-A4 was in March 2018 which is prior to issuance of Annex-A3. This is per se illegal.

Para 168 of the judgment in **Appeal No. 172/2013(SZ)**, the NGT (Southern Zone) has held that no project proponent can collect any data prior to the issuance of ToR despite the Office Memorandum issued by the Ministry in contrary. The relevant portion of the judgment regarding the scheme of EIA Notification held as follows :-

168. The practice of collecting data even before the finalization of ToR by the EAC and the communication of the same to the project proponent is untenable in the eyes of law and it also sends wrong procedural signals. Accepting such a procedure is bound to set very unhealthy precedent. Instead of deprecating the practice, the EAC, in the instant case, has given its seal of approval. We direct the concerned officials of MoEF to take note of this and initiate procedural reform(s) to discourage this practice.



MoEF&CC did not file any appeal against this direction, and therefore it is binding on the 1st Respondent.

This is upheld by the Hon'ble Supreme Court. The judicial propriety demands this Hon'ble Tribunal to follow the same stand in this case also. Since it is an admitted fact that issuance of Annex-A1 is based on Annex-A4, which was prepared by collecting data prior to the issuance of Annex-A3 ToR, it is violative of the observations made and the law laid down by the NGT in **Sriranganathan v. Union of India & Ors.**

Moreover, as evident from the records, Annexure A4 was prepared in a casual manner as it was in a lightning speed. There were only 14 days to comply the specific ToR issued in Annexure A3. Data collection for complying the specific ToRs cannot be in anyway made before its issuance. 14 days is absolutely insufficient to comply with the specific ToRs issued in Annexure A3. Therefore, Annexure A4 is insufficient and liable to be held invalid.

Corporate Environment Responsibility (CER)

13. Specific condition No. xii in Annex-A3 (page 47) mandates to submit a plan for CER along with EIA report. In Annex-A4 (page 55), the project proponent undertakes that an amount equivalent to more than 2% of project cost is earmarked for the delivery of CER. The Project cost is 1024 Crores as per Annex-A1. 2% of the project cost is 20.48 Crores. The proponent is bound to submit a plan of CER for more than 20.048 Crores, as clearly made in his EMP report. However a total plan of 31.48 lakhs alone is submitted in Annex-A4. This was not even noticed or observed by the Expert Appraisal Committee in Appraisal. This would also prove that the entire process of appraisal is a farce and with total non-application of mind.
14. **Condition no. xlvi** in Annex-A1 mandates the project proponent to comply whatever is stipulated in the EMP and a dedicated Environmental Monitoring Cell has to be functioned for implementing the EMP. Therefore Environmental Monitoring Cell shall ensure that 2% of the project cost is spent only for CER.



15. Most of the things proposed as CER is actually not a CER activity, but a CSR Activity. As per **condition No.xlix** of the Annex-A1, the proponent is duty bound to implement Corporate Social Responsibility Plan as per companies Act, in addition to the CER as mentioned in **condition No.xlvi**.

Power of EAC to modify the percentage of CER

16. Para 6, condition VIII of the Office Memorandum dated 01.05.2018 clearly states that EAC has the power to alter the percentage prescribed in the said Office Memorandum. On such power, the condition No.xlvi is made to comply with the assurance in EMP, that is 2% of the project cost. It is also made clear in para 6, condition VI that the compliance of CER activities shall be submitted along with the half-yearly compliance report to be submitted on every 6 months. After the issuance of Annexure A1, 24 months are over now. The project proponent ought to have spent 4 Crore within last 2 years and compliance report must have been produced. As on today, no such report is produced. This all would show that the CER is an eye wash in this project.

Non-Compliance of ToR

17. A detailed report on compliance to ECBC norms have been specifically sought in Annex-A3 ToR. This was not submitted in EMP by the project Proponent. The Committee did not even look into the compliance of each of the conditions in Annex-A3 during appraisal as evident from Annex-A5. EMP was prepared not in tune with the Manual on Norms and Standards for Environmental Clearances for Large Construction Project issued by the 1st respondent. The site location ought to have been selected based on the criteria of the norms. The impact of the land development of more than 18 Acres of marshy land in both sides of Edappally thodu water stream will definitely contribute to the flooding of the regions in rainy season. Absolutely no impact has been assessed in Form-I and EMP. The Appraisal Committee did not even cross checked whether the EMP was prepared in accordance with the norms issued with the 1st respondent.



Wrong Appraisal

18. Appraisal was done on 04.07.2018. There were 22 projects appraised and this was item 32.5.21. Even if the Appraisal Committee spend 6 hours on that day, they could only spend 15 minutes for the detailed scrutiny of the project. The claim of the proponent and the 1st respondent that a power point presentation was done in the meeting, the time allotted for the appraisal for the project in question is insufficient for the detailed scrutiny of the EMP along with a presentation of the proponent. This is evident from the minutes of the appraisal Committee. There was absolutely no discussion regarding the impact of the project on the socio-economic cultural and environment around the project site. Out of 10 expert of EAC, only 3 were present on the day of appraisal of the project (Page 66, Annex-A5). This also reveals that the expertise of Dr. S K Bhargava, A P Singh, Dr. Ayivaman Acharya, Dr. Chandrahas Despande, Ms. Mili Majumdar, Prof. Dr. Sanjay Gupta, Dr. M V Ramanamoorthi were absent in the appraisal of the project in question. This evidences the very credibility of the project of Appraisal.

19. The appraisal is against the law laid by the Hon'ble Supreme Court in ***Bengaluru Development Authority V Mr Sudhakar Hegde & Ors.*** Para 72, 73, 76 are squarely applicable in this case.

72. The reasons furnished by the SEAC must be assessed with reference to the norm that it is required to submit reasons for its recommendation. The analysis by the SEAC is, to say the least, both perfunctory and fails to disclose the reasons upon which it recommended to the SEIAA the grant of EC for the PRR project. The SEAC proceeds merely on the reply furnished by the appellant to the queries raised by the SEAC at its 115th meeting dated 11-12 August, 2014. In this view, the procedure followed by the SEAC suffers from a nonapplication of mind.

73. The SEAC is under an obligation to record the specific reasons upon which it recommends the grant of an EC. The requirement that the SEAC must record reasons, besides being mandatory under the 2006 Notification, is of significance for two reasons: (i) The SEAC makes a recommendation to the SEIAA in terms of the 2006 Notification. The regulatory authority has to consider the recommendation and convey its decision to the project proponent. The regulatory authority, as para 8(11) of the 2006 Notification provides, shall normally accept the recommendations of the EAC. Thus, the role of the SEAC in the grant of the EC for a proposed project is crucial; and (ii) The grant of an EC is subject to an appeal before the NGT under Section 16 of the NGT Act 2010. The reasons furnished by the SEAC constitute the link upon which the SEIAA either grants or rejects the EC. The reasons form the material which will be considered by the NGT when it considers a challenge to the grant of an EC.

76. *The SEAC, as an expert body, must speak in the manner of an expert. Its remit is to apply itself to every relevant aspect of the project bearing upon the environment and scrutinise the document submitted to it. The SEAC is duty bound to analyse the EIA report. Apart from its failure to repudiate a process conducted beyond the prescribed time period stipulated by the MoEF-CC, the SEAC failed to apply its mind to the abject failure of the appellant in conducting the EIA process leading upto the submission of the EIA report for the grant of EC. The SEAC is not required to accept either the EIA report or any clarification sent to it by the project proponent. In the absence of cogent reasons by the SEAC for the recommendation of the grant of EC, the process by its very nature, together with the outcome, stands vitiated. (emphasis added)*

In para 81, the Apex Court held as follows :-

81. *The SEAC, as an expert body abdicated its role and function by relying solely on the responses submitted to it by the appellant and failing to comply with its obligations under the OMs issued by the MoEF-CC from time to time. In failing to provide adequate reasons for its recommendation to the SEIAA for the grant of an EC, it failed in its fundamental duty of ensuring both the application of mind to the materials presented to it as well as the furnishing of reasons which it is mandated to do under the 2006 Notification. (emphasis added)*

Annexure A5 is made without any specific reasons recorded to accept the documents of the proponent, and therefore against the law laid down by the Apex Court and EIA Notification.

20. The appraisal is against the law laid by the Hon'ble High Court of Delhi in **Utkarsh Mandal V. Union of India**. This ground was not at all countered by any of the Respondents herein.

Para 45 states as follows :-

45. *As regards the functioning of the EAC, from the response of the MoEF to the RTI application referred to hereinbefore, it appears that the EAC granted as many as 410 mining approvals in the first six months of 2009. This is indeed a very large number of approvals in a fairly short time. We were informed that the EAC usually takes up the applications seeking environmental clearance in bulk and several projects are given clearance in one day. This comes across as an unsatisfactory state of affairs. The unseemly rush to grant environmental clearances for several mining projects in a single day should not be at the cost of environment itself. The spirit of the EAC has to be respected. We do not see how more than five applications for EIA clearance can be taken up for consideration at a single meeting of the EAC. This is another matter which deserves serious consideration at the hands of MoEF.*



This observation made against the MoEF&CC is still in force and applicable to the case in hand.

21. In ***Gram Panchayat Navlakh Umbre v. Union of India and Ors***, the Court held that "the decision making process of those authorities besides being transparent must result in a reasoned conclusion which is reflective of a due application of mind to the diverse concerns arising from a project such as the present. The mere fact that a body is comprised of experts is not sufficient a safeguard to ensure that the conclusion of its deliberations is just and proper."

22. In ***Samata and Forum of Sustainable Development v. Union of India & Ors*** (Appeal No. 9 of 2011. Judgment of NGT (Southern Zone, Chennai) on December 13, 2013) it was held that "In order to demonstrate the threadbare nature of discussions while considering a project for giving its recommendation, it is essential that the views, opinions, comments and suggestions made by each and every member of the committee are recorded in a structured manifest/ format."

This judgment is binding on the 1st Respondent, and Annexure A5 is the blatant violation of this dictum. Therefore Annex-A1 has to be set aside.

No demand from the 1st Respondent to dismiss this Appeal.

23. Annex-A1 was issued by the 1st respondent. The 1st respondent in their Reply Affidavit does not make any prayer or demand for dismissal of this Appeal. There are no specific pleadings to the said effect also. Therefore this is a fit case for setting aside the EC and direct the 1st respondent to re-appraise the project based on properly prepared Form-I application and EMP report. Rule 16(2) of the NGT Rules, 2011 specifically demands to specifically deny the demand, if so. 1st Respondent did not specifically demand for the dismissal of this Appeal.

Based on these facts and grounds stated above, this Hon'ble Tribunal may allow the prayers sought in the appeal.


Counsel for the Appellant.

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Documents

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

ORIGINAL APPLICATION NO 264/2017 (SZ)

**UPDATED STATUS REPORT FILED BY THE CHIEF ENVIRONMENTAL
ENGINEER, KSPCB ERNAKULAM AS PER THE ORDER DATED
18.11.2020 IN THE ABOVE APPLICATION**

Adv. Rema Smrithi.

ADDITIONAL STANDING COUNSEL FOR THE RESPONDENT

PC

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

IN

ORIGINAL APPLICATION NO 264/2017(SZ)

Applicant(s) : Lawyers Environmental Awareness Forum.
Versus

Respondent(s) : The Government of Kerala & others

**UPDATED STATUS REPORT FILED BY THE CHIEF ENVIRONMENTAL
ENGINEER FOR AND ON BEHALF OF THE BOARD AS PER THE ORDER
DATED 18.11.2020 IN THE ABOVE APPLICATION**

1. I M A Baiju, 54 years, S/o M K Aravindakshan, Chief Environmental Engineer, Regional Office, Ernakulam do hereby submit that I know the facts and circumstances of the case and I am authorized to submit report for and on behalf of the Board. The factual submissions made here under are true and correct to the best of my knowledge, information and belief. In these circumstances, it is just and necessary that this Hon'ble Tribunal may be pleased to accept the accompanying report on file and it is so humbly prayed in the interests of justice in this case,

2. It is respectfully submitted that the above original application is primarily alleging that improper facilities are provided for the treatment and disposal of waste water generated due to the functioning of a Stadium in the name and style of Jawahar Lal Nehru International Stadium (JLN Stadium), Kaloor, Ernakulam, owned and occupied by Greater Cochin Development Authority (GCDA) which is being used for various state/national/international level programmes especially for football and cricket. Also, various temporary exhibitions are staged at area available outside the stadium

3. It is respectfully submitted that this application was finally heard on 18.11.2020 and ordered as follows

"So, the Committee, the Pollution Control Board and the Corporation are directed to come with further status report regarding the upkeep and maintenance of Jawaharlal Nehru International Stadium at Kaloor, Ernakulam. They are directed to consider the status of inlet and outlet of sewage in the STP that is functioning in that area. They



M A BAIJU
Chief Environmental Engineer

are directed to submit the report on or before 16.12.2020 to this Tribunal through e-filing at nqtszfiling@gmail.com. The Registry is directed to communicate this order to the Members of the Committee, Pollution Control Board and also the Secretary, Kochi Corporation by e-mail immediately so as to enable them to comply with the direction of this Tribunal.

For consideration of further report, post on 16.12.2020"

4. It is respectfully submitted that during hearing the Hon'ble Tribunal specifically stated about the shortfalls which were noted as follows,

"The Corporation has not filed any further status report as to what are all the steps taken by them to mitigate the situation while maintaining the area in question viz., Jawaharlal Nehru International Stadium at Kaloor, Ernakulam"

and,

"The matter is of the year 2017. The only question to be considered is the 'precautionary principle' that has been applied for proper management of the Stadium which is being used for several public functions apart from games and which is likely to generate waste and sewage, apart from providing facility for conducting commercial establishments as well. Certain drawbacks were pointed out earlier and it is not known how far the drawbacks pointed out earlier have been rectified".

5. We may humbly submit that a hearing of all the concerned was conducted on 07.12.2020 and following points were discussed.

- a. Updated status of action plan for the safe and continuous operation of STP of JLN Stadium which was seen unutilized for its full capacity for the past several months. Also, the action plan to provide ultrafiltration(UF) as a tertiary treatment facility.
- b. Action plan to bring all the establishments generating waste water such as lodges, hotels, shops etc. located near to this STP, under the jurisdiction of the Kochi Corporation which are in operation without providing sufficient pollution control facilities and without the consent of the Board.
- c. Action plan for periodical cleaning of major and minor drains which carry treated effluent from different establishments including this STP connected to Perandoor Canal, one of the polluted stream in Corporation area leading to Edamula stretch of Periyar river which was identified as a major drain that contribute pollution to river Periyar.



M. A. D. S.
Chief Environmental Engineer

d. Direction of the Hon'ble Tribunal that individual reports shall be filed before the next hearing ie, 16.12.2020.

6. It is respectfully submitted that during discussion following suggestions are made by each agency

a. Greater Cochin Development Authority (GCDA): - Responsible officials of the GCDA expressed their willingness to improve the efficiency and for the maximum utilization of the existing STP provided for stadium. The GCDA, the service provider of the Stadium in question has intimated that even in the absence of a tertiary treatment plant, the STP provided for Jawaharlal Nehru International Stadium is totally in a working condition but not using for its full capacity. They have not started any matches/tournaments/functions there due to COVID-19 restrictions. As per them the quantity of effluent generation has not increased as no crowded functions are staged there till now and whenever sewage generation happens, they will be able to operate the STP in its full-fledged capacity once the action plan 5(b) mentioned above is initiated by Cochin corporation and after consultation with their technical consultant M/s KITCO Ltd. They may look into the possibility of using the treated sewage for watering stadium turf (meadow). Also, the Chief Environmental Engineer reminded the GCDA to install UF and soak pit immediately. To ensure the compliance towards installation of such a tertiary system in the STP, PCB/committee also suggests a time bound proposal need to be submitted along with sufficient amount as bank guarantee/security deposit. They will look in to the matter and necessary actions will be taken in this regard without delay.

b. Kochi Corporation: - The Corporation is initiating actions to insist the local establishments which are still working without sufficient effluent treatment facilities/consent of the Board to obtain consent after implementing necessary pollution control facilities. They are planning to identify all the establishments (Hotels and lodges etc.) which are located very near to this STP so that the transfer of the waste water will be easy. The Corporation shall ensure that the flow of the drain in which treated water is discharged will not be obstructed and they will periodically monitor the Perandoor Canal to which said drain is leading and Edappally thodu, two main streams that are connected to the Edamula stretch of Periyar river. The Corporation intimated that a DPR has been finalized for the installation of an ETP exclusively for the Slaughter House, Kaloor and its construction will be completed soon.

c. Kerala State Pollution Control Board:- The Board already had identified several units such as hotels, lodges and other establishments which are



M. A. B. J. J.
Chief Environmental Engineer

situated along the banks of Periyar River and its tributaries/certain drains leading to these tributaries and forwarded to Hon'ble Tribunal through status report filed in OA 395 of 2013 which is under the active consideration of the Tribunal. In fact, these establishments are now discharging untreated/partially treated effluent to various drains leading to the Edappally thodu and Perandoor Canal. Specific actions are being initiated by the Board for the violations noticed and to bring all these units under the purview of the consent regime and the list prepared will be forwarded to Corporation and GCDA by the District Office-1 of the Board. The Board had also identified untreated effluent discharge from a Slaughter House located at Kaloor and other establishments on which a writ petition (WPC 23911 of 2018) is pending with Hon'ble High Court of Kerala.

7. It is respectfully submitted that the GCDA, though had been insisted as per relevant condition incorporated in the consent to operate issued to them and agreed during hearing to submit a time bound proposal for the effective installation of an Ultrafiltration (UF) system within 6 months, they have not submitted a time bound proposal for the installation of an UF system. Instead they have submitted a report stating that they would consult with their consultant M/s KITCO Ltd for the installation of such system as a modification of the existing facility. Responsible Officials of the Corporation informed that proper action will be taken to insist the local establishments to transfer their sewage to existing STP of Stadium. Copy of the minutes of the hearing, Copy of the Letter explaining actions by GCDA and Copy of the letter submitted by the Kochi Corporation are produced herewith and marked as **Annexure 1**, **Annexure 2**, and **Annexure 3** respectively. However, water samples were collected from Perandoor Canal and Edappally thodu and sent to Boards laboratory for analysis report.

8. It is also respectfully submitted that though the draft report for and on behalf of the Committee was prepared and forwarded to all Committee members, final report could not be prepared since the same is not got approved by all members. Also, monitoring of inlet and outlet of this STP could not be conducted till now since sufficient quantity of effluent is not received in STP as no crowded functions are commenced till date due to COVID-19 restrictions.

Dated this the 14th day of December 2020.



Chief Environmental Engineer,
KSPCB, Ernakulam
Chief Environmental Engineer

Minutes of the Joint Committee meeting as per the order of the Hon'ble NGT
In O.A.264/2017 held on 07.12.2020

Joint committee meeting commenced at 11.00 a.m. Following members and representative of the joint committee were attended.

1. Sri. M.A. Baiju, Chief Environmental Engineer, Regional Office, Ernakulam
2. Smt.Athira S., AEE, GCDA
3. Smt.Reshma Krishna R., TGO, GCDA
4. Smt.Kiran Surya K.T., EE, Kochi Corporation
5. Smt.Ambily T.A, EE, Kochi Corporation
6. Smt.Sreelakshmi P.B., EE, KSPCB, DO-1, Ernakulam
7. Smt.Shahana M.A., AEE, RO, KSPCB, Ernakulam
8. Smt.Asha A.B., AE, RO, KSPCB, Ernakulam

Chief Environmental Engineer in his welcome speech informed that the meeting is convened for creative discussions on the recent order of the Hon'ble NGT in O.A No 264/2017 dated 18.11.2020 and reminded that the next date of hearing is on 16.2.2020. He specifically pointed out that the above order is directing Kochi Corporation, Pollution Control Board the Committee to file individual status reports about the upkeep and maintenance of Jawaharlal Nehru Stadium (JLN Stadium) and associated facilities.

The Committee discussed about explicit directions of the Hon'ble Tribunal as per the said order and also the previous reports filed by the Committee. Following decisions are taken in the meeting.

1. Samples from inlet and outlet of STP cannot be collected as the quantity of effluent reached to the plant is considerably low and the samples if collected will not a representative one. Hence, decided to wait till any matches/tournaments or crowded functions are staged there.
2. Committee observed that specific conditions of the consent to operate viz. Installation of an ultra filter (UF) and soak pit are not yet complied with by the Greater Cochin Development Authority (GCDA). Hence, reminded the GCDA to install UF and soak pit immediately. To ensure the compliance towards installation of such a tertiary system in the STP, a time bound proposal need to be submitted along with sufficient amount as bank guarantee/security deposit. GCDA replied that Authority will look in to the matter without delay after getting suggestions from their technical consultant KITCO.



3. Chief Environmental Engineer informed that the Board already had identified several units such as hotels, Lodges and other establishments which are situated along the banks of Periyar river and its tributaries/certain drains leading to these tributaries and forwarded to Hon'ble Tribunal through status report filed in OA 395 of 2013 which is under the active consideration of the Tribunal. Hence, the Corporation can identify such units where priority can be given to establishments with space constraints to construct individual sewage treatment facilities so that sewage from these establishments can be transferred to STP provided for the Stadium. In fact, these establishments are now discharging effluent to the drains leading to the Edappally thodu and Perandoor Canal. The list prepared will be forwarded to Corporation and GCDA by the District Office-1 of the Board. GCDA shall take necessary arrangements in consultation with their technical consultants to assess the quantity of wastewater that can be collected from Corporation area, as far as possible very near to this STP. An agreement with those units, GCDA and Corporation shall be made to transfer the effluent generated to the STP of the JLN Stadium.

4. Necessary arrangement shall be made by GCDA after consulting with their technical consultant KITCO to reuse the treated effluent for watering the stadium ground (Meadow) and the excess treated effluent generated if any shall be disposed to the drain /soak pit. Kochi Corporation shall ensure that the flow of the drain in which treated water is discharged will not be obstructed. It is also reiterated that the Perandoor canal and Edappally thodu are severely polluted due to the discharge of effluent from certain establishments along the banks and monitoring of these streams will be completed soon. Chief Environmental Engineer also reminded that the Board, earlier had identified untreated effluent discharge from a Slaughter House located at Kaloor and other establishments on which a writ petition (WPC 23911 of 2018) is pending with Hon'ble High Court of Kerala. The Corporation officials pointed out that a DPR has been finalized for the installation of an ETP exclusively for the Slaughter House, Kaloor and its construction will be completed soon.

Meeting ended at 12.30 P.M.



[Signature]
 Chief Environmental Engineer
 (Nodal Officer)
 A. E. IJU
 Chief Environmental Engineer

[Signature]

ACTION TAKEN REPORT ON THE OA 27/2021 HEARD ON 22/06/2021
23/07/2021

1. As ordered by the Hon'ble NGT to constitute a Joint Committee comprising of (i) the District Collector, Ernakulam District or a Senior Officer not below the rank of Assistant Collector or a Sub Divisional Magistrate as deputed by him, (ii) a Senior Officer from the Kerala State Pollution Control Board deputed by its Chairman, (iii) a Senior Officer not below the rank of Additional Secretary from the Ministry of Environment, State of Kerala as deputed by the Principal Secretary, Department of Environment 5 dealing with sanitation and sewage issue (iv) a Senior Officer from the Kochi Municipal Corporation as deputed by the Commissioner and (v) a Senior Officer from the Greater Cochin Development Authority as deputed by its Chairman to inspect the area in question, Executive Engineer of Kochi Municipal Corporation was nominated to the Government vide letter No.MOE2/10948/17 dated 15/06/2021 for forming the committee.
2. An independent action plan has been prepared by Kochi Municipal Corporation starting with the survey of the area, closing of the outlets and solution for permanently solving the issues. The action plan is annexed with this report.
3. Vide proceedings of Secretary with No.ISO/MOE6/18381/21 dated 16/07/2021 Health Inspectors and Junior Health Inspectors have been assigned the responsibility to conduct a rapid survey of the outlets draining sewage and other effluents into Perandur Edapally canals with details of households and establishments involved in the practice and it will start on 26th of July.
4. Under the IURWTS project implemented by Kochi Metro Rail Limited, STPs are proposed in the following locations as part of the permanent solution for preventing of water pollution of the major canals of Kochi Corporation that includes Perandur Canal and Edapally canal as well. Following are the major scope of works under the project:
 - Cleaning of Canals
 - De-silting & Cutting
 - Bank Protection



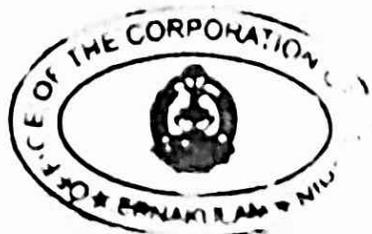
- Reconstruction of Cross Structures and Foot Over Bridges
- Sanitary Sewer Line & STPs
- Sanitation Facilities
- Jetties
- Infrastructure Development
- Beautification of canals including Tourism & Sports Park.

The Total project cost is Rs.1418 crores with the project period of 10 years and construction period of 3 years. On successful implementation of the proposed project will lead to Cleaner and Greener Environment, better drainage, sewage & rain water harvesting systems, effective and enhanced connectivity from various locations , improved landscape around the facility, reduced risk of potential flooding near the canals, properly treated and reuse of sewage from the facility etc.

5. Tenders were floated for the selection of consultant for preparation of DPR for a septage treatment plant in Brahmapuram to cater to the needs of 68 local bodies of Ernakulam District and an agency has been selected. An amount of Rs.22 Crores is also earmarked for the project under the plan fund. Agenda is placed with Corporation Council which would be considered in the next council and once council approves the financial bid of the consultant the work will be awarded and DPR preparation would be completed in 4 months time.
6. For other matters pertaining to waste management and which are under the consideration of NGT, it is reported that the work of biomining of legacy waste in Brahmapuram has been awarded to M/s Zonta Infratech Pvt Ltd on 23/07/2021 vide LOA No.MOE2/3760/20 dated 23/07/2021 .



Secretary
Kochi Municipal Corporation




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KOCHI MUNICIPAL CORPORATION

**ACTION PLAN FOR THE REJUVENATION AND PREVENTION OF
CONTAMINATION OF THE THEVARA PERANDOOR CANAL AND
EDAPPALLY CANAL IN KOCHI CITY, ERNAKULAM**

INTRODUCTION - THEVARA PERANDOOR CANAL AND EDAPPALLY CANAL

Thevara - Perandoor canal with a length of 11.15 Km and width of 5m is one of the major canals that lie across the total length of the main land of Kochi city, Passing through Edappally, Central and Vytilla zones of the Corporation. The canal has its north end at Perandoor River and in the south, it ends in Thevara canal. Mullassery canal joints this canal near KSRTC stand. Towards the Perandoor side the mouth of the canal was found to be completely filled with water hyacinth. Towards the mid-stretch running parallel to the Perandoor road the water was found to be highly polluted with waste being dumped directly into the canal. Towards the Pottakuzhy stretch, the flow of the canal was found to be disrupted to the huge volume of waste including plastic bags, bottles dumped into the canal. This stretch showed thick growth of weeds. (Environment study of Cochin Corporation, 2006, Centre for Environment and Development)

Edappally Canal with a length of 11.23 km and width of 15m forms the eastern boundary of the Kochi Municipal Corporation. This is a major canal passing through the Edappally and Vytilla zones. It connects to the Perandoor river towards the northern course and joints Chambakkara canal in the southern end. In the northern part, the canal is clogged with weeds like Eichornia Crassipes, Colocasia spp. etc and solid waste, making the water stagnant in places like Padivattom, Arakkakadavu etc. Solid wastes from the nearby flats are being directly dumped into the canal stretch. The stretch of the canal toward the north eastern side from Edappally to Palarivattom area shows moderate flow of water. The width of the canal is much reduced in many places due to

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encroachment. (Environment study of Cochin Corporation, 2006, Centre for Environment and Development)

The canals were once used for navigation, fishing, irrigation, recreation, food alleviation and goods transportation. The Edappally canal was the safest and shortest route for movement of goods along the Kodungalloor - Varapuzha - Muttar Puzha - Tripunithura channels since the erstwhile Travancore - Cochin period. It was also a seasonal fresh water source. The Thevara Perandoor canal and Edappally canal are the natural canals which was the main channel that used to empty the excess water from pokkali farms of inland areas.

The water quality report of Thevara - Perandoor canal and Edappally canal done as part of Environment study of Cochin Corporation by Centre for Environment and Development is given below.

WATER QUALITY ANALYSIS OF THEVARA PERANDOOR CANAL						
Sl no.	Parameter	Units	Location			
			Perandoor	Pottakuzhy	Gokulam Park	Kochu Kadavantra
1	Turbidity	NTU	8.9	21.8	28.1	8.5
2	Conductivity	$\mu\text{mho/cm}$	0.056	0.262	0.269	2.383
3	pH	-	6.7	6.47	7.2	7.5
4	Alkalinity	mg/l as CaCO_3	76	220	192	88
5	Acidity	-	32	14	28	4
6	Hardness	-	4000	3000	7000	22000
7	Chloride	mg/l	35.84	167.8	172.16	1525.3
8	Salinity	mg/l	64.75	302.91	311	2755.46
9	COD	mgO ₂ /l	2741	2898	4208.2	2340
10	Faecal coliform	MPN/100ml	>110000	>110000	>110000	>110000

TC

WATER QUALITY ANALYSIS OF EDAPALLY CANAL				
Sl no.	Parameter	Units	Location	
			Near Chambakkara canal	Edappally - Near Popular yard
1	Turbidity	NTU	9.7	23.8
2	Conductivity	$\mu\text{mho/cm}$	1.164	0.1635
3	pH	-	6.63	6.9
4	Alkalinity	mg/l as CaCO_3	76	196
5	Acidity	-	0	0
6	Hardness	-	12000	3000
7	Chloride	mg/l	744.7	104.64
8	Salinity	mg/l	1345.31	189.03
9	COD	mgO ₂ /l	987.3	3978
10	Faecal coliform	MPN/100ml	>110000	>110000

THEVARA PERANDOOR CANAL AND EDAPPALLY CANAL - PRESENT CONDITION

Thevara-Perandoor Canal (TP Canal) and the Edappally canal are now known to be major points of contamination of a major portion of the Kochi city and are the chief repository of urban liquid and solid waste. Since they are running through the most urbanized parts of Kochi its quality indirectly reflects the civic sense and social attitude of the people living here.

The once pure water is now stagnant, silted and putrid. Water is almost anoxic in many regions due to the inflow of domestic sewage from the nearby areas through which canal flows. At present TP canal and Edappally canal contain no fishes at all. Level of siltation makes the canals virtually non-flowing thereby contributing to the infiltration of contaminated water into ground water regions. It is also contaminating the water in the nearby wells. Large number of encroachments are seen along both sides of the canal which act not only as sources of faecal contamination but result in decreasing the width of the canal, thereby leading to clogging and hindering free flow of water. There are reports about the spread of contagious diseases in the nearby areas of these canals.



Edappally canal



Thevara - Perandoor canal

The development of urban Kochi resulted in urbanization and industrialization that changed demography and agricultural practices. When rail and road transport developed, the centre of activity moved to the eastern parts of Kochi. Whereas the lack of need for using the canals anymore for navigation made them free space for dumping of sewage. Thus, the tidal canals, which once served the purpose of modern roads, are left to degradation.

PC

TIMELINE AND ACTION PLAN FOR THE REJUVENATION AND CONTAMINATION PREVENTION

1) SANITATION SURVEY

A sanitation survey will be conducted along the Thevara – Perandoor canal area and Edappally Canal area by mobilising the Health Inspectors, Junior Health Inspectors, and health officers of the respective health circles which the canal passes. The wards covered by the canals are given below.

Major objectives to be covered in the survey are:

- Identification of outlets draining to the rivers.
- Identification of households/clusters/establishments draining sewage.
- Identifying the slums along the canal area.
- Identifying the sanitation issues in the slums.
- Identifying the reasons of sewage disposal from slums/ households and commercial establishments.
- Identification of existing provision if any for sewage treatment.
- Exploring provisions for onsite treatment.

The survey will be completed in a tentative period of three months.

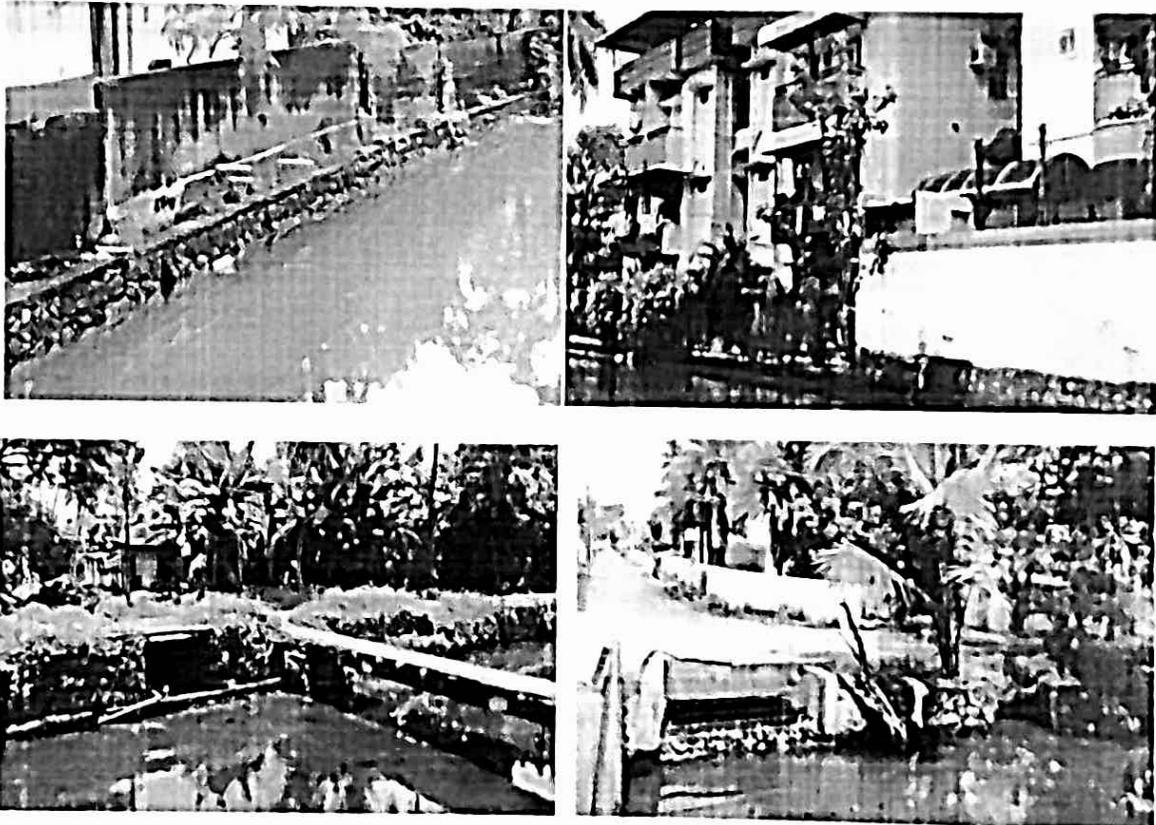
NAME OF THE CANAL	WARDS COVERED
Thevara - Perandoor Canal	32, 33, 34, 55, 56, 58, 59, 60, 63, 64, 65, 69, 70, 71, 72, 73
Edappally Canal	36, 37, 41, 42, 46, 47, 48, 49, 50

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2) CLOSING THE OUTLETS OPENING TO THE CANALS

The sewage outlets identified in the sanitation survey will be located and closed using scientific methods. All the outlets from slum areas, households and commercial establishments will be closed. The closure procedure will be initiated and mobilised by a team of Engineers, Building Inspectors and Overseers of Kochi Municipal Corporation. The implementation will be done by inviting tenders. The preparation of tender documents and estimates, Floating the tender, Inviting the quotation and mobilisation of the workers will be coordinated by the Engineering department of Kochi Municipal Corporation.

The implementation will be completed within a tentative period of six months.



Sewage discharge outlets identified along the Thevara – Perandoor canal (Thevara Perandoor Canal Survey, 2016)

PC

3) REJUVINATION, INFRASTRUCTURE DEVELOPMENT AND THE CONSTRUCTION OF SEWAGE TREATMENT PLANT

The possibilities of construction of new decentralised sewage treatment plant along the canal bank will be identified in the sanitation survey will be explored and implemented with the other ongoing major projects in the city including the IURWTS scheme. The details of IURWTS scheme are given below. To improve the sanitation infrastructure, sanitary sewer lines will be laid in the possible routes. In order to regenerate the canals to a good condition, cleaning and desilting of the canals will be done. Adequate bank protection using natural methods like vegetation planting, use of geotextiles etc will be provided along the canals to protect the canal banks from erosion and deterioration. Reconstruction of the cross drainage works and foot over bridges will also be done as part of infrastructure development. Canal beautification will also be done as part of the plan. Protective fencing will be provided along the entire stretch of the Thevara – Perandoor canal and Edappally canal. This will prevent further contamination of the canals by waste disposal.



Existing fencing along some areas of Thevara – Perandoor canal

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IURWTS FOR KOCHI CITY – A PROJECT BRIEF

The integrated urban regeneration and water transport system (IURWTS) is a scheme mooted by the government for the rejuvenation of major canals in the city. The project is funded by KIFB plans to rejuvenate six major canals Edappally canal, Thevara Perandoor canal, Chilavannor canal, Thevara canal, Market canal and Kothuruthy canal in the city and to start navigation through these canals.

The scheme envisages,

1. Restoring the canals to its original width and condition by desilting and clearing obstructions/encroachment and improving the canal system by constructing side walls and levelling up as found necessary considering the tidal variation.
2. Providing service road to facilitate proper maintenance of the canal system.
3. Providing necessary linkage for the surface drain to the main discharge canals.
4. Identifying the need and feasibility of providing new roads/culverts/bridges to smoothen the traffic.
5. General uplift and beautification of the area.

The plan is to widen, desilt and beautify Edappally, Chilavannoor, Thevara-Perandoor, Market, Thevara and Kothuruthy canals. As part of canal bank infrastructure development, roads along the banks of the canals will have to be restored or widened. There had been roads along either side of these canals. But rampant encroachment either reduced the width of the roads or caused their disappearance.

Besides the regeneration of the canals, the IURWTS envisages canal network for inland navigation, tourism and recreational purpose. Boat jetties, bridges and foot overbridges, etc. will have to be constructed. Most of the houses, offices and shops along either side of these canals open their outlet of toilets to the canals. The authorities also plan to provide the canals a uniform width of at least 20m, with 18m navigation channel and one metre for sewage pipeline on either side.

This scheme will help the rejuvenation of the canals in a major way. The Kochi Municipal Corporation will extend all support of the implementation of the project and will ensure that the canals included in the project get a total phase lift once implemented. Through this project Kochi Municipal Corporation will ensure the proper upkeep of the canal as well.

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CONCLUSION

Kochi Municipal Corporation will carry out all possible measures to ensure the proper upkeep of all canals in the city including Thevara - Perandoor canal and Edappally Canal. A dedicated team of experts will be deployed to ensure the proper upkeep of canals. The existing staff from the Health Department, Engineering Department and all other related department will be assigned to the task of the maintenance of the canals in their respective areas. The canals are important part of the city and is considered as the lifeline of Kochi and the Kochi Municipal Corporation will do everything possible to safeguard the canal system of the city.



Secretary
Kochi Municipal Corporation



REJUVANATION OF PERANDUR AND EDAPALLY THODU IN OA 27/2021 OF NGT				
ACTION PLAN				
#	KEY ACTION	Lead Responsibility	Duration	Deadline
1	Survey to identify the sources of pollution/outlets to the rivers			
	Mobilisation of junior Health Inspectors and Health Inspectors of respective Health Circles	HS	7 days	07-10-2021
	Conducting of survey			
	Identification of outlets draining to the rivers	HS	4 months	25-10-2021
	Identification of households/clusters/establishments draining sewage			
	Identification of existing provision if any for sewage treatment			
	Exploring provisions for onsite treatment			
Consolidation of survey reports	HS	1 week	01-11-2021	
2	Closing of outlets opening to the river			
	Preparation of tender documents/estimate preparation	EE	1 month	01-12-2021
	Floating of tender/inviting quotation for the work/Mobilisation of workers	EE	2 weeks	15-12-2021
	Closing of outlets opening to the river	EE/HS	6 month	15-06-2022
3	Construction of sewage treatment plants under IURWTS, by KMRL			
	Cleaning of the canals De-silting and cutting Bank protection works	TO BE FINALISED		
	Reconstruction of cross structures and foot over bridges sanitary sewer lines and STPs Sanitation facilities			
	Construction of jetties Infrastructure development Beautification of canal including tourism and sports parks Fencing along the sensitive and crowded locations			

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Manual on norms and standards for environment
clearance of large construction projects

Ministry of Environment and Forests,
Government of India



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CHAPTER 1 Sustainable site planning

1.0 Introduction

Site planning is a vital component of any type of building activity and is the first step. With growing urban development and environmental degradation it has become imperative to determine landscape design parameters, and also provide rules, regulations, controls and procedures for the protection, preservation and modification of surrounding environment. In most of the cases the site is selected by the developer before commencement of design phase. However, ideally the design team should be involved in site selection and should assess the appropriateness of the site relative to the proposed development. Analysis and assessment of the site characteristics in terms of its capacity to provide natural resources inside the building such as light, air and water without damaging the natural environment should be carried out during site selection and analysis process. The process has been divided into two parts: site selection and site analysis. The concerns related to all natural resources during site planning are covered in the site analysis section. The aim is to integrate an architecturally sustainable design with the natural environment with least damage to the nature and at best improving it by restoring its balance.

1.1 Scope of work

Sustainable site planning section of the manual covers two aspects: first site selection process, which brings it upfront all elements that would affect future development of the project. The second part is site analysis, which brings it upfront all those elements and natural resources that would get affected by the project.

The elements that get affected on site due to project development are: - Soil conditions if not preserved, hydrology of the site, topography and characteristics of land due to hard paving and built up spaces on the site, existing vegetation, solar access, and wind patterns. Mitigation options are provided in the site analysis section that would help reduce the negative impact of large construction projects on natural resources.

Site analysis section of this manual focuses on the need to consider management of resources during the design and development of the project at macro level with respect to the overall site. Impact on the resources, guidelines to mitigate negative impact, best practices, mandatory clauses, dos and don'ts for management of following resources are covered:

1. Soil

2. Land use
3. Vegetation
4. Air
5. Water
6. Waste
7. Health and well-being of construction workers

1.2 Site selection

The process of site selection for sustainable development involves identifying and weighing the appropriateness of the site with respect to sustainable building design criteria. This step is the first step and needs to be done long before the project's design phase commences. Appropriate site selection procedure reduces the negative impacts and requirement for mitigation measures for large construction projects. Site selection and analysis should be carried out to create living spaces for people in harmony with the local environment. The development of a project should not cause damage to the natural surrounding of the site but in fact should try to improve it by restoring its balance. Thus site selection should be carried out in light of a holistic perspective of land use, development intensity, social well-being and preservation of the environment. The selection should be based upon several feasibility and impact studies related to sustainability such as existing wind pattern, solar access, soil, air, water conditions, noise pollution, and bio diversity.

1.2.1 Concerns

1.2.1.1 Land use

The first feature, which should influence development of a new project, is the existing land use pattern of the neighbourhood of the project: whether the proposed development conforms to the development for that area. Recommendations for site selection are provided in this chapter.

1.2.1.2 Location of site with respect to existing eco-system on site

Development of new construction projects should not have a negative impact on the existing bio diversity and ecosystem of the site. Development of the project on the located site should not disturb sites with heritage and cultural values such as protected monuments. Constructed projects on selected sites should not disturb aesthetics and scenic beauty of a location.

1.2.1.3 Ambient environment quality in the region

Levels of air, noise and water pollution should be surveyed and considered carefully before implementing the building design. For example: High level of air, noise and water pollution and location near pollution sources such as heavy traffic roadways

should be considered carefully to implement residential building.

1.2.1.4 Availability of infrastructure

The fourth feature which should influence site selection for the development of a project are the infrastructure and utilities available, expected water and power requirement by the proposed new buildings and feasibility study of how much is available and what is the source of supply for power and water. The developer should submit the list of items asked in Form 1 and 1A as a proof to confirm the availability of infrastructure.

1.2.2 Guidelines/Recommendations for Site Selection

Site selection process includes analysis of several site factors. These are land-use, eco-system and diversity history and heritage, urban context and the environmental considerations. This part of chapter suggests guidelines for site selection including all these features.

1.2.2.1 Land use

The first concern while selecting the site should be suitability of the site. This should be analysed with respect to the surrounding existing development, natural environment and urban environment to define whether the site should be built or not and secondly to judge whether the proposed development is best suited on the considered site. Proposed land use must conform to the approved Master Plan/Development plan of the area. If there is no approved Plan, consent from appropriate authority should be taken and should be submitted for Environment clearance. If the area is outside municipal limits /outside planning area, full justification for the proposed development should be provided.

1.2.2.2. Ecosystems and diversity

Sites for new developments should be carefully assessed in context of the wider environment particularly in relation to the habitats dwelling on site or on adjacent sites. There may exist on the site some rare or endangered species of plants and animals, such sites are considered unsuitable for development. The site(s) selection can be an effective approach in minimising the requirement of mitigation measures. Project siting restrictions depend on the sensitivity of the site and its surrounding environment and the following considerations should be made while selecting a site.

1.2.2.3 Analysis of cultural/historical considerations

1. Review the traditional or vernacular architecture of the region. : The regional architectural style may be revealed through the use of vernacular architecture to

form a design that is responsive to the local cultural characteristics, thus enhancing community values.

2. **Restore historical or cultural resources on-site:**
Historical features on-site can be integrated by either modifying or incorporating parts of the existing structure into the proposed design, thus adding to the cultural fabric of the area provided that these structures are not legally protected.
3. **Use of historical, energy efficient building techniques**
Historical, energy efficient building techniques that have been involved and sustained in response to local climatic or cultural characteristics can be used or modified to suite the proposed suitable design.

1.2.2.4 Analysis of urban context considerations

1. **Analyse the city form:** The delineation of the city form due to layout of roads, open spaces, or architectural forms should be analysed. For example, a building may be visually unifying element, providing connections and continuity with adjacent buildings. Sites at the end of important vistas or adjacent to major city squares should be reserved for important public buildings.
2. **Review the potential of views:** Important city views of plazas, squares, monuments, and natural features (such as parks and water fronts) should be considered. It is important to design the proposed building in a manner that will enhance and preserve such views for the public.

1.2.2.5 Urban availability of water and other critical infrastructures like electricity, roads with adequate width and capacity.

1. The design team should gauge whether the site takes maximum advantage of natural resources, such as solar energy, natural vegetation, and geographical features, and should also analyse the proximity or remoteness of the site from existing transportation corridors, and its ability to match the needs of the building owner, users, and their occupancy patterns.
2. Resource and needs' assessment of the project should be done at this pre-design stage. Issues which need to be identified at pre design and site selection stage are: connectivity to infrastructure and public transport networks, power requirement and power source, water requirement and water source, waste management on the site.
3. Urban infrastructure and facilities, public transport, infrastructure for power, water supply to meet the estimated requirement, sewage system network should be available nearby or should be made available with minimum environment impact. For example the

residential areas should be well connected to the utilities like school, market place, sports and recreational facilities to meet the basic needs of a residential society. The team should also see whether the waste output could be dealt with acceptable environmental costs and whether development impacts can be minimised on site. It is desirable to integrate the existing utility and infrastructure, and identify whether additional infrastructure needs to be planned for the proposed project. Whatever, the case may be, additional cost or the associated disruption to the environmental or surrounding system may sometimes question the project's integrity.

4. Take into consideration the impact of proposed future development on the infrastructure.
5. Sharing of existing transportation or parking facilities may minimise the budget for infrastructure.

1.2.2.6 Onsite management of waste

1. Land acquired should be minimum but sufficient to provide for a green belt wherein the treated wastewater, if possible/ suitable, could be utilised from wastewater treatment systems.
2. Space onsite for solid waste: Enough space may be provided for storing solid wastes. The space and the waste can be made available for possible reuse in future.
3. Reuse negative urban spaces or industrial site: This should be done when existing urban amenities and infrastructure can be utilized, thus reducing the pressure on undeveloped land. If possible and justified in terms of sustainable design goals, select a site that offers a possibility of urban redevelopment, (or where development is constrained due to environmental pollution or increasing urban pressure), or which uses existing urban infrastructure confirming the desired density goals. This would help reduce the perennial pressures on the undeveloped land to some extent.
4. Conformance to existing landscape: Layout and form of the project must conform to the landscape of the area without unduly affecting the scenic features of that place.

1.2.2.7 Environmental consideration

In addition to the siting criteria listed above, the proposed project location should meet the standards prescribed by the Central Pollution Control Board (CPCB) and IS standards for the following environment parameters:

- Ambient air, water and noise quality standards
- Natural disaster prone areas
- Ecologically sensitive areas

development can be designed with the ability to withstand such eventualities. Other investigations may be carried out on relative mappings of natural winds, floods, or climatic data to ascertain the possibility of any other risks involved. If possible, new choices or other complementary structural techniques should be developed for the site.

1.3 Site analysis

After the first analysis of the site evaluation and site selection, the site should be analysed with respect to all the issues involved in its sustainable development. The natural functions of a plot of land (hydrology, geology and microclimate) could be seriously disrupted by the placement of buildings on it if site analysis for optimum placement and design of buildings is not carried out. Layout the site activities and building requirements after carrying out detailed site analysis so as to ensure sustainable site development is in tune with its topography, climate, ecological character and functional requirements of the building. The main objective is to allocate and define the use of various parts of the site in a manner that is most appropriate to specific building activities to be carried on the proposed site. The purpose of site analysis is also to determine the site characteristics so that proper drainage pattern and system, circulation pattern, landscape design and other site development features can be considered in relation to the existing site features and proposed building design parameters such as building form, solar orientation, shape, skin to volume ratio, materials etc.

The site analysis evaluates all the environmental determinants, which include (soil, air, water, solar access, noise), that could get affected due to development on the proposed site. All the concerns and mitigation options for the concerns at site level are covered in this section. Impact of development of the project on ecology and available resources on site, example impact of building shade on open spaces, existing wind patterns on the site, impact on soil erosion, existing vegetation, habitat protection, water and air pollution and waste handling should be assessed and mitigation options to reduce the negative impact on the resources as suggested in this document should be carried out.

1.3.1 Concerns

1.3.1.1 Building siting

Geographical latitude and microclimatic factors such as wind loads and solar access: Improper planning and layout of buildings can affect the availability of natural resources to the occupants. For example, Large built volumes perpendicular to the wind divert the latter and tend to create a wind shadow of a length equal to 15 times the building's height (with wind

velocity halved down). Design of buildings could result in overshadowing existing buildings and sometimes also result in cutting down the availability of natural light in adjacent buildings. The way in which a building or group of buildings are sited in relation to other buildings, natural topography and landscape could have detrimental effects on its potentialities.

1.3.1.2 Impact on soil due to land disturbance :

Top soil conservation: Topsoil is rich in organic content and is essential to establish new vegetation. Development projects involve disturbance to the existing soil conditions, removal of existing trees, which result into soil erosion, instability and overall change in the microclimate and drainage pattern of the site. Erosion, by the action of water, wind and ice, is a natural process in which soil and rock material get loose and removed. There are two major classifications of erosion - (1) geological erosion, and (2) man-made erosion.

Geological erosion, includes soil-forming as well as soil-removing, has contributed to the formation of soils and their distribution on the surface of the earth. Man-made erosion, which greatly accelerates the natural erosion process, includes the breakdown of soil aggregates and the increases removal of organic and mineral particles. This could be caused due to clearing, grading or otherwise altering the land. Erosion of soils that occur at construction sites is man – made erosion.

1.3.1.3 Preservation of vegetation and landscape

Preservation of natural vegetation and protection of landscape during construction : Development projects involve disturbance to the existing soil conditions, removal of existing trees and overall change in the microclimate and drainage pattern. Measures to minimize hazardous effects should be put into effect as explained in this manual.

1.3.1.4 Preservation of Air environment

Air environment of the proposed site gets affected due to wind erosion, construction on site, transportation on site and heat island effect.

Dense urban areas tend to have higher air temperatures as compared to the surrounding low-rise rural areas because of the absorption and storage of a high percentage of radiation received by the built mass and minimised radiative heat losses from it. This gives rise to warmer air temperature in urban localities, which might reach 1-2deg.C more than that of the surrounding green areas. This phenomenon is called as the heat island effect.

Principle surfaces that contribute to the heat island effect include streets, sidewalks, parking lots, and buildings. Heat island effect can be minimized by use of shading or reflective surfaces. As mentioned, hard paved surfaces are one of the