

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

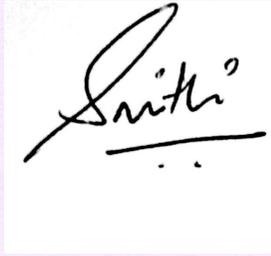
**ORIGINAL APPLICATION NO. 141 of 2021(SZ)**

The Tribunal on its own motion based on the news item published in Kerala Kaumudi News Paper web edition dated 6th June 2021 under the caption "A New Ray of Life For Pallikkalar".

Vs

State of Kerala & Others

: Respondent(s)



**REPORT FILED BY THE CHIEF ENVIRONMENTAL ENGINEER,  
KERALA STATE POLLUTION CONTROL BOARD, FOR AND ON  
BEHALF OF THE RESPONDENT**

Adv. Rema Smrithi.V.K

ADDITIONAL STANDING COUNSEL FOR THE SECOND RESPONDENT

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**VOLUME 1**

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1	Report filed by the Chief Environmental Engineer, Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram on behalf of Kerala State Pollution Control Board, in Original Application No. 141/2021.	1- 4

Dated this the 29<sup>th</sup> day of April 2024.

Rema Smrithi. V.K, Advocate

ADDITIONAL STANDING COUNSEL FOR THE SECOND RESPONDENT

**BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL**

**SOUTH ZONE, CHENNAI**

**Original Application No.141 of 2021 (SZ)**

Applicant : The Tribunal on its own motion based on the news item published in Kerala Kaumudi News Paper web edition dated 6<sup>th</sup> June 2021 under the caption "A New Ray of Life For Pallikkalar".

Respondents : State of Kerala & Others

**Report filed by Chief Environmental Engineer, Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram on behalf of The Kerala State Pollution Control Board, in Original Application No. 141/2021.**

The report is filed in accordance with the order of the Hon'ble NGT dated 23/02/2024 in O.A.No.141/2021.

1. In continuation to the report submitted on 26/08/2023 by Kerala State Pollution Control Board, wherein it has reported that the Board via email dated 23/08/2023 had requested CSIR-NEERI for additional details on their proposal on Pallikkalar. CSIR-NEERI submitted revised proposal vide letter dated 22/09/2023. The matter was examined in detail and Administrative Sanction was accorded to carry out "Feasibility study on development of process package for Domestic Sewage" to meet environmental compliance at Pallikkalar and Edappally – Perandoor Canal for an amount of Rs. 45,00,000/- (Forty Five Lakhs only) through CSIR-NEERI Nagpur, Maharashtra. The study duration was initially fixed as 15 months and the Hon'ble NGT vide its order dated 12/10/2023 recommended CSIR-NEERI to reduce the length of the project.

2. Accordingly Memorandum of Agreement dated 23/01/2024 was signed between Kerala State Pollution Control Board and CSIR-NEERI with a study



*Vinaya*  
VINAYA. K.S  
CHIEF ENVIRONMENTAL ENGINEER

duration of 12 months starting from the receipt of first installment of the Project Cost. The responsibilities of CSIR-NEERI includes preparation of a feasibility report on the process package for the treatment of domestic sewage to meet environmental compliance with the following scope of work.

- Delineation of the stormwater and raw sewage catchment area discharged into the Canal/Nallah/Drain
- Physico-chemical characterization of two seasons (based on the primary data and quantification (based on the secondary data) of domestic sewage from different municipalities flowing into the Canal/Nallah/Drain
- Population forecasting for designing the hydraulic load and estimating pollution loads of sewage discharge from different municipality areas on the proposed treatment scheme, Evaluation of Drain/Canal/Nallah configuration for the feasibility of In-situ or Ex-situ treatment.
- Delineation of the site-specific In-situ or Ex-situ treatment scheme to meet Environmental Compliance.
- A topography survey of the Drain/Canal/Nallah as per In-situ or Ex-situ treatment.
- Delineation of conceptual frame design of the recommended treatment scheme with basic engineering design details and specifications (excluding the detailed engineering) for treating the domestic sewage flowing into the Nallah /drain/Canal.
- Tentative cost estimation of the recommended In-situ or Ex-situ treatment schemes with project implementation strategy and schedule.
- Preparation of process package for In-situ or Ex-situ treatment for sewage from the above-mentioned municipalities flowing into



*Vinaya*  
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CHIEF ENVIRONMENTAL ENGINEER

Nallah/Canal/drain.

3. Subsequently, CSIR-NEERI has submitted invoice for release of first installment and sanction vide order dated 19/02/2024 was accorded for the release of Rs.26,55,000/- (Twenty Six Lakh Fifty Five Thousand Only) to CSIR-NEERI, Nagpur, Maharashtra.

4. Subsequently the officials from CSIR-NEERI made a field visit of Pallikkalar on 17/04/2024 & 18/04/2024. As a part of the pre-monsoon visit, GPS co-ordinates, flow, cross section measurements etc were recorded and samples were collected from various points of Pattoli Canal and Valiyath Canal flowing into the Pallikkalar and transferred to NEERI's lab for detailed analysis. Feasibility regarding in-situ treatment in canal's and streams were looked into. The canal stretches were marked for the delineation studies. A visit will be conducted during post monsoon period to study the physio-chemical characteristics of the canals.

5. Based on the field visit, NEERI has submitted report dated 25/04/2024 (produced as Annexure A). In the report, NEERI states the purpose of development of the process package for the treatment of domestic waste in natural systems, which includes

- Variation in wastewater flow and characteristics which is diurnal as well as seasonal.
- The topographical and site-specific conditions.
- Different sources of pollution and their contributions.
- Selection of appropriate technology or combinations thereof to ensure compliance with the prescribed norms by NGT.
- Decision on single or multiple decentralized treatment units
- Delineation of an appropriate treatment scheme/train, sludge management treated water discharge, etc.



*Vinaya*

**VINAYA. K.S**

**CHIEF ENVIRONMENTAL ENGINEER**

6. A detailed feasibility study, essentially covering data in pre-monsoon season (representing the worst scenario), was essential for the development of a scientific and technically sound process package that would ensure environmental compliance in the long term. It also assesses the performance viability of various treatment processes and delineates the most appropriate treatment scheme with design specifications, including tentative CAPEX and, operating and maintenance costs required to treat wastewater for environmental compliance. A detailed project report (DPR) will be prepared by CSIR-NEERI based on the feasibility report for its full-scale implementation. Thus, the process package developed based on a scientific feasibility study will be key for the successful implementation of the techno-economically viable scheme for treating domestic sewage to meet environmental compliance.

7. It is humbly submitted that the Board has taken utmost entrust and urgent action to get the project done through CSIR-NEERI, in compliance with the order of Hon'ble NGT.

All that stated above are true to the best of my knowledge and belief.

Dated this the 29th day of April 2024.



*Vinaya*  
**Chief Environmental Engineer**

**VINAYA. K.S**  
**CHIEF ENVIRONMENTAL ENGINEER**

**KSPCB**

Solemnly affirmed and signed by the deponent who is known to me on  
this the 29<sup>th</sup> day of April 2024.

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**VOLUME 2**

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1	Annexure A – Progress Report of "Feasibility study on development of process package for Domestic Sewage" submitted by CSIR-NEERI dated 25/04/2024.	1-13

Dated this the 29<sup>th</sup> day of April 2024

Rema Smrithi. V.K, Advocate

ADDITIONAL STANDING COUNSEL FOR THE SECOND RESPONDENT

## Progress Report

# Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Perandoor, Pattolit and Valiyat Canals) to Meet Environmental Compliance

## Sponsor



Kerala State Pollution Control Board,  
Thiruvananthapuram



CSIR-National Environmental Engineering Research Institute  
Nehru Marg, Nagpur – 440 020



April 25, 2024

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## Progress Report

# Feasibility Study on Development of Process Package for Treatment of Domestic Sewage (Edappally, Perandoor, Pattolit and Valiyat Canals) to Meet Environmental Compliance

### 1.0 Preamble

Member Secretary of Kerala State Pollution Control Board (KSPCB), Thiruvananthapuram, requested vide letter [No. PCB/HO/EE3/ O.A/ No.27 / 2021 (SZ)/ 2021] dated May 08, 2023, addressed to the Director, CSIR-National Environmental Engineering Research Institute(CSIR-NEERI), Nagpur, to send the two experts for a site visit to examine the feasibility of the Phytoid Wastewater Treatment Technology or any other similar technology and submit the site visit report. Accordingly, a two-member team from CSIR-NEERI, Nagpur, and officials of different Government Departments visited the different concerned sites during May 11-13, 2023. During this visit, locations of Canal/Drain/Nallah/River/Lake were identified, which carry untreated domestic wastewater as well as solid and plastic wastes from different locations or municipal areas.

Based on the site visit and preliminary discussions with the officials of KSPCB and different Government departments, the Site Visit Report based on observations also way forward for managing the discharge of untreated domestic sewage/septage, and effluent from the respective municipalities, houseboats, and prawn peeling industries into different water bodies was submitted to the KSPCB, Thiruvananthapuram on May 30, 2023. Thereafter, based on the CSIR-NEERI's Site Visit Report, KSPCB requested CSIR-NEERI, Nagpur vide letter [No. PCB/HO/EE3/OA. No. 27/2021(SZ)/2021] dated July 04, 2023, to submit the Project Proposal with the scope of the work and financial budget. The Project Proposal for a feasibility study for developing a process package for domestic sewage to meet Environmental Compliance was submitted to KSPCB on July 28, 2023

Lateral, the Member Secretary of the KSPCB requested through email, dated August 23, 2023, to submit a proposal for a feasibility study on the development of a process package for domestic sewage to meet environmental compliance for two sites, Pattolit and Valiyat Canals discharging sewage into Pallikalar River and Edappally and Perandoor canals. Accordingly, CSIR-NEERI submitted the proposal and

subsequently issued a work order to conduct a feasibility study on developing a process package for treating domestic sewage of Edappally, Perandoor, Pattolit, and Valiyat canals to meet environmental Compliance to meet environmental compliance. The first installment of the said study was released by KSPCB on February 26, 2024. Work was immediately taken up after that. A complete Project chronology is given in **Table 1.**

**Table 1: Project Chronology**

<b>Sr. No.</b>	<b>Description</b>	<b>Dates</b>
1.	Request from Member Secretary of Kerala State Pollution Control Board (KSPCB) Thiruvananthapuram for site visit of CSIR-NEERI Scientist	May 08, 2023
2.	The site visit is carried out by CSIR-NEERI	May 11-13, 2023
3.	The Site Visit Report submitted to KSPCB, Thiruvananthapuram	May 30, 2023
4.	Request for submitting the project proposal based on site visit Report	July 04, 2023
5.	Submission of three project proposals for domestic sewage, septage, and prawn peeling industries	July 28, 2023
6.	Out of three proposals, accept one proposal on domestic sewage and request to add the site of Pallikalar (Karunagapally municipality)	August 23, 2023
7.	Submission of the revised proposal	September 22, 2023
8.	Work order issue date	September 23, 2023
9.	Requesting CSIR-NEERI to reduce the time period of the project from 15 months to 12 months	October 30, 2023
10.	Letter from CSIR-NEERI for trying to complete the study in 12 months	November 6, 2023
11.	Draft MoA submitted to KSPCB	November 28, 2023
12.	Final project proposal submission to sponsor	January 24, 2024
13.	Invoice raised by CSIR-NEERI	January 24, 2024
14.	MoA final	February 19, 2024
15.	First instalment received	February 26, 2024
16.	First monitoring started by CSIR-NEERI	April 14-19, 2024

## **2.0 Need for Feasibility Study**

Development of a process package for the treatment of Domestic waste in natural systems is a complex task as it has to address:

- Variationa in wastewater flow and characteristics which is diurnal as well as seasonal.
- The topographical and site-specific conditions.
- Different sources of pollution and their contributions.
- Selection of appropriate technology or combinations thereof to ensure compliance with the prescribed norms by NGT.
- Decision on single or multiple decentralized treatment units
- Delineation of an appropriate treatment scheme/train, sludge management, treated water discharge, etc.

Therefore, a detailed feasibility study, essentially covering data in pre-monsoon season (representing the worst scenario), is essential for the development of a scientific and technically sound process package that would ensure environmental compliance in the long term. It also assesses the performance viability of various treatment processes and delineates the most appropriate treatment scheme with design specifications, including tentative CAPEX and operating and maintenance costs required to treat wastewater for environmental compliance. A detailed project report (DPR) has to be prepared based on the feasibility report for its full-scale implementation. A process package thus developed based on a scientific feasibility study will be key for the successful implementation of the techno-economically viable scheme for treating domestic sewage to meet environmental compliance.

### **3.0 Objective**

The project aims to prepare the feasibility report for developing the process package for domestic sewage from the various canals to meet Environmental Compliance.

### **4.0 Scope of Work:**

Based on the above objective, the following is the project scope of work:

- Delineation of the stormwater and raw sewage catchment area discharged into the Canal/Nallah/Drain.
- Physico-chemical characterization of two seasons (based on the primary data) and quantification (based on the secondary data) of domestic sewage from different municipalities flowing into the Canal/Nallah/Drain.

- Population forecasting for designing the hydraulic load on the treatment scheme.
- Estimation of pollution loads of sewage discharge from different areas of municipalities.
- Evaluation of Drain/Canal/Nallah configuration for the feasibility of In-situ or Ex-situ treatment.
- Delineation of the site-specific In-situ or Ex-situ treatment scheme to meet Environmental Compliance.
- A topography survey of the Drain/Canal/Nallah as per In-situ or Ex-situ treatment
- Delineation of conceptual frame design of the recommended treatment scheme with basic engineering design details and specifications (excluding the detailed engineering) for treating the domestic sewage flowing into the Nallah /drain/Canal.
- Tentative cost estimation of the recommended In-situ or Ex-situ treatment schemes.
- Project implementation strategy and schedule for in-situ or Ex-situ treatment
- Preparation of process package for In-situ or Ex-situ treatment for sewage from the above-mentioned municipalities flowing into Nallah/Canal/drain.
- Submission of Report.

## **5.0 Study Area**

The study area lies in the Ernakulam and Kollam districts of Kerala State. The base map of the study area will be prepared after receiving an administrative map from the Kerala State Pollution Control Board (KSPCB), Thiruvananthapuram. The Edappally and Thevara-Perandoor (TP) canals are situated in Ernakulam districts with lengths of approximately 12 and 10 km, respectively. Both canals receive stormwater and domestic sewage from different municipalities and are discharged into different water bodies. The Pattolit and the Valiyat canals are situated in the Kollam districts, which also receive stormwater and domestic sewage from the Karunagapally Municipality area and finally discharged into the Pallikal River.

## 6.0 Site Observations

The following are site-specific observations of the Edappally, Thevara-Perandoor canals situated in Ernakulam district and Pattolit and Valiyat canals situated in Kollam district:

- The aerial length of the Edappally canal is approximately 12 km, which originates from the Periyar River and the confluence with the Chambakkara canal within Kochi City. The configuration of the canal throughout its length is not uniform in terms of width and depth. There is the tidal effect in the canal, which allows the flow of water/wastewater in both directions. The main purpose of the canal was navigation and trading. Presently, it carries stormwater and domestic sewage generated from the Kochi Municipal Corporation area.
- The Edappally canal passing adjacent to Lulu Mall was found covered with water hyacinth at the top surface and sludge deposited at the bottom. Therefore, it was difficult to monitor the flow and collect the wastewater samples. However, the sample collection and flow monitoring were shifted to 40m upstream from the bridge near the Lulu Mall.
- Harvesting of fish by the local people was carried out during monitoring near the confluence of Edappally and Champakkara canals (Plate 1), which may indicate the presence of good water quality.
- The Thevara-Perandoor (TP) canal originates between the interconnection of the Thevara canal and at approximately 10 km downstream the canal is the confluence with the Perandoor canal within Kochi City. This canal was previously used for business purposes namely, navigation and trading. The configuration of the canal throughout its length is not uniform. The tidal effect in the canal allows the flow of water/wastewater in both directions. Presently, it carries stormwater and domestic sewage generated from the Kochi Municipal Corporation area.
- Pattolit and Valiyat canals carry stormwater and untreated domestic sewage from the inhabitants of the Karunagapally Municipality area, which is finally discharged into the Pallikal River. The configuration of both canals, as monitored, is not uniform in terms of width and depth. During the monitoring, the septic condition and water hyacinth were also observed. Some portion of the canals at the top was also covered with concrete slabs.

- As per the KSPCB, Kollam households have been facilitated with the septic tank, and its overflow is discharged into the canal. This indicates that there is no sewerage system or sewage treatment plant to carry and treat domestic sewage generated by households. Therefore, the sewage is discharged into the abovementioned canals.

## 7.0 Flow Monitoring & Sampling and Analysis

Field monitoring comprising flow measuring/ recording, and on-site measuring of physical parameters of collected samples from different water bodies. The monitoring was carried out from April 15-18, 2024, to determine its water/wastewater quality and quantity, and to identify various issues of the canals. The onsite flow measuring/ recording of different canals was carried out with an area velocity flow meter (Plate 1). The grab samples were collected from different locations of the five significant water bodies namely Edappally, Perandoor, Pattolit, and Valiyath canals and Periyar River.

One water sample was collected from the Periyar River (**Plate 2**). Three samples were collected at different locations of the Edappally canal, starting from the Periyar River to the Chambakkara canal (**Plates 3-5**). Three wastewater samples were collected at different locations of the Thevara-Perandoor (TP) (**Plates 6-8**), starting from the interconnection of the Thevara canal at upstream and downstream at the confluence with the Perandoor canal. The five and six wastewater samples were also collected from the Pattolit (**Plates 9-13**) and Valiyath canals (**Plates 14-19**), respectively. The details of the sampling locations, along with coordinates of the Periyar River, Edappally, Thevara-Perandoor, Pattolit, and Valiyat canals, are presented in **Table 2**.

**Table 2: Details of the sampling location of Periyar River, Edappally, Thevara-Perandoor, Pattolit, and Valiyat canals**

Site ID	Sample ID	Particulars	Latitude (N)	Longitude (E)
<b>Periyar River (PR)</b>				
EC-02	PR	Located at 50 m upstream of the starting point of the Edappally canal.	10°2'48"	76°18'11"
<b>Edappally canal (EC)</b>				
EC-01	EC-01	Located at 30 m downstream of the confluence of the Periyar River and Edappally canal.	10° 2'36."	76°18'12."
EC-04	EC-02	Located at 2.25 km downstream of the EC-01 and	10°1'36"	76°18'26"

		40 m upstream of the bridge near Lulu Mall.		
EC-05	EC-03	Located at 7.25km downstream of EC-02 and 0.1km upstream of the Champakkara canal.	9°58'51"	76°20'14"
<b>Thevara-Perandoor canal (TPC)</b>				
PC-01	TPC-02	Located at 3 km downstream of TPC-01.	9°58'11"	76°17'41"
PC-02	TPC-01	Located at 0.1 km downstream of the interconnection of the Thevara canal near the Thevara Railway line.	9°56'46"	76°18'1"
PC-03	TPC-03	Located at 3.25 km downstream of TPC-02 near Gokulam Convention Centre.	9°59'43"	76°17'24"
<b>Pattolil canal (PC)</b>				
PT-01	PC-01	Located at 0.1 km upstream of the Pallikal River.	9° 3'20.01"	76°32'38.72"
PT-02	PC-02	Located at 0.9 km upstream of the Pallikal River	9° 3'41.48"	76°32'36.39"
PC-03	PC-03	Located at 1.7 km upstream of the Pallikal River	9° 4'8.31"	76°32'26.05"
PC-04	PC-04	Located at 2.9 km upstream of the Pallikal River.	9° 4'42.39"	76°32'11.10"
PC-05	PC-05	Located at 3.4 km upstream of the Pallikal River.	9° 4'55.62"	76°32'6.25"
<b>Valiyath canal (VC)</b>				
VC-01	VC-01	Located at 0.1 km upstream of the Pallikal River.	9° 3'25.04"	76°32'30.56"
VC-02	VC-02	Located at 0.75 km upstream of the Pallikal River.	9° 3'38.09"	76°32'23.61"
VC-03	VC-03	Located at 1.10 km upstream of the Pallikal River.	9° 3'46.10"	76°32'17.59"
VC-04	VC-04	Located at 1.30 km upstream of the Pallikal River.	9° 3'51.00"	76°32'19.00"
VC-07	VC-05	Located at 1.80 km upstream of the Pallikal River.	9° 4'8/17"	76°32'14.20"
VCS	VC-06	Located at 3.0 km upstream of the Pallikal River.	9° 4'38.76"	76°32'2.30"

Measurements of pH, temperature, and total dissolved solids were made onsite. Further analysis of these samples for physicochemical parameters is initiated at CSIR-NEERI, Nagpur, and is being analyzed according to Standard Methods for the Examination of Water and Wastewater, 23<sup>rd</sup>. Ed., American Public Health Association, American Water Works Association, & Water Environment Federation, Washington, DC, 2017 (APHA 2017).

## 8.0 Future Course of Work for Interim Report

The following activities of the work are in progress for the finalization of the interim report:

- Preparation of the thematic maps of the Edappally, Thevara-Perandoor, Pattolit, and Valiyat canals, including the Periyar River, indicating the identified water and wastewater sample locations in the above-mentioned canals.
- The point and non-point source of pollution discharged into the above-mentioned canals will be identified.
- Physico-chemical characterization of the collected water and wastewater samples for the identified locations of Edappally, Thevara-Perandoor, Pattolit, and Valiyat canals, including Periyar River.
- Review and analysis of the secondary data required for the project activities after receiving it from KSPCB.
- Identification of various point and non-point sources of wastewater being discharged into the various canals.
- Assessment of water and wastewater quality of the Edappally, Thevara-Perandoor, Pattolit, and Valiyat canals, including Periyar River, based on the pollution indicator/water quality parameters, etc.
- Population forecasting for designing the hydraulic load on the treatment scheme.
- Estimation of pollution loads of sewage discharge from different areas of municipalities.



**Plate 1: Fish harvesting by local people near confluence of Edappally and Champakkara canals**



**Plate 2: Periyar River (PC) at 50 m upstream of the starting point of the Edappally canal**



**Plate 3: Edappally canal (EC-01) at 30 m downstream of the confluence of the Periyar River and Edappally canal.**



**Plate 4: Edappally canal (EC-02) at 2.25 km downstream of the EC-01 and 40 m upstream of the bridge near Lulu Mall. Edappally canal.**



**Plate 5: Edappally canal (EC-03) at 7.25km downstream of EC-02 and 0.1km upstream of the Chabakarra canal.**



**Plate 6: Thevara-Perandoor (TPC-01) Located at 0.1 km downstream of the interconnection of the Thevara canal near the Thevara Railway line.**



**Plate 7 :Thevara-Perandoor (TPC-02) located at 3 km downstream of TPC-01**



**Plate 8: Thevara-Perandoor (TPC-03) Located at 3.25 km downstream of TPC-02 near Gokulam Convention Centre**



**Plate 9: Pattoli canal (PC-01) located at 0.1 km upstream of the Pallikal**



**Plate 10: Pattoli canal (PC-02) located at 0.9 km upstream of the Pallikal River**



**Plate 11: Pattoli canal (PC-03) located at 1.7 km upstream of the Pallikal River**



**Plate 12: Pattoli canal (PC-04) located at 2.9 km upstream of the Pallikal River**



**Plate 13: Pattoli canal (PC-05) located at 3.4 km upstream of the Pallikal River**



**Plate 14: Valiyath canal (VC-01) located at 0.1 km upstream of the Pallikal River**



**Plate 15: Valiyath canal (VC-02) located at 0.75 km upstream of the Pallikal River**



**Plate 15: Valiyath canal (VC-03) located at 1.11 km upstream of the Pallikal River**



**Plate 17: Valiyath canal (VC-04) located at 1.30 km upstream of the Pallikal River**



**Plate 18: Valiyath canal (VC-05) located at 1.8 km upstream of the Pallikal River**



**Plate 19: Valiyath canal (VC-06) located at 3.0 km upstream of the Pallikal River**