BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Execution Application No. 24 of 2023

in

Original Application No. 44 of 2022

Saket Girls P.G. College ...   **Applicant**

Versus

State of Uttar Pradesh & Ors   **Respondents**

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	True copy of recommendation by Jal Nigam along with designs and drawings and reports meeting the prescribed effluent standards of the Uttar Pradesh Pollution Control Board (UPPCB)	33-53
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Through

Date: 08.08.2025

Place: New Delhi

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WRITTEN SUBMISSION ON BEHALF OF THE EXECUTIVE OFFICER, NAGAR PALIKA PARISHAD, BELHA, PRATAPGARH

MOST RESPECTFULLY SHOWETH:-

1. That the present written submission is tendered on behalf of the Executive Officer, Nagar Palika Parishad, Belha, Pratapgarh ("NPP Belha"), in compliance with the orders of this Hon'ble Tribunal dated 1 July 2022 and 21 November 2024, and in reply to the allegations

made in Execution Application No. 24 of 2023 filed by Saket Girls P.G. College.

2. It is submitted with utmost respect that NPP Belha has undertaken and completed all necessary, practical, and technically sound measures to address the problem of waterlogging and sewage discharge in and around the Applicant's premises. The works executed by the municipal body have been designed not merely to comply with the Tribunal's directions, but to ensure a permanent, sustainable environmental solution in accordance with recognised legal principles and environmental norms.

3. That the Applicant institution was established approximately three decades ago on low-lying land in Dahilamau, which, at the time of construction, lay outside the limits of the municipal council and fell within the jurisdiction of the Gram Sabha.

4. That the only drainage provided then was a simple open channel ending just outside the main gate, discharging into adjacent vacant agricultural lands. These lands served as natural percolation and dispersion areas for both stormwater and wastewater. Over time, private development on these lands obstructed the natural flow, causing rainwater and wastewater to accumulate in the College's surroundings and often flow back into its premises.

5. That the College authorities, despite being aware of these topographical constraints, did not plan or install any internal drainage network to channel their wastewater to an appropriate outlet.

6. That by Government notification dated 31 December 2019, the municipal limits of Belha–Pratapgarh were extended to encompass the Applicant's premises. Only thereafter did the statutory responsibility for the drainage of this area vest in NPP Belha.

7. That Soon after assuming jurisdiction, and upon receiving complaints about water stagnation, the municipal body initiated immediate remedial measures and, in parallel, prepared a detailed permanent drainage project for submission to the State Government.

8. That this Hon'ble Tribunal, in its order of 1 July 2022, directed the municipal council to complete a permanent drain to prevent waterlogging, while also continuing interim measures such as suction pumping.

9. That in faithful compliance, NPP Belha installed high-capacity pumps to lift accumulated wastewater from the affected area and divert it to the 8.95 MLD Sewage Treatment Plant (STP). The pumping operation has been maintained continuously, with dedicated

sanitation staff deployed to desilt and clean the drains, thereby preventing any stagnation that could cause health hazards.

10. That simultaneously, the Nagar Palika Parishad prepared estimates for the construction of a covered drain from the transformer near Saket Degree College on the main road to the front of Premium Palace, and from Plaza Palace on Gaighat Road to New Basti, Jankipuram. The project, with a total length of 920 metres, was sanctioned by the Government of Uttar Pradesh for ₹4.995 crore on 14 March 2024.

11. That owing to the Model Code of Conduct for Lok Sabha elections and a temporary vacancy in the office of the Municipal President, the tender process commenced in June 2024. The works began immediately thereafter, notwithstanding seasonal rains, and progressed in stages.

12. That as of mid-November 2024, 552 metres about 60% of the drain had been completed, as recorded in the Work Completion Certificate dated 16 November 2024 and supported by GPS-tagged photographs. **True copy of work completion certificate and GPS-tagged photographs is attached herewith and marked as Annexure P/1**.

13. That the contractor, Jasoriya Builders, issued a written assurance confirming that the remaining work would be completed before the end of November 2024. **True copy of assurance is attached herewith and marked as Annexure P/2.**

14. That the above assurance was duly honoured, and the entire 920 metres of the covered drain was finished and commissioned before the year's end, as certified in the Final Work Completion Certificate dated 6th May 2025 The completion was physically verified by municipal engineers and has been functioning as intended since. **True copy of work completion certificate is attached herewith and marked as Annexure P/3.**

15. That It is respectfully submitted that, for certain outlets such as the Bhuliyapur drain, a direct connection of the newly constructed drain to the existing Sewage Treatment Plant was not technically feasible, owing to the considerable distance involved and the absence of any intermediate pumping station within the scope of the sanctioned estimate. In recognition of these constraints, and in adherence to the sustainable treatment approach endorsed by this Hon'ble Tribunal, NPP Belha implemented decentralised treatment solutions in the form of constructed wetland systems, ensuring that all sewage from these outlets is treated to CPCB norms prior to discharge. To demonstrate the full extent of the works executed and the operational continuity of the

drainage network, a pen drive containing **video footage of the covered drains measuring approximately 13 kilometres in total length has been prepared and is filed herewith, marked as Annexure P/4**

16. That recognising the technical impracticability of connecting certain outlets—particularly the Bhuliyapur drain—to the existing 8.95 MLD Sewage Treatment Plant, and acting in accordance with sustainable environmental practices, NPP Belha constructed decentralised treatment facilities in the form of Sub-Surface Vertical Upflow Constructed Wetland Systems. The Bhuliyapur drain posed unique constraints: owing to its long distance from the STP and the absence of an intermediate pumping station in the sanctioned estimate, direct tapping was not feasible. On the specific suggestion and advice of the Uttar Pradesh Jal Nigam, which is the statutory, technical, and competent authority for the design and execution of sewerage works in the State, and with the design duly vetted by MNIT Allahabad, a constructed wetland of 2.5 MLD capacity and an optimal retention period of 17 hours was established at the downstream location of the Bhuliyapur drain. This facility treats all inflow before its release into the Sai River, ensuring full compliance with Central Pollution Control Board (CPCB) norms.

17. That similarly, in respect of the Ramleela drain—two-thirds of which is already tapped to the 8.95 MLD STP—residual flows from households downstream of the railway line could not be conveyed to the STP. For the treatment of this approximately 0.2 MLD of untapped sewage, and again on the recommendation of the Uttar Pradesh Jal Nigam as the competent authority, an additional constructed wetland of 0.5 MLD capacity was built on the Ramleela drain. Both the Ramleela and Bhuliyapur wetland systems represent a significant leap towards decentralised, eco-friendly sewage treatment. The monitoring, operational control, and maintenance of these constructed wetlands are under the supervision of the Uttar Pradesh Jal Nigam, ensuring that they function optimally and consistently meet the prescribed effluent standards of the Uttar Pradesh Pollution Control Board (UPPCB). **True copy of recommendation by Jal Nigam along with designs and drawings and reports meeting the prescribed effluent standards of the Uttar Pradesh Pollution Control Board (UPPCB) are enclosed herewith and marked as Annexure P/5**

18. That since the commissioning of these wetlands, no untreated sewage from the concerned drains is discharged into the Sai River

or any open land. Continuous monitoring, including water quality testing, confirms that treated effluent meets all prescribed environmental standards. The District Magistrate's oversight committee, after inspection in March 2025 and as late as August 2025, commended the municipal body for effectively addressing the long-standing problem.

19. That it is pertinent to highlight that independent inquiries by the Sub-Divisional Magistrate and Tehsildar have revealed acts of encroachment and record manipulation by the Applicant's management. Official revenue records demonstrate that the College has encroached upon approximately 0.020 hectares of "new fallow" land (Gaata No. 96) and has, by tampering with entries, doubled the recorded area of Gaata No. 98 from 0.378 hectares to 0.721 hectares in order to secure recognition for additional courses and facilities. As the SDM's report of November 2024 records,

> *"It is clear from the above investigation that by tampering with the records, double entry has been made in plot number 98…The manager…has used the Khatauni of double entry…to take unfair advantage."*

20. That in furthermore, the Public Works Department, in its inspection, found that the College's buildings have been erected in violation of NBC 2005 standards, without any meaningful internal drainage provision, and on land significantly lower than the surrounding area, making it inherently prone to flooding regardless of municipal works

21. That in law, the municipal body's role is governed by the Water (Prevention and Control of Pollution) Act, 1974, the Environment (Protection) Act, 1986, and the constitutional mandate under Articles 243W and 21 to provide basic services in a manner consistent with public health and environmental protection. The measures taken by NPP Belha are fully in line with the precautionary principle as articulated in *Vellore Citizens' Welfare Forum v. Union of India* (1996) 5 SCC 647, and also reflect the "polluter pays" principle endorsed in *Indian Council for Enviro-Legal Action v. Union of India* (1996) 3 SCC 212. The Hon'ble Supreme Court in *M.C. Mehta v. Union of India* (1988 SCR (1) 471) underscored that municipal authorities are duty-bound to ensure that untreated effluent does not enter natural water bodies. The construction of covered drains and decentralised wetlands

goes beyond mere compliance—it creates a long-term, environmentally sustainable solution in harmony with the CPCB's own recommendations for wastewater management in semi-urban areas.

22. That in view of the above facts and supporting documentation, including the three Work Completion Certificates marked as **Annexures P/1, P/2, P/3, P/4 and P/5 (COLLY.), alongwith GPS-tagged photographic evidence**, and the reports of the District Magistrate's committee, it is respectfully submitted that NPP Belha has fully complied with the orders of this Hon'ble Tribunal.

23. It is submitted that a comprehensive and operational drainage network, integrated with fully functional sewage treatment wetlands, is now in place, ensuring that no untreated sewage from the concerned area is discharged into any water body or open land. The environmental objective underlying the orders of this Hon'ble Tribunal stands fully achieved.

24. It is respectfully submitted that, in furtherance of compliance reporting, the Office of the Municipal Council, Belha–Pratapgarh, has issued formal Work Completion Certificates under State Sector items confirming that the sanctioned drainage works stand fully

executed. The first certificate records that the RCC covered drain from Shivam Dubey's house to the Bhuliyapur 2.5 MLD wetland in Jankipuram—measuring 368 metres—has been completed in its entirety and duly connected to the said wetland constructed by the Uttar Pradesh Jal Nigam. The second certificate confirms that the covered drain from the transformer on the main road through Saket Degree College to the front of Premium Palace, and from Plaza Palace to Naya Basti, Jankipuram, on Gaighat Road—measuring 920 metres in total—has also been completed in full. **True copy of both certificates bear the seal of the Executive Officer, Municipal Council, Belha–Pratapgarh, are annexed herewith and collectively marked as Annexure P/6**.

25. That any incidental or localised issues that may persist are solely attributable to the Applicant's own acts of omission and commission, including defective site planning, failure to provide internal drainage, and unauthorised construction upon encroached land. Such self-created impediments cannot, in law or on facts, be construed as non-compliance on the part of the municipal authority, which has discharged its statutory and judicially mandated duties in their entirety.

26. That it is therefore prayed that this Hon'ble Tribunal be pleased to take on record the full compliance by NPP Belha with its orders dated 1 July 2022 and 21 November 2024, and dispose of Execution Application No. 24 of 2023 accordingly, while reserving the municipality's right to seek appropriate orders against the Applicant for recovery of costs and for action on the encroachments and record tampering already found by competent authorities.

Priyanka Swami

Advocate

Nagar Palika Parishad, Belha, Pratapgarh

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E: advpriyankaswami@gmail.com

BEFORE THE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

EXECUTION APPLICATION NO 24/2023

IN

ORIGINAL APPLICATION No. 44 /2022

IN THE MATTER OF:

SAKET GIRLS P.G. COLLEGE   Applicant

VERSUS

STATE OF UTTAR PRADESH   Respondents

AFFIDAVIT

I, Rakesh Kumar agaed about 50 years S/o Shri Lakshmi Prasad Jaiswal is presently posted as executive officer, Nagar Palika Parishad, Belha, District-Pratapgarh, Uttar Pradesh do hereby state and declare on solemn affirmation as under:

1. That I am posted as stated above and well conversant with the facts of the present case and as such competent to swear this affidavit before this Tribunal.

2. That the accompanying executive application has been drafted by our counsel upon my instructions.

3. That the contents of the accompanying application are true and correct, and the knowledge has been derived from official records and nothing material has been concealed therefrom

DEPONENT

VERIFICATION:

Verified at   on this the   day of August 2025 that the averments made in the paragraphs are based on the true statements of facts based on the personal belief and knowledge of the Deponent derived from the records of the matter and nothing material has been concealed therefrom.

DEPONENT

कार्यालय नगरपालिका परिषद बेल्हा–प्रतापगढ़।

संख्याः 835 / न0पा0परि0–2024   दिनांकः 16 :नवम्बर, 2024

वर्क कम्पलीटीशन सर्टिफिकेट प्रमाण–पत्र

प्रमाणित किया जाता है कि राज्य सेक्टर मद अन्तर्गत निर्माणाधीन नाला मुख्य मार्ग पर ट्रान्सफर्मर से साकेत डिग्री कालेज होते हुए मुख्य मार्ग पर प्रिमियम पैलेस के सामने तक कवर्ड नाला निर्माण कार्य एवं गायघाट रोड़ पर प्लाजा पैलेस के सामने से नई बस्ती जानकीपुरम तक कवर्ड नाला निर्माण कार्य की कुल लम्बाई 920 मीटर के सापेक्ष 552 मीटर नाला निर्माण कार्य पूर्ण किया जा चुका है अर्थात कुल 60 प्रतिशत कार्य स्थल पर पूर्ण कराया जा चुका है। स्थल पर कराये गये कार्य की जी0पी0एस0 टैग फोटोग्राफ संलग्न है।

अवर अभियन्ता (सिविल)   अधिशासी अधिकारी
नगरपालिका परिषद बेल्हा–प्रतापगढ़।   नगरपालिका परिषद बेल्हा–प्रतापगढ़।

GPS Map Camera

Bela Pratapgarh, Uttar Pradesh, India
Wxjm+64w, Bela Pratapgarh, Uttar Pradesh 230001, India
Lat 25.931547° Long 81.983658°
05/08/2025 04:21 PM GMT +05:30

Dahilamau, Uttar Pradesh, India
Wxjm+j55, Dahilamau, Uttar Pradesh 230001, India
Lat 25.931716° Long 81.983768°
05/08/2025 04:20 PM GMT +05:30

श्री बालाजी

GPS Map Camera

Dahilamau, Uttar Pradesh, India
7, Gaighat Rd, Dahilamau, Uttar Pradesh 230001, India
Lat 25.925166° Long 81.981393°
05/08/2025 04:06 PM GMT +05:30

Bela Pratapgarh, Uttar Pradesh, India

642/36, Bela Pratapgarh, Uttar Pradesh 230001, India
Lat 25.927509° Long 81.979665°
05/08/2025 04:08 PM GMT +05:30

Bela Pratapgarh, Uttar Pradesh, India

642/36, Bela Pratapgarh, Uttar Pradesh 230001, India
Lat 25.927426° Long 81.979696°
05/08/2025 04:07 PM GMT +05:30

Google

Pure Ishwarnath, Uttar Pradesh, India
Wxhh+p2q, Gaighat Rd, Bela Pratapgarh, Pure Ishwarnath,
Uttar Pradesh 230001, India
Lat 25.929045° Long 81.977906°
05/08/2025 04:10 PM GMT +05:30

GPS Map Camera

Dahilamau, Uttar Pradesh, India
22, Heeraganj, Dahilamau, Uttar Pradesh 230001, India
Lat 25.93181° Long 81.981751°
05/08/2025 04:25 PM GMT +05:30

Dahilamau, Uttar Pradesh, India
Wxjm+93q, Chandmari, Dahilamau, Uttar Pradesh
230001, India
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05/08/2025 04:24 PM GMT +05:30
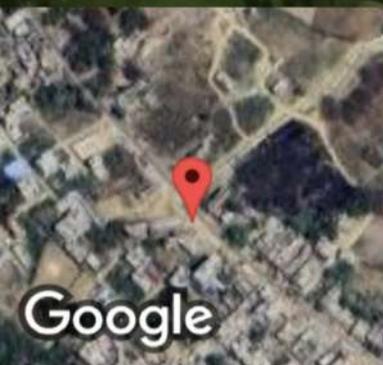
GPS Map Camera

Dahilamau, Uttar Pradesh, India
Wxjj+6xj, Bela Pratapgarh, Dahilamau, Uttar
Pradesh 230001, India
Lat 25.931088° Long 81.981217°
05/08/2025 04:28 PM GMT +05:30

GPS Map Camera

Dahilamau, Uttar Pradesh, India
22, Heeraganj, Dahilamau, Uttar Pradesh 230001,
India
Lat 25.931756° Long 81.981696°
05/08/2025 04:25 PM GMT +05:30

GPS Map Camera

Bela Pratapgarh, Uttar Pradesh, India
Wxhh+g7w, Gaighat Rd, Bela Pratapgarh, Uttar Pradesh
230001, India
Lat 25.929035° Long 81.978072°
05/08/2025 04:11 PM GMT +05:30

GPS Map Camera

Bela Pratapgarh, Uttar Pradesh, India
Wxjm+64w, Bela Pratapgarh, Uttar Pradesh 230001, India
Lat 25.931028° Long 81.983171°
05/08/2025 04:23 PM GMT +05:30

Google

GSTIN: 09ADOPK2513P1Z2

M/s JASORIA BUILDERS

❖ *Specilist in Road, Bridges, Buildings and Civil Works*

दिनाँक :- 14-11-24

सेवा में,

अधिशाषी अधिकारी,

नगर पालिका परिषद,

बेल्हा - प्रतापगढ़ |

विषय:- निर्माणधीन नाला मुख्य मार्ग पर ट्रांसफार्मर से साकेत डिग्री कॉलेज होते हुए मुख्य मार्ग पर प्रीमियम मैरेज पैलेस के सामने तक कवर्ड नाला निर्माण कार्य एवं गाय घाट रोड पर प्रीमियम मैरेज पैलेस के सामने से नई बस्ती जानकीपुरम तक कवर्ड नाला निर्माण कार्य पूर्ण कराये जानें के सम्बन्ध मे |

महोदय,

कृपया उपरोक्त विषयक की ओर आपका ध्यान आकृष्ट कराते हुए अवगत कराना है कि वर्षा ऋतु समाप्त हो जाने के उपरान्त उपयुक्त निर्माण कार्य पूरी गति एवं क्षमता से कराया जा रहा है जिसका लगभग 60 प्रतिशत कार्य पूर्ण हो चुका है और अवशेष कार्य भी नवम्बर, 2024 माह में पूर्ण कराने का भरसक प्रयास किया जा रहा हैं | आशा है कि अवशेष निर्माण कार्य नवम्बर, माह के समाप्ति तक अथवा दिसम्बर माह के मध्य तक पूर्ण हो जाएगा |

अतएवं उपरोक्तानुसार सूचना अग्रेतर कार्यवाही हेतु सेवा मे प्रेषित हैं |

धन्यवाद,

भवदीय,

जसोरिया बिल्डर्स,

प्रतापगढ़

❖Address: 53/A- Bhadri House, Pratapgarh (U.P.) - 230001   Email: jasoriabuilders@gmail.com

❖Contact : 09919142555, 09415229132, 09415229291

कार्यालय नगरपालिका परिषद बेल्हा—प्रतापगढ़।

संख्याः 280 / न0पा0परि0—2025   दिनांकः 06 :मई, 2025

वर्क कम्पलीटीशन सर्टिफिकेट प्रमाण—पत्र

प्रमाणित किया जाता है कि राज्य सेक्टर मद अन्तर्गत निर्माणाधीन नाला मुख्य मार्ग पर ट्रान्सफर्मर से साकेत डिग्री कालेज होते हुए मुख्य मार्ग पर प्रिमियम पैलेस के सामने तक कवर्ड नाला निर्माण कार्य एवं गायघाट रोड़ पर प्लाजा पैलेस के सामने से नई बस्ती जानकीपुरम तक कवर्ड नाला निर्माण कार्य की कुल लम्बाई 920 मीटर के सापेक्ष 920 मीटर नाला निर्माण कार्य शत—प्रतिशत पूर्ण किया जा चुका है अर्थात कार्य स्थल पर कराये गये कार्य की जी0पी0एस0 टैग फोटोग्राफ संलग्न है।

अवर अभियन्ता (सिविल)   अधिशासी अधिकारी

नगरपालिका परिषद बेल्हा—प्रतापगढ़।   नगरपालिका परिषद बेल्हा—प्रतापगढ़।

ANNEXURE 4

E-Mail :- seconddiv_upjn@yahoo.com   Mob: - +91-9473942661

कार्यालय अधिशासी अभियन्ता

निर्माण खण्ड(द्वितीय), उ0प्र0 जल निगम (नगरीय), प्रयागराज

8, महर्षि दयानन्द मार्ग, सिविल लाइन,

प्रयागराज, 211001

Letter No: 846 / W-46 / 10   Date: 07-7-25

सेवा में,

अधिशासी अधिकारी,

नगर पालिका परिषद,

जनपद– प्रतागढ़।

विषयः–मा0 राष्ट्रीय हरित अधिकरण, नई दिल्ली में योजित Execution application No. 32/2023 in Original application No. 490/2019 T.S Singh बनाम स्टेट ऑफ यू0पी0 एवं अन्य में पारित आदेश दिनांक 22.11.2023 के अनुपालन के सम्बन्ध में।

महोदय,

उपरोक्त विषयक मा0 राष्ट्रीय हरित अधिकरण, नई दिल्ली में योजित Execution application No. 32/2023 in Original application No. 490/2019 T.S Singh बनाम स्टेट ऑफ यू0पी0 एवं अन्य में पारित आदेश दिनांक 22.11.2023 के सम्बन्ध में अवगत कराना है कि जनपद प्रतापगढ़ नगर पालिका परिषद बेल्हा प्रतापगढ़ में कुल 4 नग नाले प्रवाहित हो रहे है, इसमे से 02 नाले सदर एवं पुलिस लाइन 8.95 एम0एल0डी0 एस0टी0पी0 पर टैप्ड है। रामलीला नाला आंशिक रूप से 8.95 एम0एल0डी0 एस0टी0पी0 पर टैप्ड है। रेलवे लाइन के डाउन स्ट्रीम के घरों का पानी एस0टी0पी0 पर टैप्ड नहीं किया जा सका। लगभग 0.2 एम0एल0डी0 अनटैप्ड सीवर के ट्रीटमेन्ट हेतु 0.5 एम0एल0डी0 का वेटलैण्ड रामलीला ड्रेन पर अतिरिक्त बनाया गया है, जिससे सीवेज ट्रीटमेन्ट किया जा रहा है। भुलियापुर नाले की दूरी ज्यादा होने के कारण पूर्व निर्मित एस0टी0पी0 तक भुलियापुर नाले को सीवर लाइन के माध्यम से टैप किया जाना संभव नही था। अतः भुलियापुर ड्रेन पर कन्स्ट्रक्टेड वेटलैण्ड का निर्माण कर सीवेज ट्रीटमेन्ट किया जा रहा है। उक्त वेटलैण्ड ट्रीटमेन्ट की तकनीकी को एम0एन0आई0टी0, इलाहाबाद से वेट कराया गया है। राम लीला ड्रेन पर निर्मित वेटलैण्ड की क्षमता 0.5 एम0एल0डी0 एवं भुलियापुर ड्रेन पर निर्मित वेटलैण्ड की क्षमता 2.5 एम0एल0डी0 है। रामलीला एवं भुलियापुर ड्रेन पर बनाया गया वेटलैण्ड की डिजाइन एवं ड्राइंग संलग्न की जा रही है।

संलग्नक–उपरोक्तानुसार।

भवदीय

(अमित राज)

अधिशासी अभियन्ता

पृ0सं0 एवं दिनांक यथोपरिः–

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

1. अधीक्षण अभियन्ता, निर्माण मण्डल, उ0प्र0 जल निगम (नगरीय), प्रयागराज।

2. श्री नीरज कुमार, अधिशासी अभियन्ता (नागर), उ0प्र0 जल निगम (नगरीय), लखनऊ।

3. श्री भवर पाल सिंह जादौन, एडवोकेट।

अधिशासी अभियन्ता

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DESIGN CALCULATION 0.5 MLD SEWAGE TREATMENT PLANT BASED ON
SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY
AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

DESIGN CALCULATION SHEET

The proposed STP is designed to treat the wastewater with following characteristics:

Mode of Operation	: Manual
Nature of Wastewater	: Drainage
Wastewater Daily Average Flow	: 200 Cum/ day
Peak factor	: 2.5
Designed Peak flow	: 200 * 2.5 = 500 Cum/ day

DESIGN CONSIDERATION

INLET CHARACTERISTICS:

pH	7.5 to 8.5
BOD_5	Up to 250 mg/l
COD	450 mg/l
Suspended solids	350 mg/l
Oil & Grease	30 mg/l

OUTLET CHARACTERISTICS:

pH	6.5 to 9.0
BOD_5	Not more than 30 mg/l
COD	Not more than 100 mg/l
Suspended solids	Not more than 50 mg/l
Oil & Grease	Less than 10 mg/l

SCREEN CHAMBER & APPROACH CHANNEL

The Approach channel is the unit from where the sewage will enter the screen chamber. I]=t is the first unit in the STP, so all the incoming sewage passes through its grill. Therefore, it should be able to handle the sewage (especially the peak flows) without overflowing.

There are two major factors to be considered:

1. Adequacy of the cross-sectional area of the chamber itself

2. Obstruction posed by the bars of the screen.

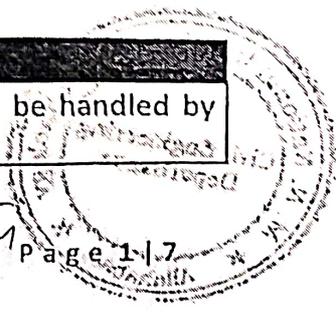3. Remove floating particle larger than 10 mm.

The net opening should be adequate to allow proper flow of the sewage (especially during peak inflow).

Parameter	Value/ Calculation	Remarks
Desired daily flow	0.5 MLD	Quantity of sewage to be handled by the STP on daily basis.

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.
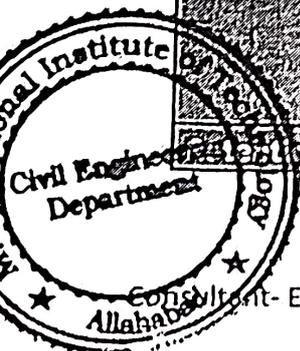
Designed hourly flow	= 500/ 24 = 20.83 m³/ hr. = 20.83/ 60 m³/min = 0.00578 m³/sec	Average flow in respect with hour and second.
Approach Channel Length	3 m	Reference: Technical Instructions on Sewage Management in MES, Page 35 of 64.
Design flow velocity	0.6 m/ sec	This is the optimal velocity: • Sewage flowing at a higher velocity will forcibly push the debris through the screen. • Sewage flowing at a lower velocity will leave an excessive amount of sedimentation on the floor of the screen chamber.
Cross-sectional area of screen channel	= 0.00578/ 0.6 = 0.00963 m²	
Adjust for the flow-area blocked by the bars	= 0.00963 m² x 1.8 = 0.01734 m²	Cross-sectional area is increased by 80% to compensate for the obstruction posed by the bars of the grill. In general, the multiplication factor is (1 + W/ G) Where: G = Gap between two bars of the screen (here, 10 mm) W = Width of a bar (here, 5 mm).

GRIT SETTLING CUM OIL & GREASE CHAMBER

Grit chambers are long narrow tanks that are designed to slow down the flow so that solids such as sand, coffee grounds and eggshells will settle out of the water. Grit causes excessive wear and tear on pumps and other plant equipment.

Parameter	Value/Calculation	Remarks
Designed daily flow	0.5 MLD or 500 KLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	= 500/ 24 = 20.833 m³/hr. = 20.833/ 60 m³/min = 0.3472 m³/min	
Retention	1.5 min	Retention time to maintain optimal

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

time		velocity for removal of Grit Particles such as Sand, Eggshells etc.: • Minimum 0.5 min. • Maximum 1.5 min. And using this tank also as an oil and grease tank for removing most of the skimming particles.
Volume of Receiving chamber	= 0.3472 x 1.5 min = 0.5208 m^3	Volume = retention time x Volume/ sec.

Reference: *Wastewater Engineering by Metcalf Eddy. Chapter 5, page no. 387.*
Reference: *Technical Instructions on Sewage Management in MES, Page 37 of 64.*

OIL AND GREASE CHAMBER

The fats that are separated in this unit are disposed of along with other biodegradable waste, and can be used as feed for piggeries. The grease is placed at the discharge point of the canteen/ kitchen area itself to arrest solid and fatty matter at source. The wastewater output from this unit is taken to the collection/ Anaerobic Baffle Reactor.

Parameter	Value/ Calculation	Remarks
Designed daily flow	0.5 MLD or 500 KLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	= 500/ 24 = 20.833 m^3/hr. = 20.833/ 60 m^3/min = 0.3472 m^3/min	
Retention time	20 min	Retention time to maintain optimal velocity for removal of oil and grease: • Minimum 3 min. • Maximum 20 min.
Volume of Receiving chamber	= 0.3472 x 20 = 6.944 m^3	Volume = retention time x volume/sec.
		Due to no manpower present in regular basis hence, taking a conservative approach for oil and grease removal. Providing 2 tank for safety features.
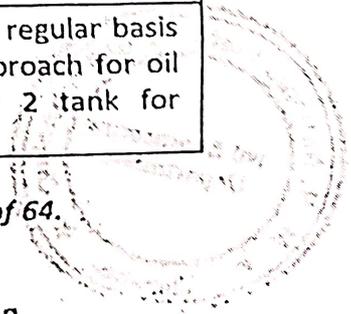
Reference: *Technical Instructions on Sewage Management in MES, Page 37 of 64.*

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOG AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

COLLECTION CUM ANAEROBIC BAFFLE REACTOR

Anaerobic suspended growth reactors, the suspended growth reactor are simply a tank in which nitrified wastewater is mixed with a carbon source, typically septic tank effluent. In some cases, nitrified wastewater is discharged back to the primary treatment stage, such as a septic tank, for denitrification.

Parameter	Value/Calculation	Remarks
STP Capacity	0.5 MLD $= 500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.
Hourly inflow	$= 500/24 \ m^3/hr.$ $= 20.83 \ m^3/hr.$	
Anoxic tank volume	$= 20.83 \ m^3/hr. \times 6 \ hr.$ $= 125 \ m^3$	Tank is designed to hold 6 to 24 hours of average flow. *Minimum Retention time is taken due to the variability of influent BOD that may vary from 60 to 250 mg/l in the Drainage System.*
No. of tanks	$= 4 \ No.$	

Reference: Wastewater Engineering : Metcalf & Eddy , page no. 1017

DISTRIBUTION TANK

For equal distribution of the outlet of anaerobic tank before entering it into plant bed.

Parameter	Value/Calculation	Remarks
Designed daily flow	0.5 MLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	$= 500/24$ $= 20.83 \ m^3/hr.$ $= 20.83/60 \ m^3/min$ $= 0.348 \ m^3/min$	
Retention time	55 min	
Volume of Chamber	$= 0.348 \times 55$ $= 19.14 \ m^3$	Volume = retention time x volume/ sec.
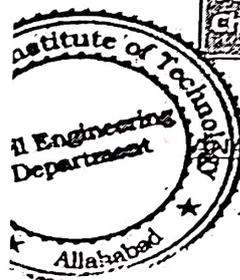
ANAEROBIC CUM UP FLOW VERTICAL PLANT BED SYSTEM

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

Area of the tank, $A = \dfrac{Q \, (\ln (BOD_{in}) - \ln (BOD_{out})}{K_{BOD}}$

(Reference: Manual on Constructed Wetland as an alternative Technology, CPCB 2019, Page 83)

Where,

A = Area of Constructed Wetland (m^2)

Q = Volume of Wastewater

BOD_{in} = Influent concentration of BOD (mg/l)

BOD_{out} = Effluent concentration of BOD (mg/l)

K_{BOD} = Removal Rate Constant (d^{-1})

$$k_{BOD} = KTdn$$

$K_T = K_{20} (1.06)^{(T-20)}$

K_{20} = rate constant @ 20°C (d^{-1}) = 0.12 to 0.46 d^{-1}

(Reference: Wastewater Engineering, Metcalf & Eddy, page no. 85)

d = Depth (m)

n = Porosity of CW (percentage expressed as fraction)

So,

Taking BOD_{in} = 250 mg/l, BOD_{out} = 30mg/l, Q= 500 m^3/d, d= 2.7m, n = 0.75

$K_{BOD} = K_T \times 25°C \times 2.7m \times 0.75$

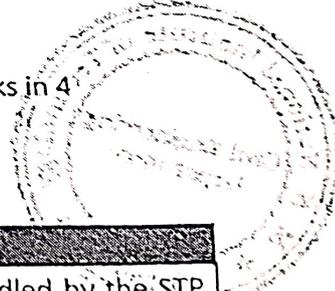$K_T = 0.23 \times (1.06)^{(25-20)} = 0.3077 \ d^{-1}$

$K_{BOD} = 15.581 \ d^{-1}$

Area of CW = $A = \dfrac{500 \times (\ln(250) - \ln(30))}{15.581}$

$A = 68.0400 \ m^2$.

Hence, providing tank area of 9 m^2 for each tank and providing 8 no. of tanks in 4 phases of 2 tanks each.

PLANT BED – Phase I

Parameter	Value/ Calculation	Remarks
Capacity	0.5 MLD = 500 m^3/day	Quantity of sewage to be handled by the STP on daily basis.
Hourly Sewage inflow	= 500/ 24 m^3/hr. = 20.83 m^3/hr.	

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED o
SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY
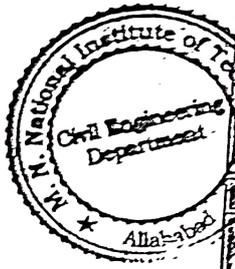AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

Parameter	Value/Calculation	Remarks
Plant Bed volume	$= 18 \ m^2 \times 2.7m$ $= 48.6 \ m^3$	Providing 9 m^2 area for each plant bed and each phase has 2 PB. Therefore, total area = 9 x 2 = 18 m^2
Freeboard	0.3 to 0.5 m	Selected by convention.
Water depth in tank (including freeboard)	= 3m	

PLANT BED – Phase II

Parameter	Value/Calculation	Remarks
STP Capacity	0.5 MLD $= 500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	$= 500/24 \ m^3/hr.$ $= 20.83 \ m^3/hr.$	
Plant Bed volume	$= 18 \ m^2 \times 2.7m$ $= 48.6 \ m^3$	Providing 9 m^2 area for each plant bed and each phase has 2 PB. Therefore, total area = 9 x 2 = 18 m^2
Freeboard	0.3 to 0.5 m	Selected by convention.
Water depth in tank (including freeboard)	= 3m	

PLANT BED – Phase III

Parameter	Value/Calculation	Remarks
STP Capacity	0.5 MLD $= 500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	$= 500/24 \ m^3/hr.$ $= 20.83 \ m^3/hr.$	
Plant Bed volume	$= 18 \ m^2 \times 2.7m$ $= 48.6 \ m^3$	Providing 9 m^2 area for each plant bed and each phase has 2 PB. Therefore, total area = 9 x 2 = 18 m^2
Freeboard	0.3 to 0.5 m	Selected by convention.
Water depth in tank (including freeboard)	= 3m	

PLANT BED – Phase IV

Parameter	Value/Calculation	Remarks
STP Capacity	0.5 MLD $= 500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.

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DESIGN CALCULATION OF 0.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY AT RAMLEELA MAIDAN, PRATAPGARH, UTTAR PRADESH.

Parameter	Value/ Calculation	Remarks
Hourly sewage inflow	= 500/ 24 m^3/hr. = 20.83 m^3/hr.	
Plant Bed volume	= 18 m^2 × 2.7m = 48.6 m^3	Providing 9 m^2 area for each plant bed and each phase has 2 PB. Therefore, total area = 9 × 2 = 18 m^2
Freeboard	0.3 to 0.5 m	Selected by convention.
Water depth in tank (including freeboard)	= 3m	

CLEAR WATER TANK

Clear water tanks are commonly used to hold treated water prior to distribution or for disinfection purposes before releasing the treated water.

Parameter	Value/ Calculation	Remarks
STP Capacity	0.5 MLD = 500 m^3/day	Quantity of sewage to be handled by the STP on daily basis
Hourly inflow	= 500/ 24 m^3/hr. = 20.83 m^3/hr.	
Tank volume	= 20.83 m^3/hr. × 1 hr. = 20.83 m^3	Tank is designed to hold: - • Minimum 20 minutes. • Maximum 60 minutes. *Note: This is the usable volume, and does not include the freeboard.*
Freeboard	0.3 to 0.5 m	Selected by convention.
Water depth in tank (including freeboard)	= 2.0m to 3m	
Tank area	= 20.83/ 2.2 = 9.46 m^2	Area = Volume/ Depth *Note: Select length and width to suit the site conditions.*

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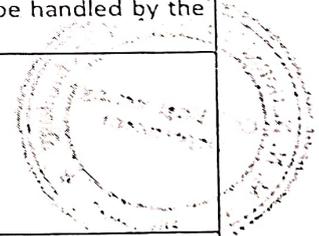M-Tech Environmental Engg.

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

DESIGN CALCULATION SHEET

The proposed STP is designed to treat the wastewater with following characteristics:

Mode of Operation	: Manual
Nature of Wastewater	: Drainage
Wastewater Daily Average Flow	: 1000 cum/day
Peak factor	: 2.5
Designed Peak flow	: 1000 * 2.5 = 2500 cum/day

DESIGN CONSIDERATION

INLET CHARACTERISTICS

pH	7.5 to 8.5
BODs	Up to 250 mg/l
COD	450 mg/l
Suspended solids	350 mg/l
Oil & Grease	30 mg/l

OUTLET CHARACTERISTICS

pH	6.5 to 9.0
BODs	Not more than 30 mg/l
COD	Not more than 100 mg/l
Suspended solids	Not more than 50 mg/l
Oil & Grease	Less than 10 mg/l

SCREEN CHAMBER & APPROACH CHANNEL

The approach channel is the unit from where the sewage will enter screen chamber. It is the first unit in the STP, so all the incoming sewage passes through its grill. Therefore, it should be able to handle the sewage (especially the peak flows) without overflowing.

There are two major factors to be considered:

1. Adequacy of the cross-sectional area of the chamber itself
2. Obstruction posed by the bars of the screen.

- Remove floating particle larger than 10 mm.
- Inlet opening should be adequate to allow proper flow of the sewage (especially during peak inflow).

Parameter	Value/Calculation	Remarks
Designed daily flow	2.5 MLD	Quantity of sewage to be handled by the STP on daily basis.

Page 1|8

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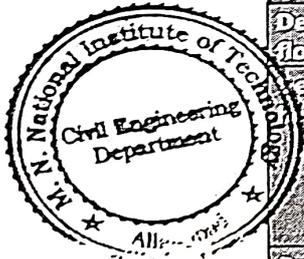
DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

Parameter	Value/Calculation	Remarks
Designed hourly flow	= 2500/ 24 = 104.17 m³/hr. = 104.17/ 3600 m³/sec = 0.0289 m³/sec	Average flow in respect with hour and second.
Approach Channel Length	3 m	Reference: Technical Instructions on Sewage Management in MES, Page 35 of 64.
Design flow velocity	0.6 m/ sec	This is the optimal velocity: • Sewage flowing at a higher velocity will forcibly push the debris through the screen. • Sewage flowing at a lower velocity will leave an excessive amount of sedimentation on the floor of the screen chamber.
Cross-sectional area of screen channel	= 0.0289/ 0.6 = 0.04816 m²	
Adjust for the flow-area blocked by the bars	= 0.04816 m² x 1.8 = 0.0867 m²	Cross-sectional area is increased by 80% to compensate for the obstruction posed by the bars of the grill. In general, the multiplication factor is (1+ W/ G) Where: G = Gap between two bars of the screen (here, 10 mm) W = Width of a bar (here, 5 mm).

GRIT SETTLING CUM OIL AND GREASE CHAMBER

Grit chambers are long narrow tanks that are designed to slow down the flow so that solids such as sand, coffee grounds and eggshells will settle out of the water. Grit causes excessive wear and tear on pumps and other plant equipment.

Parameter	Value/Calculation	Remarks
Designed daily flow	2.5 MLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	= 2500/ 24 = 104.17 m³/hr. = 104.17/ 3600 m³/sec = 0.0289 m³/sec	
Retention time	1.5 min or 90 sec	Retention time to maintain optimal velocity for removal of oil and grease:

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DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

		• Minimum 0.5 min. • Maximum 1.5 min. And using this tank also as an oil and grease tank for removing most of the skimming particles.
Volume of Receiving Chamber	= 0.0289 m³/sec x 90 sec = 2.601 m³	Volume = retention time x Volume/sec.

Reference: Wastewater Engineering by Metcalf Eddy. Chapter 5, page no. 387.
Reference: Technical Instructions on Sewage Management In MES, Page 37 of 64.

OIL AND GREASE CHAMBER

The fats that are separated in this unit are disposed of along with other biodegradable waste, and can be used as feed for piggeries. The grease is placed at the discharge point of the canteen/ kitchen area itself to arrest solid and fatty matter at source. The wastewater output from this unit is taken to the collection / Anaerobic Baffle Reactor.

Parameter	Value/Calculation	Remarks
Designed daily flow	2.5 MLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	= 2500/ 24 = 104.17 m³/hr. = 104.17/ 3600 m³/sec = 0.0289 m³/sec	
Retention time	15 min or 900 sec	Retention time to maintain optimal velocity for removal of oil and grease: • Minimum 3 min. • Maximum 20 min.
Volume of Receiving Chamber	= 0.0289 x 900 sec = 26.01 m³	Volume = retention time x volume/sec.

Reference: Technical Instructions on Sewage Management in MES, Page 37 of 64.
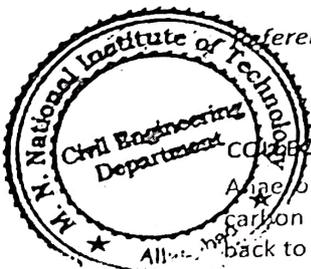
COLLECTION CUM ANAEROBIC BAFFLE REACTOR

Anaerobic Baffle reactors are simply a tank in which nitrified wastewater is mixed with a carbon source, typically septic tank effluent. In some cases, nitrified wastewater is discharged back to the primary treatment stage, such as a septic tank, for denitrification.

Consultant- Emerging Enviro-Tech Solution & Services Pvt. Ltd., Lucknow

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON
SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY,
BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD = 2500 m³/day	Quantity of sewage to be handled by the STP on daily basis.
Hourly inflow	= 2500/ 24 m³/hr. = 104.17 m³/hr.	
Anoxic tank volume	= 104.17 m³/hr. x 8 hr. = 833.33 m³	Tank is designed to hold 6 to 24 hours of average flow. Minimum Retention time is taken due to the variability of influent BOD that may vary from 60 to 250 mg/l in the Drainage System.
No. of Tanks	= 16 No.	

Reference: Wastewater Engineering : Metcalf & Eddy , page no. 1017

DISTRIBUTION TANK

For equal distribution of the outlet of anaerobic tank before entering it into plant bed.

Parameter	Value/Calculation	Remarks
Designed daily flow	2.5 MLD	Quantity of sewage to be handled by the STP on daily basis.
Designed hourly flow	= 2500/ 24 = 104.17 m³/hr. = 104.17/ 60 m³/sec = 1.74 m³/min	
Retention time	45 min	This tank is designed to break the flow of waste water before equally distributing it to the plant Bed.
Volume of Receiving Chamber	= 1.74 x 45 = 78.3 m³	Volume = retention time x volume/sec.

Design vetted by us

24/04/2024

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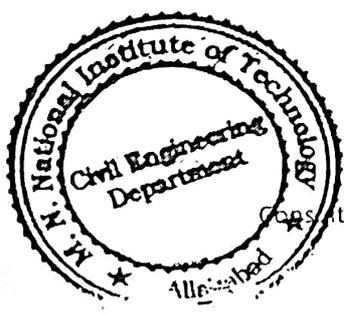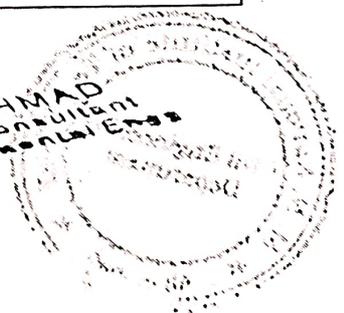
Consultant- Emerging Enviro-Tech Solution & Services Pvt. Ltd., Lucknow

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

ANAEROBIC CUM UP FLOW VERTICAL PLANT BED SYSTEM

Area of the tank, $\quad A = \dfrac{Q\,(\ln(BOD_{in}) - \ln(BOD_{out}))}{K_{BOD}}$

(Reference: Manual on Constructed Wetland as an alternative Technology, CPCB 2019 , Page 83)

Where,

A = Area of Constructed Wetland (m^2)

Q = Volume of Wastewater

BOD_{in} = Influent concentration of BOD (mg/l)

BOD_{out} = Effluent concentration of BOD (mg/l)

K_{BOD} = Removal Rate Constant (d^{-1})

$$k_{BOD} = KTdn$$

$K_T = K_{20}\,(1.06)^{(T-20)}$

K_{20} = rate constant @ 20°C (d^{-1}) = 0.12 to 0.46 d^{-1}

(Reference: Wastewater Engineering, Metcalf & Eddy, page no. 85)

d = Depth (m)

n = Porosity of CW (percentage expressed as fraction)

So,
Taking BOD_{in}= 250 mg/l, BOD_{out} = 30mg/l, Q= 2500 m^3/d, d= 3.0 m, n = 0.75

K_{BOD} = K_T x 25°C x 3.0 m x 0.75

$K_T = K_{20}\,(1.06)^{(T-20)}$

K_T = 0.363 x $(1.06)^{(25-20)}$ = 0.4857 d^{-1}

(Reference: Guideline for Constructed wetland systems, Namami Gange, National Mission for Clean Ganga, GOI , page no. 26)
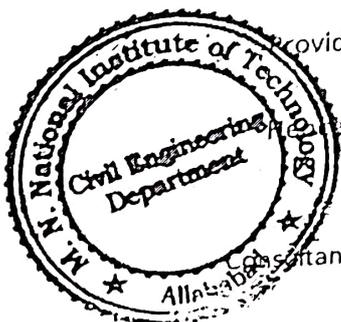
K_{BOD} = 27.32 d^{-1}

Area of CW = $A = \dfrac{2500 \times (\ln(250) - \ln(30))}{27.32}$

A = 194.02 m^2.

Provided Area = 230 m^2

, Providing total 24 no. of tanks in 4 phases of 6 tanks each.

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Er WASEEM AHMAD
Environmental Consultant
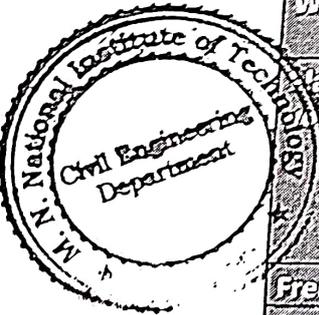M-Tech Environmental Eng

Design Vetted
by us

Page 5 of 8

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON
SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY,
BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

PLANT BED – Phase I

Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD = 2500 m³/day	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	= 2500/ 24 m³/hr. = 104.17 m³/hr.	
Water Depth	= 3 m	
Plant Bed Volume	= 63 m² x 3 m = 189 m³	Providing 10.5 m² area for each plant bed and each phase has 6 PB. Therefore, Total Area = 10.5 x 6 = 63 m². Note: Select length and width to suit the site conditions.
Freeboard	0.3 to 0.5 m	Selected by convention.
Depth of tank (including freeboard)	= 3.5 m	

PLANT BED – Phase II

Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD = 2500 m³/day	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	= 2500/ 24 m³/hr. = 104.17 m³/hr.	
Water Depth	= 3 m	
Plant Bed Volume	= 63 m² x 3 m = 189 m³	Providing 10.5 m² area for each plant bed and each phase has 6 PB. Therefore, Total Area = 10.5 x 6 = 63 m². Note: Select length and width to suit the site conditions.
Freeboard	0.3 to 0.5 m	Selected by convention.
Depth of tank (including freeboard)	= 3.5 m	

NASEEM AHMAD
Er. Environmental Consultant
M-Tech Environmental Engg

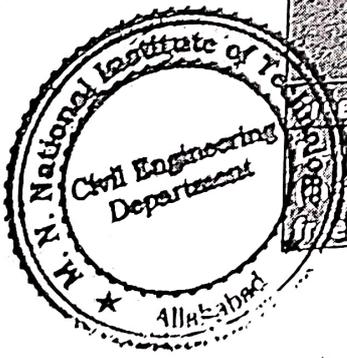Consultant- Emerging Enviro-Tech Solution & Services Pvt. Ltd., Lucknow

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH

PLANT BED – Phase III

Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD $= 2500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	$= 2500/24 \ m^3/hr.$ $= 104.17 \ m^3/hr.$	
Water Depth	$= 3 \ m$	
Plant Bed volume	$= 52.2 \ m^2 \times 3 \ m$ $= 156.6 \ m^3$	Providing 8.7 m² area for each plant bed and each phase has 6 PB. Therefore, Total Area = 8.7 x 6 = 52.2 m². Note: Select length and width to suit the site conditions.
Freeboard	0.3 to 0.5 m	Selected by convention.
Depth of tank (including freeboard)	$= 3.5 \ m$	

PLANT BED – Phase IV

Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD $= 2500 \ m^3/day$	Quantity of sewage to be handled by the STP on daily basis.
Hourly sewage inflow	$= 2500/24 \ m^3/hr.$ $= 104.17 \ m^3/hr.$	
Water Depth	$= 3 \ m$	
Plant Bed volume	$= 52.2 \ m^2 \times 3 \ m$ $= 156.6 \ m^3$	Providing 8.7 m² area for each plant bed and each phase has 6 PB. Therefore, Total Area = 8.7 x 6 = 52.2 m². Note: Select length and width to suit the site conditions.
Freeboard	0.3 to 0.5 m	Selected by convention.
Depth of tank (including freeboard)	$= 3.5 \ m$	

Design by
Vetted by

Er. WASEEM AHMAD
Environmental Consultant
M-Tech Environmental Engg.
27.4.24

Consultant- Emerging Enviro-Tech Solution & Services Pvt. Ltd., Lucknow

DESIGN CALCULATION OF 2.5 MLD SEWAGE TREATMENT PLANT BASED ON SUB-SURFACE VERTICAL UPFLOW CONSTRUCTED WETLAND (CW) TECHNOLOGY, BHOLIYAPUR, PRATAPGARH, UTTAR PRADESH
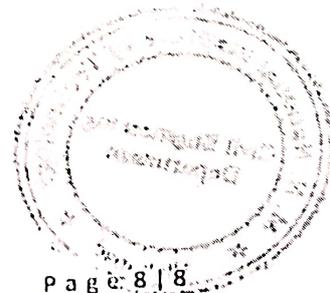
CLEAR WATER TANK

Clear Water tanks are commonly used to hold treated water prior to distribution or for disinfection purposes before releasing the treated water.

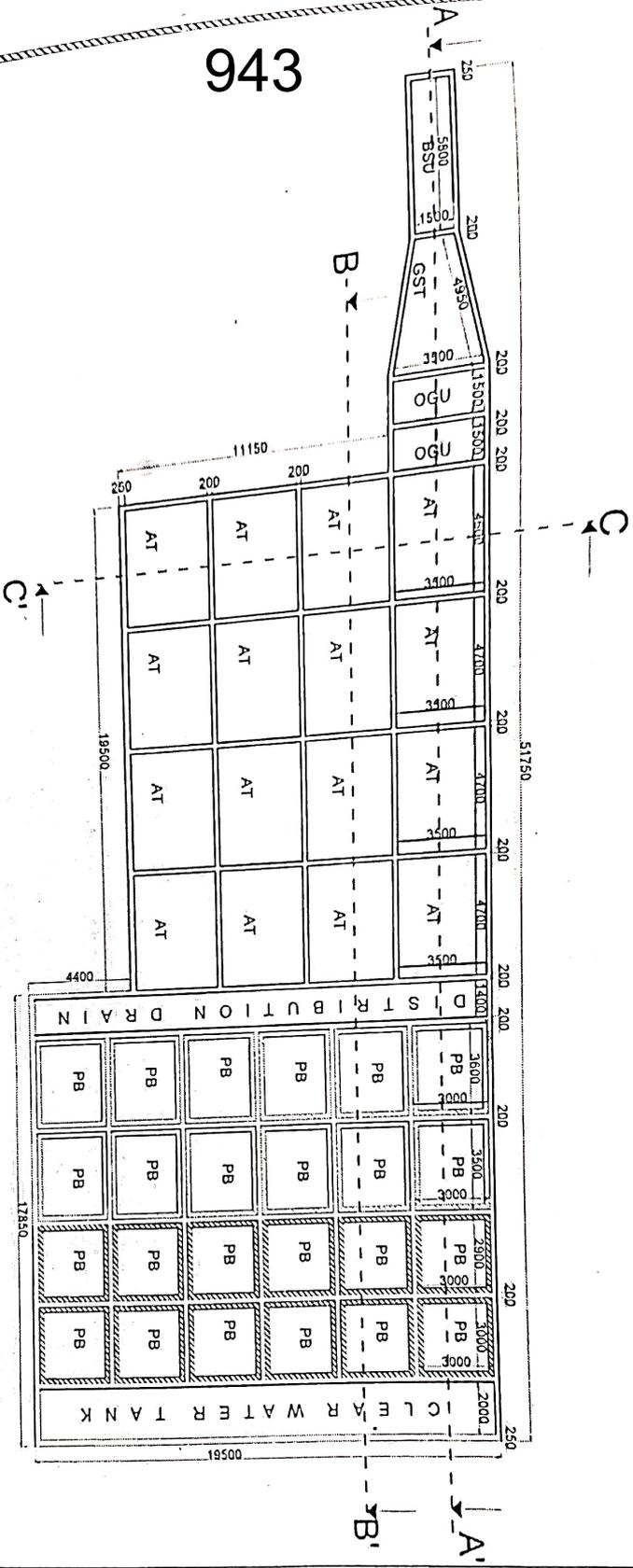| Parameter	Value/Calculation	Remarks
STP Capacity	2.5 MLD $= 2500 \, m^3/day$	Quantity of sewage to be handled by the STP on daily basis
Hourly inflow	$= 2500/24 \, m^3/hr.$ $= 104.17 \, m^3/hr.$	
Tank volume	$= 104.17 \, m^3/hr. \times 1 \, hr.$ $= 104.17 \, m^3$	Tank is designed to hold: - • Minimum 20 minutes. • Maximum 60 minutes. Note: This is the usable volume, and does not include the freeboard.
Freeboard	$= 0.5 \, m$	Selected by convention.
Water depth in tank	$= 3.0m$	
Tank area	$= 104.17/3$ $= 34.72 \, m^2$	Area = Volume/ Depth Note: Select length and width to suit the site conditions.

Design vetted by us
24.4.24
Er. WASEEM AHMAD
Environmental Consultant
M-Tech Environmental Engg

24/04/2024

LAYOUT PLAN

Labels in diagram: BSU, GST, OGU, OGU, AT (multiple), PB (multiple), DISTRIBUTION DRAIN, CLEAR WATER TANK

Dimensions: 250, 5500, 1500, 200, 4950, 3900, 1500, 1500, 200, 200, 11150, 250, 200, 200, 19500, 51750, 4400, 17850, 19500, 3600, 3000, 3500, 3000, 3000, 2000, 250

ABBREVIATIONS:

BSU: BAR SCREEN UNIT
GST: GRIT SETTLING TANK
OGU: OIL & GREASE UNIT
RC: COLLECTION TANK
AT: ANOXIC TANK
DD: DISTRIBUTION DRAIN
PB: PLANT BED
CWT: CLEAR WATER TANK

SR. NO.	REVISION	DIRECTION	REMARK
02	14		

1. ALL DIMENSIONS AND LEVELS ARE IN MM.
2. THE THICKNESS OF RCC WALL OUTER 250MM & INNER WALL 200MM.
3. SPACING OF BAR USED 12MM C/C 150MM
4. GRADE OF CONCRETE: M30

PROJECT NAME: 2.5 MLD STP BASED ON CONSTRUCTED WETLAND TECHNOLOGY

CLIENT NAME: U.P. JAL NIGAM, PRATAPGARH

CONTRACTOR- RKC & TC3S JOINT VENTURE

ADDRESS: BHOLIYAPUR, PRATAPGARH U.P.

DRAWING TITLE: LAYOUT PLAN

DRAWING NO.	DATE	SCALE
02	22/07/2022	N.T.S

| Drawing By:	Designed By:	Checked By:
Shweta Rao	Er. Waseem Ahmad	Er. Ram Nath

Prepared By:

EMERGING ENVIRO-TECH
Solution & Services Pvt. Ltd.
1455, Sector 14, Indira Nagar,
Lucknow-226016, Uttar Pradesh.

Mobile No.: +91-7705800091,92,93
Landline No.: 0522-4244917
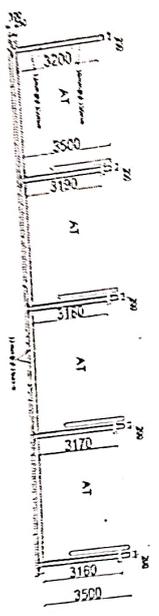Email Id: emergingenviro@gmail.com
Website: www.emergingenvirotech.com

VETTED BY
Dr. A. K. Shukla
Professor & Head
Civil Engg. Deptt.
I.E.T., Lucknow
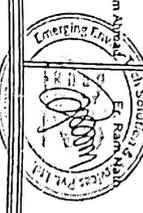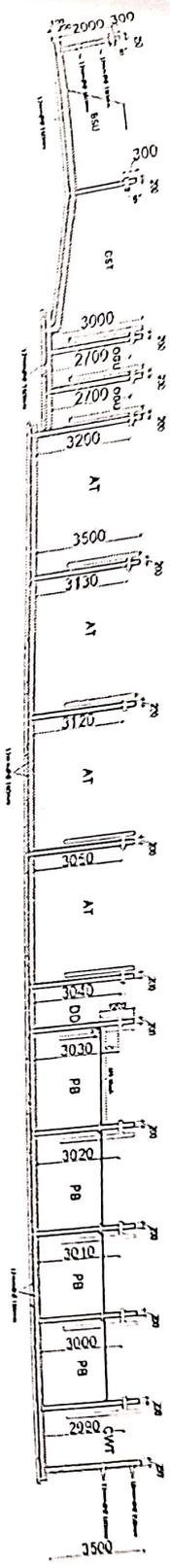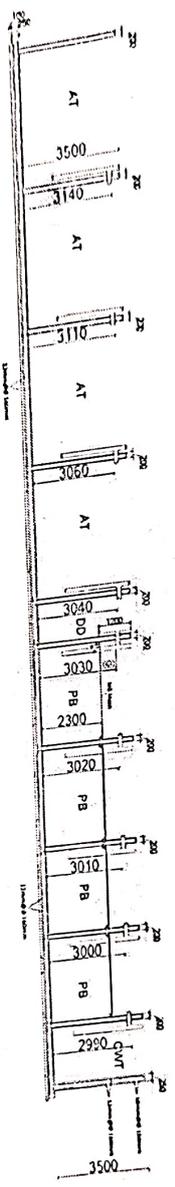
SECTION AA'

SECTION BB'

SECTION CC'

NOTES:

1. ALL DIMENSIONS AND LEVELS ARE IN MM.
2. THE THICKNESS OF RCC WALL OUTER 250MM & INNER WALL 200MM.
3. SPACING OF BAR USED 12MM C/C 150MM
4. GRADE OF CONCRETE: M30

ABBREVIATIONS:

BSU: BAR SCREEN UNIT
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OGU: OIL & GREASE UNIT
RC: COLLECTION TANK
AT: ANOXIC TANK
DD: DISTRIBUTION DRAIN
PB: PLANT BED
CWT: CLEAR WATER TANK

SR. NO.	REVISION	DIRECTION	REMARK
	14	- -	

PROJECT NAME: 25 MLD STP BASED ON CONSTRUCTED WETLAND TECHNOLOGY

CLIENT NAME: U.P. JAL NIGAM, PRATAPGARH

CONTRACTOR- RKC & TC&S JOINT VENTURE

ADDRESS: BHOLIYAPUR, PRATAPGARH U.P.
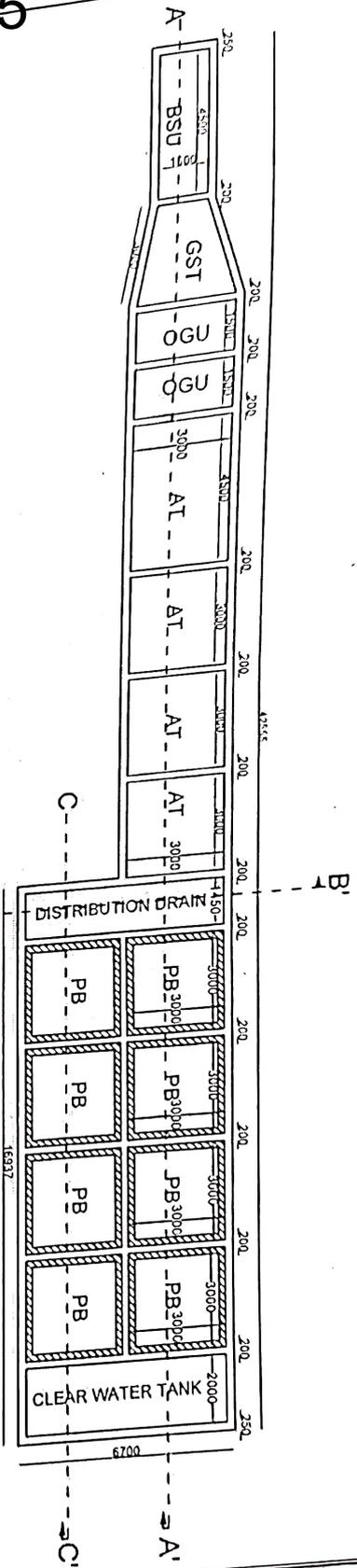
DRAWING TITLE:
SECTION AA' BB' & CC'

Drawing By:	Designed By:	Checked By:
Shweta Rao	Er. Waseem	Er. Ram

DRAWING NO.	DATE	SCALE
02	22/07/2022	N.T.S

Prepared By:

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Solution & Services Pvt. Ltd.
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Lucknow- 226016, Uttar Pradesh.
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Landline No.: 0522-4244917
Email Id: emergingenviro@gmail.com
Website: www.emergingenvirotech.com

VETTED BY:
Dr. A. K. Shukla
Professor & Head
Civil Engg. Deptt.
I.E.T. Lucknow

LAYOUT PLAN

A' — BSU 1000 — GST — OGU — OGU — AT — AT — AT — AT — AT

B' / B — DISTRIBUTION DRAIN

C / C' — PB — PB — PB — PB — PB — PB — PB — PB — PB — PB — PB — PB — CLEAR WATER TANK

A' / A

SECTION AA'

BSU — BS — GST — OGU — OGU — OGU — AT — AT — AT — AT — DD — PB — PB — PB — PB — PB — CWT

VETTED BY
Dr. A. K. Shukla
Professor & Head
Civil Engg. Dept.
I.E.T., Lucknow

1. ALL DIMENSIONS AND LEVELS ARE IN MM.
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SR. NO.	REVISION	DIRECTION	REMARK
01	14		

PROJECT NAME: 500 KLD STP, RAMLEELA MAIDAN AT PRATAPGARH U.P.

CLIENT NAME: U.P. JAL NIGAM, PRATAPGARH

CONTRACTOR: RKC & TCAS JOINT VENTURE

ADDRESS: RAMLEELA MAIDAN NALA PRATAPGARH
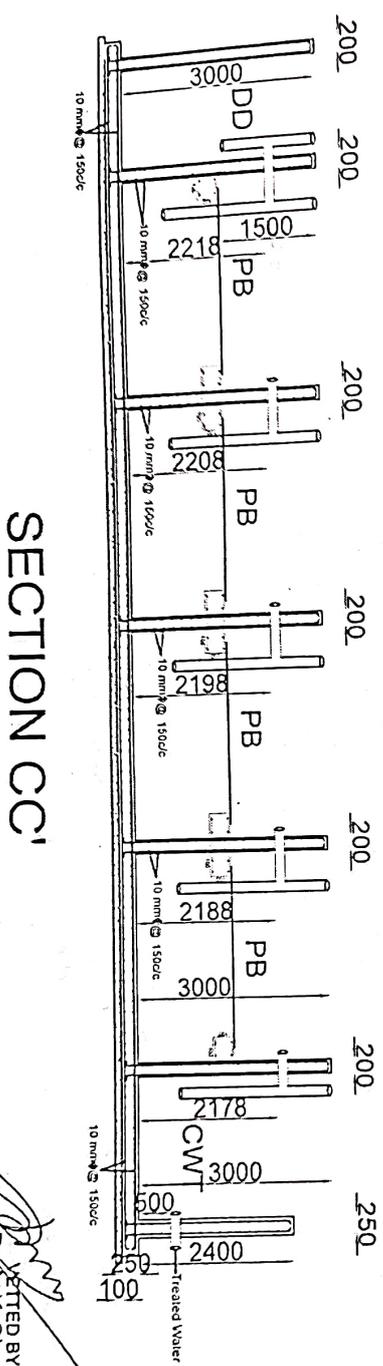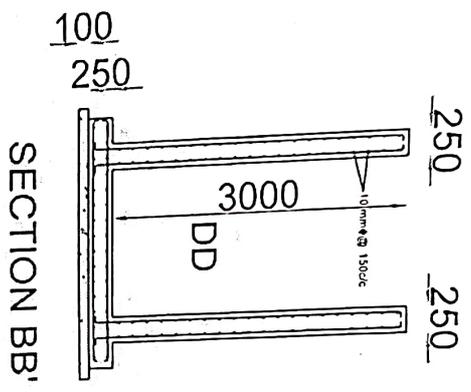
DRAWING TITLE: LAYOUT PLAN & SECTION AA'

DRAWING NO.		DATE	SCALE
01		05/12/2022	N.T.S.
Drawn By	Designed By	Checked By	
Shweta Rao	Er. Waseem Ahmad		

Prepared By:

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Email Id: emergquenviro@gmail.com
Website: www.emergquenviro-tech.com

SECTION CC'

SECTION BB'

ABBREVIATIONS:

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4. SPACING OF BAR USED 10mm C/C 150mm

SR. NO.	REVISION	DIRECTION	REMARK
01	14		

PROJECT NAME: 500 KLD STP, RAMLEELA MAIDAN AT PRATAPGARH U.P.

CLIENT NAME: U.P. JAL NIGAM, PRATAPGARH

CONTRACTOR- RKC & TCLS JOINT VENTURE

ADDRESS: RAMLEELA MAIDAN NALA PRATAPGARH

DRAWING TITLE: SECTION BB' &CC'

DRAWING NO.	DATE	SCALE
01	05/12/2022	N.T.S

Drawing By	Designed By:	Checked By:
Sheela Rao	Er. Waseem	

Prepared By:

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Landline No.: 0522-1241917
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Website: www.emergingenvirotech.com

VETTED BY
Dr. A. K. Shukla
Professor & Head
Civil Engg. Deptt.
I.E.T., Lucknow

UNIVERSAL RESEARCH
LABORATORY SERVICES LLP

TEST REPORT

Test Report No.: URLS/2025-0803-3		Issued On: 17.03.2025
1.	Name & Address of Customer	Technocrafts & Solutions; 2nd Floor, Plot No. 49, Dayal Bhawan, Patel Nagar, Mint Huse Road, Cantonment, Nadeshar, Varanasi, Uttar Pradesh- 221002.
2.	Registration Reference Details	Order Code/Job Order No.: URLS/O/25-0299/3; Dated: 08.03.2025
3.	Material Identification with Details	Waste Water; 1 Litre.
4.	Source / Location	STP Treated Water / 2.5 MLD STP Plant -Bhuliyapur Wetland
5.	Sample Collected by / Condition	Customer / Sealed & Satisfactory
6.	Sample Collection Plan & Procedure	NA
7.	Date / Time of Sample Collection	NA
8.	Date of Sample Registration	08.03.2025
9.	Date of Sample Testing	08.03.2025 to 17.03.2025
10.	Environmental Conditions	Room Temperature (°C): 24.1 | Relative Humidity (%): 64

RESULTS

S. No.	Name of Test	Test Result	Units	Limits as per Schedule VI, EPA Rules 1986	Method of Test
Discipline- Chemical					
Group- Waste Water					
1	pH value at 25°C	7.92	-	5.5 to 9.0	IS:3025 (Part 11) 2022
2	Total Suspended Solids	14	mg/L	100	IS:3025 (Part 17) 2022
3	Chemical Oxygen Demand	115.2	mg/L	Max.250	IS:3025 (Part 58) 2023
4	Biological Oxygen Demand @ 20°C -5 Days	23.96	mg/L	Max.30	IS:3025 (Part 44) 2023
Discipline- Biological					
Group- Waste Water					
5	Feacal Coliform	280	MPN/100 mL	1000	APHA 23 Ed. 9221 E

BLQ=Below Limit of Quantification, LOQ= Limit of Quantification.

Checked By
Suryabhan Singh
Quality Manager

Authorized Signatory
J.P Nautiyal
Technical Manager

End of Report

Doc. No.: URLS/QP/13/F-01

Page No.: 1 of 1

An ISO 9001:2015 & ISO/IEC 17025:2017 NABL Accredited Laboratory

Ground Floor-Raj Market, Deva Road,
Chinhat, Lucknow-226028
Uttar Pradesh India.

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GSTIN: 09AAGFU3889F1ZN I LLPIN: ACC-7927
ISO/IEC 17025:2017 NABL Accredited Laboratory

कार्यालय नगरपालिका परिषद बेल्हा–प्रतापगढ़।

संख्याः 1291 / न0पा0परि0–2025   दिनांकः 08:अगस्त, 2025

कार्य पूर्णता प्रमाण–पत्र

प्रभाणित किया जाता है कि राज्य सेक्टर मद अन्तर्गत निर्माणाधीन नाला शिवम दूबे के घर से जानकीपुरम् में भुलियापुर वेटलैण्ड 2.5 एम0एल0डी0 तक आर0सी0सी0 कवर्ड नाला के कार्य की कुल लम्बाई 368 मीटर के सापेक्ष 368 मीटर नाला निर्माण कार्य पूर्ण कराते हुए जल निगम द्वारा बनाये गये वेटलैण्ड 2.5 एम0एल0डी0 में नाला को जोड़ा जा चुका है। अर्थात कुल 100 प्रतिशत कार्य स्थल पर पूर्ण कराया जा चुका है। स्थल पर कराये गये कार्य की जी0पी0एस0 टैग फोटोग्राफ संलग्न है।

अधिशासी अधिकारी
नगरपालिका परिषद बेल्हा–प्रतापगढ़।

कार्यालय नगरपालिका परिषद बेल्हा–प्रतापगढ़।

संख्याः 1291 / न0पा0परि0–2025   दिनांकः 08 :अगस्त, 2025

कार्य पूर्णता प्रमाण–पत्र

     प्रमाणित किया जाता है कि राज्य सेक्टर मद अन्तर्गत निर्माणाधीन नाला मुख्य मार्ग पर ट्रांसफार्मर से साकेत डिग्री कालेज होते हुए मुख्य मार्ग पर प्रिमियम पैलेस के सामनें तक कवर्ड नाला निर्माण कार्य एवं गायघाट रोड़ पर प्लाजा पैलेस के सामनें से नई बस्ती जानकीपुरम् तक कवर्ड नाला निर्माण कार्य की कुल लम्बाई 920 मीटर के सापेक्ष 920 मीटर नाला निर्माण कार्य पूर्ण किया जा चुका है। अर्थात कुल 100 प्रतिशत कार्य स्थल पर पूर्ण कराया जा चुका है। स्थल पर कराये गये कार्य की जी0पी0एस0 टैग फोटोग्राफ संलग्न है।

अधिशासी अधिकारी
नगरपालिका परिषद बेल्हा–प्रतापगढ़।