



क्षेत्रीय कार्यालय,
छ.ग.पर्यावरण संरक्षण मंडल
5/32 बंगला भिलाई, जिला दुर्ग (छ.ग.)
bhilairo@gmail.com

क्रमांक 38/3 /क्षे.कार्या /छपसंमं /भिलाई /2025
प्रति,

दिनांक 04/11/25

सदस्य सचिव,
छ.ग. पर्यावरण संरक्षण मण्डल,
पर्यावास भवन, सेक्टर-19,
नवा रायपुर अटल नगर, रायपुर (छ.ग.)।

विषय :- REPORT OF THE JOINT COMMITTEE CONSTITUTED IN COMPLIANCE WITH THE ORDER DATED 23.07.2025 IN THE O.A. NO. 338 OF 2025 (107 of 2025-CZ) IN THE MATTER OF AMARCHAND SURANA VERSUS STATE OF CHHATTISGARH & ORS. BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, CENTRAL ZONE BENCH, BHOPAL के अनुमोदन के संबंध में।

- संदर्भ:- 1. क्षेत्रीय निदेशक, क्षेत्रीय निदेशालय, (मध्य), भोपाल, केन्द्रीय प्रदूषण नियंत्रण बोर्ड का पत्र क्रमांक CM-13012/32/2025-LAW-RD BHOPAL/23101/573, दिनांक 06 अगस्त 2025 (ई-मेल के माध्यम से प्राप्त दिनांक 06.08.2025)
2. इस कार्यालय का पु.पत्र क्रमांक 2469 दिनांक 06.08.2025
3. मण्डल मुख्यालय का पत्र क्रमांक 5542 दिनांक 12.08.2025

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उपरोक्त विषयांतर्गत संदर्भित पत्रों के अनुक्रम में लेख है कि माननीय एनजीटी, प्रिंसिपल बेंच, नई दिल्ली द्वारा पारित आदेश दिनांक 23.07.2025 के संदर्भ में संयुक्त समिति द्वारा याचिका में उल्लेखित स्थलों का निरीक्षण परियोजना प्रस्तावक एवं याचिकाकर्ता श्री अमरचंद सुराना की उपस्थिति में दिनांक 29.08.2025 को किया गया। अतः उपरोक्त आदेश के परिपालन में तैयार किये गये प्रतिवेदन की प्रति माननीय नेशनल ग्रीन ट्रिब्युनल, सेंट्रल जोन बेंच, भोपाल में प्रस्तुत किया जाना है। तत्संबंध में प्रतिवेदन की स्वच्छ प्रति संलग्न कर कृपया अवलोकनार्थ/आवश्यक निर्देशार्थ सादर संप्रेषित है।

संलग्न:-उपरोक्तानुसार।

क्षेत्रीय अधिकारी,

छ.ग. पर्यावरण संरक्षण मंडल, भिलाई

पृ. क्रमांक /क्षे.कार्या /छपसंमं /भिलाई /2025

दिनांक

प्रतिलिपि:-

1. कलेक्टर, कार्यालय कलेक्टर, जिला-दुर्ग की ओर कृपया सूचनार्थ एवं संलग्न कर आवश्यक कार्यवाही हेतु प्रेषित।
2. आयुक्त, नगर पालिक निगम, दुर्ग, जिला-दुर्ग की ओर कृपया सूचनार्थ प्रेषित।
3. श्रीमती पॉलमी सी पाटिल, सांईटिस्ट-बी, क्षेत्रीय निदेशालय (मध्य), केन्द्रीय प्रदूषण नियंत्रण बोर्ड, भोपाल (म.प्र.) की ओर कृपया सूचनार्थ एवं संलग्न कर आवश्यक कार्यवाही हेतु प्रेषित।
4. श्री प्रकाश सिंह ठाकुर, सहायक अभियंता, लोक स्वास्थ्य यांत्रिकी विभाग, राजेन्द्र पार्क चौक के पास, दुर्ग जिला-दुर्ग की ओर सूचनार्थ की ओर सूचनार्थ एवं संलग्न कर आवश्यक कार्यवाही हेतु प्रेषित।

क्षेत्रीय अधिकारी,

छ.ग. पर्यावरण संरक्षण मंडल, भिलाई

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
CENTRAL ZONAL BENCH, BHOPAL**

Original Application No.338/2025 (PB)

Original Application No.107/2025 (CZ)

IN THE MATTER OF:

AMARCHAND SURANA

APPLICANT

Versus

STATE OF CHHATTISGARH & ORS.

RESPONDENTS

REPORT OF THE JOINT COMMITTEE CONSTITUTED IN COMPLIANCE WITH THE
ORDER DATED 23.07.2025 IN THE O.A. NO. 338 OF 2025 IN THE MATTER OF
AMARCHAND SURANA VERSUS STATE OF CHHATTISGARH & ORS. BEFORE THE
HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, NEW DELHI.



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**REPORT OF THE JOINT COMMITTEE CONSTITUTED IN COMPLIANCE WITH
THE ORDER DATED 23.07.2025 IN THE O.A. NO. 338 OF 2025 (107 of 2025-CZ) IN
THE MATTER OF AMARCHAND SURANA VERSUS STATE OF CHHATTISGARH
& ORS. BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, CENTRAL ZONE
BENCH, BHOPAL**

1. Grievances as per the order: -

The present letter petition enumerates grievances of the applicant Mr. Amarchand Surana which are produced as under: -

“Two anicuts (1) Bhatgaon Anicut (2) Urla Belaudi Anicut built on the Shivrath river flowing through Durg district of Chhattisgarh state. These two anicuts were constructed by Tandula Water Resources Department Durg for water storage. But according to the applicant, due to mistakes in construction, the two anicuts have become synonymous with polluted water storage.”

2. Constitution of the Joint Committee: -

An order was passed on 23.07.2025 in the current matter by Hon'ble NGT, PB, New Delhi and the following directions were given: -

“In view of the environmental questions involved in the case, we also consider it appropriate that a Joint Committee be constituted to verify the factual position and suggest appropriate remedial action. Accordingly, we constitute a Joint Committee comprising of representatives of Central Pollution Control Board (CPCB), Chhattisgarh SPCB and District Magistrate, Durg and direct the same to meet within two weeks, undertake visits to the site, look into the grievances of the applicant, associate the applicant and representative of the concerned project proponents, verify the factual position and submit report suggesting appropriate remedial action. The Chhattisgarh SPCB will be the nodal agency for coordination and compliance.”

In compliance of the above order, a joint committee has been constituted based on the nominations received from the organizations concerned, comprising of the following representatives:

- (i) Dr. Poulami C Patil, Scientist B, Central Pollution Control Board, Bhopal.
- (ii) Dr. Anita Savant, Regional Officer, C.G. Environment Conservation Board, Bhilai, Durg.
- (iii) Shri Prakash Singh Thakur, Assistant Engineer, Public Health Engineering Department Durg (Representative of Shri Utkarsh Pandey, Executive Engineer, Public Health Engineering Department Durg who is representative of District Magistrate, Durg).

The nodal agency i.e. Chhattisgarh Environment Conservation Board (CECB) has organized a meeting of the members of the joint committee prior to the field visit. During the meeting the following members were also present: -

1. Shri M.A. Khan, Assistant Engineer, Public Health Engineering Department Durg.
2. Shri Shiv Prasad, Junior Scientist, C.G. Environment Conservation Board, Bhilai, Durg.
3. Shri M.K. Shrivastava, Junior Scientist, C.G. Environment Conservation Board, Bhilai, Durg.
4. Shri Dharmendra Mishra, Health Officer, Nagar Nigam, Durg and
5. Shri Mohit Markam, Sub-engineer, Nagar Nigam, Durg

3. Introduction

Durg is a city in the Indian state of Chhattisgarh, east of the Shivrath River and is part of the Durg-Bhilai urban agglomeration. With an urban population of 1554000 (Estimated as on 2025). The total area of Durg Municipal Corporation is 182 Sq.km. and divided into 60 wards. As per the official website of District Durg, the current population is 391000 (Estimated as on 2025) in Durg

Municipal Corporation. River Shivnath is a major tributary of the Mahanadi River, flowing through the state of Chhattisgarh. It originates from Godari village in Gadchiroli district, Maharashtra. The river has a length of about 383 kilometers. It flows towards northeast through Chhattisgarh state for approximately 300 kilometers and joins the Mahanadi River near Changori, Janjgir-Champa. Total 23.5 km stretch of the Shivnath River is in Durg district. The Shivnath is the main source of drinking water for the cities of Durg, Bhilai and Rajnandgao.

4. Status of sewage management in the city

As the population is increasing due to rapid urban growth, the sewage discharges into natural drains flowing from the city, may create pollution to natural water streams such as Shivnath river. Presently in Durg city about 6 MLD sewage is collected in septic tanks from colonies and treated in 30 MLD STP operated by Bhilai Steel Plant, Bhilai. The Remaining domestic waste water from households in Durg City is collected in soak pits and septic tanks and its overflow is discharged through local drains into the Shivnath river via Shankar Nalla and Pulgaon Nalla.

It was observed that the sewage carrying wastewater from Durg city travels approximately 15 km before merging with the Shivnath River at Belaudi. During this transit, the sewage undergoes partial oxidation through natural self-purification processes. These open drains facilitate cleansing via a combination of physical, chemical, and biological mechanisms. At the upstream location of the Urla–Belodi anicut, following the confluence with Shankar Nalla, the Dissolved Oxygen level was recorded at 7.1 mg/l, and the Biochemical Oxygen Demand was measured at 2.5 mg/l. These values indicate that presently the impact of Shankar Nalla on water quality is minimal. However, to ensure sustained water quality and prevent future degradation, appropriate treatment of the discharge remains essential. The copy of DPR is enclosed herewith as *Annexure III*.

5. Observation of the Joint Committee during field visit: -

The inspection was done on 29.08.2025 by the Committee in the presence of Petitioner Shri Amarchand Surana & Project Proponent i.e. Tandula Water Resources Department. Prior to the field visit a meeting was conducted. During the meeting all the members of the joint committee have discussed the fact and issues raised in the above petition. During the meeting the committee member, representative of District Magistrate i.e. Public Health Engineering Department, Durg has provided the information about three water intake well which are under construction and will be used for supply of drinking water at Bhatgaon Anicut,. Details are enclosed herewith as *Annexure IV*.

The intake wells of Durg and Bhilai Water supply schemes are situated at the upstream of Mahamara Anicut built across the confluence point of Pulgaon Nalla and Shivnath River. It was observed that the Pulgaon Nalla and Shankar nalla carries most of the sewage generated from Durg city and join the Shivnath river.

At present the water supply is being done from the existing anicuts built across Shivnath River just nearby Durg city. During inspection the following observations have been made: -



Satellite image of Shivnath River showing anicuts and drains

- (i) **Urla -Beloudi Anicut** - The Urla-Beloudi Anicut is about 240 meters in length. It has 24 gates for water flow. The height of the Anicut from the bed level is 3.0 meters. During the inspection, water was flowing about 2 feet above the Anicut. This anicut is constructed about 1 km. d/s from the confluence of Shankar nalla to the river. Water sample was collected from the Anicut. Photographs and analysis report are attached as *Annexure- VI*.
- (ii) **Bhatgaon Anicut** - The length of Bhatgaon Anicut is approximately 220 meters. It has 3 gates for water flow. The height of the Anicut from the bed level is 1.5 meters. There are 3 water supply intake-well points near the Anicut which are under construction. During the inspection, water was flowing approx. 2 feet above the Anicut. Water samples were collected from upstream of the anicut. Photographs and analysis report are attached as *Annexure VII*.

Pollution load introduced in River Shivnath

The slope of Durg city area is from middle portion to downwards on both the sides thus bifurcating the natural drainage pattern in two zones. The zone I is comprising of Shankar Nalla catchment and Zone 2 is comprising of Pulgaon Nalla catchment.

- (iii) **Shankar Nalla, Urla, Durg** :- Zone I consists of Ward No 1 to 23, 25, 26, 32 to 34, 47, 56 to 60, sewage generated from Zone-I is discharged through Shankar Nalla. The Shankar Nalla after collecting all the sewage from the drains of Zone 1, meet Shivnath River near Village Urla. Water samples were collected from the nalla. Photographs and analysis report are attached as *Annexure VIII*. The nalla water is being used for irrigation purposes by local formers in nearby area. Measured flow of the drain was 25.5 MLD at the time of inspection.
- (iv) **Pulgaon Nalla**:- Zone II consists of ward no 24, 27 to 31, 35 to 46, 48 to 55 are coming under Pulgaon Nalla. The Pulgaon Nalla is having three sub drains

which meet the Nalla at different locations namely Potia Nalla, Kosardih Nalla and Kelabadi Nalla. The pulgaon nalla meets Shivnath river near a location at about 5 kms upstream of Urla-Beloudi anicut and near the drinking water Intake wells of Durg and Bhilai cities. Mahmara Anicut has been constructed at the downstream of the confluence point of Pulgaon Nalla and Shivnath River. The flow is coming approx. 22.47 MLD. Water sample from the Pulgaon Nalla is collected on monthly basis, The average BOD of last 8 month is assessed as 27.5 mg/l. The BOD of sample collected from Shankar Nalla during the inspection is found as 26 mg/l.

7. Water Quality Assessment

For the reference for water quality of river Shivnath the analysis report of the upstream and downstream of the Shivnath River under the National Water Quality Monitoring Programme Station from June 2024 to July 2025 has been provided by the Regional Office. C.G. Environment Conservation Board, Bhilai. The report is enclosed herewith as **Annexure V**.

River Sheonath at Village Jhenjhri, Distt. -Durg, A/C of Samoda Nalla

S. No.	Parameters	Unit	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25
1	pH	-	7.78	7.81	7.42	7.45	7.35	7.14	7.69	7.6	7.6	7.2	7.8	7.4	7.5	7.1
2	BOD	mg/l	4.8	4.2	3.4	2.8	2.7	2.8	2.4	2.4	2.1	2.9	2.9	3.4	2.5	2.8
3	COD	mg/l	55.44	37.28	37.6	28.56	27.96	28.8	28.2	52.32	18.4	45	112.8	47.57	43	43.8
4	DO	mg/l	5.8	5.4	6	7.2	6.9	6.4	6.2	6.4	6.4	6.1	6.5	5.2	5.5	6.2

River Sheonath at Durg, (Intake well Point), Distt.- Durg.

S. No.	Parameter s	Unit	Jun -24	Jul- 24	Au g- 24	Sep -24	Oct -24	Nov- 24	Dec- 24	Jan- 25	Feb- 25	Ma r- 25	Ap r- 25	May -25	Jun -25	Jul- 25
1	pH	pH Units	7.45	7.52	7.43	7.52	7.51	7.33	7.88	7.3	7.4	7.3	7.34	7.3	7.3	7.4
2	BOD	mg/l	1.4	1.3	3.2	2.1	2	1.8	2.3	2.3	1.6	2.2	1.8	2.5	2.4	2.5
3	COD	mg/l	18.48	18.64	37.6	19.04	18.8	28.8	29.28	34.88	27.72	27	28.2	33.76	27.48	26.28
4	DO	mg/l	7.4	7.4	6.8	7.6	7.6	6.8	6.7	6.3	6.4	6.4	6.8	7.2	5.8	6.6

Current status of water quality: -

During inspection the team has collected samples from

S. No.	Parameters	Unit	U/s of Urla- Belodi Anicut (after confluence of Shankar Nalla)	U/s of Bhatgaon Anicut (also D/s of Urla – Belodi anicut)	Shankar Nalla
1	pH	pH Units	6.9	6.8	6.8
2	BOD	mg/l	2.5	2.3	26
3	COD	mg/l	52.56	43.8	280.32
4	DO	mg/l	7.1	7.3	-
5	Total Coliform	MPN/ 100 ml	430	350	>1600
6.	Conductivity	Mhos	438	447	-
7.	TDS	Mg/L	306	305	282

The results of waste water show that the sewage load carried by the drains and its impact on river water quality are presently minimal and it has to be addressed.

10. Recommendations

Information was provided about the sanctioned project of proposed 47 MLD sewage treatment plant for the treatment of sewage flowing through Shankar nalla

and 30 MLD sewage treatment plant for the treatment of sewage flowing through Pulgaon Nalla, a copy of the DPR was provided for that.

- Construction of any anicut or stop dam shall be ensured to be done at upstream where no drains meet with the stream to avoid pollution of drinking water source.
- STPs on both the drains meeting at River Shivnath are proposed by Municipal Corporation, Durg. It is recommended to complete the construction of STPs as early as possible.
- Conventional treatment process may be adopted till the STPs are made fully operational. There are several technologies available for treatment of wastewater which may be In-situ or Ex-situ in nature.



Dr. Poulami C Patil

Scientist B, Central
Pollution Control Board,
Bhopal



Dr. Anita Savant

Regional Officer, CECB,
RO - Bhilai, Durg



Shri Prakash Singh Thakur

Assistant Engineer, Public
Health Department Durg
(Representative of District
Magistrate, Durg)

Item No. 02

Court No. 2

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application No. 338/2025

Amarchand Surana

Applicant

Versus

State of Chhattisgarh & Ors.

Respondents

Date of hearing: 23.07.2025

**CORAM: HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER**

Applicant: Applicant in person (through VC).

ORDER

1. The applicant-Amarchand Surana resident of Shakkar-Pramila Kunj, behind hotel Cambean, Green Chowk, Station Road, Durg, Chhattisgarh has sent a letter petition dated 12.04.2025 to the Ld. Registrar of this Tribunal which has been treated and registered as Original Application No. 338/2025 for exercise of suo motu jurisdiction.
2. The relevant part of the letter petition enumerating grievances of the applicant is reproduced as follows:-

“ छत्तीसगढ़ राज्य के दुर्ग जिले से होकर बहने वाली शिवनाथ नदी पर बने दो एनीकेट (1) भटगाँव एनीकेट (2) उरला बेलौदी एनीकेट का निर्माण ताँदुला जल सँसाधन विभाग दुर्ग द्वारा जल सँग्रहण हेतु किया गया था किन्तु निर्माण में हुई चूक के कारण उक्त एनीकेट प्रदूषित जल सँग्रहण का पर्याय बन गया है।
अतः आपके माध्यम से माननीय अध्यक्ष, राष्ट्रीय हरित अधिकरण को आवेदन प्रस्तुत कर समग्र पर्यावरणीय हितों की रक्षा एवं ठोस और सुनिश्चित समाधानिक उपायों का मार्ग प्रशस्त हो इस भावना के साथ सादर आवेदन पत्र संलग्न है।
होगा। आपसे प्राप्त सहयोग एवं की गई कार्यवाही से प्रकृति और समाज, निश्चित अनुग्रहित”

3. The English translation by the Registry of the relevant part of the letter petition enumerating grievances of the applicant reads as under:-

“Two anicuts (1) Bhatgaon Anicut (2) Urla Belaudi Anicut built on the Shivrath river flowing through Durg district of Chhattisgarh state were constructed by Tandula Water Resources Department Durg for water storage but due to mistakes in construction, the said anicuts have become synonymous with polluted water storage. Therefore, by submitting an application through you to the Honorable Chairman, National Green Tribunal, the overall environmental interests should be protected and the way should be paved for concrete and assured remedial measures, the application form is enclosed with respect. Nature and society will definitely be blessed by the cooperation received from you and the action taken.”

4. The applicant has attached duly stamped application mentioning the grievances in detail alongwith two CDs and photographs with the letter petition in support of the averments made therein.

5. *Prima facie* the averments made in the application raise substantial questions relating to environment arising out of the implementation of the enactments specified in Schedule-I to the National Green Tribunal Act, 2010.

6. In view of the averments made in the application, we consider it appropriate to have response of (1) State of Chhattisgarh through its Additional Chief Secretary, Forest and Climate Change Department, Government of Chhattisgarh (2) Chhattisgarh State Wetland Authority through its Chairman, (3) Chhattisgarh State Pollution Control Board through its Member Secretary and (4) District Magistrate, Durg who are impleaded as respondents no. 1 to 4. The Registry is directed to prepare and attach memo of parties to the application and issue notices to respondents no. 1 to 4 requiring them to file their reply/response within two months.

7. In view of the environmental questions involved in the case, we also consider it appropriate that a Joint Committee be constituted to verify the factual position and suggest appropriate remedial action. Accordingly, we constitute a Joint Committee comprising of representatives of Central Pollution Control Board (CPCB), Chhattisgarh SPCB and District Magistrate, Durg and direct the same to meet within two weeks, undertake visits to the site, look into the grievances of the applicant, associate the applicant and representative of the concerned project proponents, verify the factual position and submit report suggesting appropriate remedial action. The Chhattisgarh SPCB will be the nodal agency for coordination and compliance.

8. Even though in the present case cognizance has been taken by this Bench on the basis of letter petition received by post with approval and assignment under order of Hon'ble Chairperson, but in view of the facts and circumstances of the case including the fact that the place of accrual of cause of action lies within jurisdiction of the Central Zone Bench of this Tribunal at Bhopal we are of the considered view that it will be appropriate if the case is further heard by the Central Zone Bench of this Tribunal at Bhopal.

9. Accordingly, the Registry is directed to list the matter before the Central Zone Bench of this Tribunal at Bhopal on 09.09.2025 after obtaining orders from Hon'ble the Chairperson for transfer of the case.

10. Report of the Joint Committee may be filed by Chhattisgarh State Pollution Control Board and replies/ responses may be filed by respondents no. 1 to 4 before the Central Zone Bench of this Tribunal at Bhopal within one month.

11. A copy of this order be sent to the Member Secretary, CPCB, Member Secretary, Chhattisgarh SPCB and District Magistrate, Durg by email for requisite compliance.

Arun Kumar Tyagi, JM

Dr. Afroz Ahmad, EM

July 23rd, 2025
Original Application No. 338/2025
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माननीय NGT द्वारा OA No. 107/2025 (CZ) Earlier 338/2025 (PB) "Amarchand Surana Vs. State of Chhattisgarh & Ors." में पारित आदेश दिनांक 23.07.2025 द्वारा गठित समिति की बैठक दिनांक 29.08.2025 का कार्यवाही विवरण।

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बैठक के दौरान माननीय एनजीटी द्वारा OA No. 107/2025 (CZ) Earlier 338/2025 (PB) "Amarchand Surana Vs. State of Chhattisgarh & Ors." में पारित आदेश दिनांक 23.07.2025 में उल्लेखित याचिकाकर्ता श्री अमरचंद सुराना द्वारा निम्न विषयों पर संदेह प्रकाश किया गया :-
"छत्तीसगढ़ राज्य के दुर्ग जिले से होकर बहने वाली शिवनाथ नदी पर बने दो एनीकट (1) भटगांव एनीकट (2) उरला बेलोदी एनीकट का निर्माण तांदुला जल संसाधन विभाग दुर्ग द्वारा जल संग्रहण हेतु किया गया था, किन्तु निर्माण में हुई चूक के कारण उक्त एनीकट प्रदूषित जल संग्रहण का पर्याय बन गया है।

1. शिवनाथ नदी में उरला बेलोदी एनीकट का निर्माण जिस स्थान पर हुआ है उसके ठीक ऊपर में दुर्ग शहर का शंकर नाला आकर मिलता है और ये शंकर नाला दुर्ग शहर का अत्यधिक गन्दे पानी को लेकर बहते हुए उरला बेलोदी एनीकट में समाहित हो जाता है और यह कम लगातार निरंतर जारी है।
2. शिवनाथ नदी पर निर्मित भटगांव एनीकट का निर्माण भटगांव के पास हुआ है। उरला बेलोदी एनीकट का प्रदूषित जल भटगांव एनीकट में मिलने के कारण भटगांव एनीकट का भी जल प्रदूषित हो गया है।

3. भटगांव एनीकट के प्रदूषित जल का निरीक्षण फोटोग्राफी एवं विडियोग्राफी दिनांक 01 मार्च 2025 को किया गया है जिसकी छायाप्रति संलग्न है।
4. उरला बेलोदी एनीकट के प्रदूषित जल का निरीक्षण फोटोग्राफी एवं विडियोग्राफी दिनांक 27 मार्च 2025 को किया गया है जिसकी छायाप्रति संलग्न है।
5. प्रदूषित जल की भयावहता का वर्णन शब्दों में भी सरलता से नहीं किया जा सकता है। संलग्न छाया चित्रों से आप सहजता से अनुमान लगा सकते हैं प्रदूषित जल के कारण जिस स्थिति को मैंने देखा और पाया है वह इस प्रकार से है :-
 - (क) एनीकट का समस्त जल प्रदूषित होकर गहरा हरा रंग का रूप ले लिया है।
 - (ख) संग्रहित प्रदूषित जल से निरंतर दुर्गन्ध फैल रही है जिसके कारण वायु प्रदूषण भी स्वाभाविक हो रहा है।
 - (ग) संग्रहित प्रदूषित जल के कारण जलचर जीवों की अप्राकृतिक मौत हो गई है। साथ ही जलचर की मौजूदगी शून्य सी है।
 - (घ) पशु एवं पक्षियों का पेयजल पूर्ण रूप से प्रदूषित होने के कारण उन पर भी संकट आ पड़ा है।
 - (ङ) निश्चय ही संग्रहित प्रदूषित जल के कारण भूजल भी प्रदूषित हो रहा होगा।
 - (च) संग्रहित प्रदूषित जल के कारण जल और वायु में स्वाभाविक परिवर्तन होना तय/निश्चित है जिसके कारण स्वच्छ पर्यावरण पर विपरीत/दुष्प्रभाव पड़ रहा है।
 - (छ) संग्रहित प्रदूषित जल की मैली गाद से नदी का तल भी गंदे गाद से निरंतर भर रहा है।
 - (ज) प्रदूषित जल संग्रहण के कारण प्राणी मात्र के स्वास्थ्य पर भी दुष्प्रभाव पड़ना स्वाभाविक है।
 - (झ) संग्रहित प्रदूषित जल प्राकृतिक नहीं है। तांदुला जल संसाधन विभाग दुर्ग के अधिकारियों की भूल/गलतियों के कारण जल प्रदूषित हो रहा है।
6. उरला बेलोदी एनीकट और भटगांव एनीकट पर प्रदूषित जल संग्रहण होने का एक प्रमुख कारण यह भी है कि तांदुला जल संसाधन विभाग, दुर्ग द्वारा एनीकट के निकास गेट को बंद रखा जाता है, जल संग्रहण के नाम पर।
7. जल का प्राकृतिक स्वभाव/गुण है कि जल बहते बहते अपने को स्वयं स्वच्छ और साफ कर लेता है।

बहता जल निर्मल—ठहरा जल गंदा

अतः प्रदूषित जल के संग्रहण करने का कोई औचित्य नहीं है।

8. जीवित जलचर प्रकृति की संरचना को प्राकृतिक रूप से बनाये रखने में महत्वपूर्ण भूमिका का निर्वहन करते हैं।

उपरोक्त उल्लेखित याचिका के परिपेक्ष्य में चर्चा की गई। केन्द्रीय प्रदूषण नियंत्रण बोर्ड की प्रतिनिधि डॉ० पौलमी सी-पाटिल द्वारा याचिका में उल्लेखित भटगांव एनीकट एवं उरला बेलोदी एनीकट के संबंध में नगर पालिक निगम के प्रतिनिधि श्री धर्मेन्द्र मिश्रा एवं उप अभियंता श्री मोहित मरकाम से वार्डों एवं जनसंख्या के संबंध में जानकारी चाही गई तथा सीवेज ट्रीटमेन्ट प्लांट हेतु डीपीआर की कापी उपलब्ध कराने हेतु कहा गया। नगर पालिक निगम के प्रतिनिधि द्वारा जानकारी दी गई कि वर्तमान में यहां संयुक्त घरेलू दूषित जल उपचार संयंत्र (Combined Sewage Treatment Plant) स्थापित नहीं है। अमृत मिशन 2.0 के तहत शंकर नाले हेतु 47 एमएलडी क्षमता का सीवेज ट्रीटमेन्ट प्लांट एवं पुलगांव नाले हेतु 30 एमएलडी क्षमता के सीवेज ट्रीटमेन्ट प्लांट की स्थापना का प्रस्ताव है तथा यह भी जानकारी दी गई कि इन नालों में किसी भी उद्योग का पानी निस्सारित नहीं होता है। उनके द्वारा यह भी बताया गया कि शंकर नाले का प्लो 47 एमएलडी है। यह नाला उरला तक पक्का है उसके पश्चात् 2 किलोमीटर तक कच्चे नाले के रूप में शिवनाथ नदी में मिलता है।

लोक स्वास्थ्य यांत्रिकी विभाग के प्रतिनिधि श्री प्रकाश सिंह ठाकुर एवं श्री एम.ए. खान द्वारा जानकारी दी गई कि मुख्यतः शिवनाथ नदी पेयजल का स्रोत है। इनके द्वारा भटगांव एनीकट के संबंध में बताया गया कि ग्राम-अंजोरा ढाबा (एम.वी.एस.) में वॉटर ट्रीटमेन्ट प्लांट की क्षमता-8.5 एमएलडी प्रस्तावित है, जिससे लगभग 50 गांव को जल प्रदाय किया जायेगा। जेवरा सिरसा में 4 एमएलडी क्षमता का वॉटर ट्रीटमेन्ट प्लांट प्रस्तावित है, जिससे लगभग 17 गांव को जल प्रदाय किया जायेगा व इण्डियन इंस्टीट्यूट ऑफ टेक्नॉलाजी, भिलाई हेतु 4.5 एमएलडी क्षमता का वॉटर ट्रीटमेन्ट प्लांट प्रस्तावित है।

छत्तीसगढ़ पर्यावरण संरक्षण मण्डल, की प्रतिनिधि डॉ० अनीता सावंत ने जानकारी दी कि भटगांव एनीकट एवं उरला बेलोदी एनीकट में किसी भी उद्योग का पानी निस्सारित नहीं होता है। केन्द्रीय प्रदूषण नियंत्रण बोर्ड की प्रतिनिधि डॉ० पौलमी सी-पाटिल ने डॉ० अनीता सावंत को विगत जून 2024 से जुलाई 2025 तक के शिवनाथ नदी के राष्ट्रीय जल गुणवत्ता निगरानी कार्यक्रम के विश्लेषण परिणाम उपलब्ध कराने हेतु कहा गया। डॉ० अनीता सावंत द्वारा उक्त जानकारी उपलब्ध कराने की सहमति दी गई।

बैठक में दिनांक 29.08.2025 को दोपहर 02.00 बजे याचिकाकर्ता द्वारा उल्लेखित दोनों एनीकट (1) भटगांव एनीकट एवं (2) उरला-बेलोदी एनीकट एवं अन्य आसपास के स्थलों के

निरीक्षण हेतु उपस्थित सदस्यों द्वारा सहमति दी गई। कार्यपालन अभियंता, तांदुला जल संसाधन विभाग के प्रतिनिधि तथा याचिकाकर्ता श्री अमरचंद सुराना को निरीक्षण के दौरान उपस्थित रहने हेतु दूरभाष के माध्यम से सूचित किया गया। बैठक संपन्न हुई तथा बैठक का समापन हुआ।

* * *

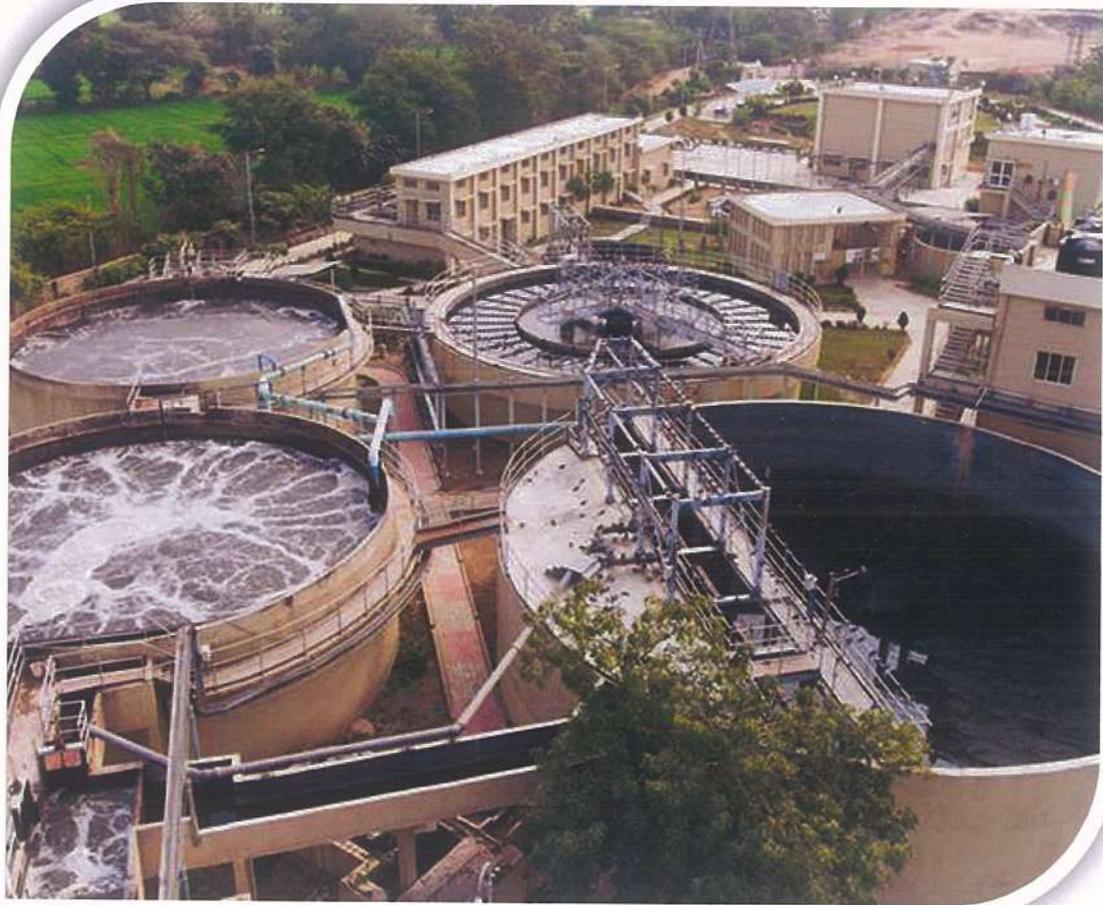
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**MUNICIPAL CORPORATION
DURG**



**DURG SEWAGE MASTER PLAN UNDER
AMRUT 2.0**



DETAILED PROJECT REPORT

PREPARED BY



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Durg Sewage Master Plan at District Durg
Detailed Project Report

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Durg Sewage Master Plan at District Durg
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Durg Sewerage Master Plan at District Durg
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Abbreviations

ASP	Activated Sludge Process
DMC	Durg Municipal Corporation
CI	Cast Iron
CPHEEO	Central Public Health & Environmental Engineering Organisation
DPR	Detailed Project Report
DI	Ductile Iron
FSL	Full Supply Level
GCP	Ground Control Points
GIS	Geographic Information System
GSR	Ground Service Reservoir
HDPE	High-density polyethylene
HFL	High Flood Level
ISO	Indian Standard Organisation
KL	Kilo litre
LPCD	litre Per Capita Per Day
MBBR	Moving Bed Biofilm Reactor
MLD	Million Litre per Day
MSL	Mean Sea Level
MWL	Mean Water Line
NA	Not Available
NTU	Nephelometric Turbidity unit
PHE	Public Health Engineering Department
PFR	Pre-Feasibility Report
PSC	Pre-Stressed Concrete
RCC	Reinforced Cement Concrete
RFP	Request for Proposal
RL	Reduced Level
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
STP	Sewage treatment plant
UASB	Up flow Anaerobic Sludge Blanket
UFW	Unaccounted for Flow
WSP	Waste Stabilization Pond
WSS	Water Supply System
WTP	Water Treatment Plant


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

1.0 INTRODUCTION

EXECUTIVE SUMMARY

Durg is a city in the Indian state of Chhattisgarh, east of the Shivrath River and is part of the Durg- Bhilai urban agglomeration. With an urban population of 1,064,077, Durg-Bhilai is the second largest urban area in Chhattisgarh after Raipur. It is the headquarters of Durg District.

Situated on the east bank of river Shivrath, District Durg is herald of Chhattisgarh's Industrial Development, Cultural competence, social harmony, and Meaningful use of resources. It is a symbol of status, prestige, and glory of Chhattisgarh. History of Durg is like conducive inspiration which is unique mixture of oldness and modernity, culture-rite and entrepreneurship. Bhilai known as "Mini India" for Industrial development, social harmony and cultural diversity is a twin city of Durg

In the 2011 census, Durg-Bhilainagar Urban Agglomeration had a population of 1,064,077. Durg-Bhilainagar Urban Agglomeration includes: Durg (M Corp.), Bhilai Nagar (M Corp.), Dumardih (part) (OG), Bhilai Charoda (M Corp), Jamul (M), Kumhari (M) and Utai (NP).

Durg Municipal Corporation had a total population of 268,679 in 2011, out of which 136,537 were males and 132,142 were females. Durg had a below six years population of 29,165. Durg had an effective literacy rate (7+ population) of 87.94 per cent, with male literacy of 93.72% and female literacy of 82.00. In 2011, the city had a sex ratio of 968.

The original name of the town was "Shiva Durg", literally meaning fort on the Shivrath River. Durg used to have a fort that was the headquarters of one of the 18 Garhs or districts under the administration of the medieval Kalachuri kings.

Durg is high rich industrial areas which contribute highly in state & country GDP. Its main Industrial areas have in Bhilai, Rasmada & Kumhari. Majorly Industries belong to steel production example Bhilai Steel Plant


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a. Introduction

Durg district is one of the densely populated districts of the Chhattisgarh state of India. Based on climate & topography the Chhattisgarh state is divided into 3 agro climatic zones. The Bastar Plateau comprises of Bastar, Dantewada, Bijapur & Narayanpur districts and a part of Kanker (excluding Charama, Narharpur & Kanker Blocks). Northern parts of the state come under “Northern Hilly Region” which comprises of Sarguja, Koriya & Jashpur Districts. Bilaspur, Raipur, Janjgir-Champa, Raigarh, Rajnandgaon, Kawardha, Durg, Mahasamund, Dhamtari, Korba and parts of Kanker come under “Plains of Chhattisgarh”. Durg district is situated in the southern part of the rich Chhattisgarh plain.

The district is bounded by Bemetara district in the north, Rajnandgaon district in the west, Balod district in the south and Raipur and Dhamtari district in the east. Durg district is situated on the Howrah-Mumbai main line of south-eastern railway. National Highway No. 6 also passes through the district.

Rivers

The general slope of the district is towards the north-east in which direction the major streams of the district flow.

Shivnath

Shivnath is main river of District Durg. Shivnath river is tributary of Mahanadi River. Shivnath river originates from Mountain at height of 625 meter at Panabaras situated in south western parts of Rajnandgaon and flows towards north east direction. City Durg is situated on east bank of Shivnath River. It flows towards north east passing through Khujji, Rajnandgaon, Durg, Dhamdha and Nandghat and joins (meet) Mahanadi near Shivrinarayan of Bilaspur District.

b. Scope of Work

The scope of the proposed mission will be divided into four broad components namely Planning, Design and Supervision and Project Management. The consultant will carry out a multi-stage exercise in close collaboration with the ULB / State Government and other stakeholders. The proposed project has been taken up for improvement / introduction of Urban Infrastructure including ensuring delivery of services. Without limiting the scope, is to work in close liaison with the Municipal Corporation Durg.

c. General

The objectives of the Durg Sewage Master Plan Project is to provide a commercially, technically viable and feasible solution on a priority basis that can be provided within a short span of time which is effective in lowering the pollution in Shivrath River and improving water quality making it best fit for the designated / projected use.

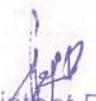
The objectives of this DPR is to provide estimates of Dry Weather Flow in the Nallah to be intercepted, to evaluate various alternatives for interception and conveyance methods of the dry weather flows at the Nallahs and to carry out a techno – economic study of these options for recommendation of the most feasible option.

d. General

Durg is a city in the Indian state of Chhattisgarh, east of the Shivrath River and is part of the Durg-Bhilai urban agglomeration. Durg-Bhilai is the second largest urban area in Chhattisgarh after Raipur. Durg-Bhilainagar Urban Agglomeration includes: Durg (MCorp.), BhilaiNagar(MCorp.), Dumardih (part)(OG), BhilaiCharoda (MCorp), Jamu l (M), Kumhari (M), and Utai (NP).

Durg Municipal Corporation consist of 60 wards. The Corporation is administered by an elected body headed by the Mayor. The population as per the 2011 census within Municipal Corporation limit for Durg was approximately 268806. At present the area do not have proper sewage collection system nor do have the Sewage Treatment Plant. The total area of Durg Municipal Corporation is 182 Sq.km.


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Figure 1:1 : Location Map of Durg

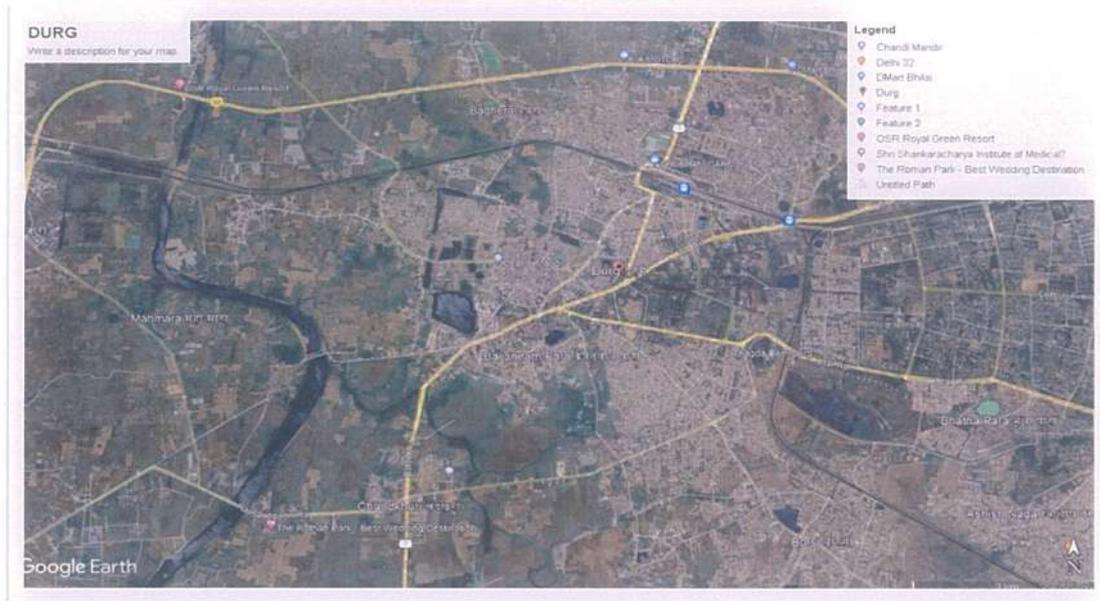


Table 1-1 : Durg Statistics

Name of the Urban Local Body	Durg Municipal Corporation
Location	21.19°N 81.28°E
City	Durg
State	Chhattisgarh
District	Durg
Altitude	317.6 m above MSL
Area under consideration (DMC)	182 Km ² approx.
Population (As per 2011 census)	268806

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2.0 BACKGROUND AND OBJECTIVES

a. Background

Shivnath River, one of the major rivers in Chhattisgarh and is tributary of Mahanadi River. Shivnath river originates Godari village in Gadchiroli district, Maharashtra, and flows northeast for 300 kms then joins the Mahanadi River near the town Shivrinarayan in Chhattisgarh. City Durg is situated on east bank of Shivnath River. It flows towards north east passing through Khujji, Rajnandgaon, Durg, Dhasmha and Nandghat and joins (meet) Mahanadi near Shivari Narayan of Bilaspur District. The area around Shivnath river is very fertile. It provides drinking water to public, irrigation water for agricultural lands, and bathing for millions of people.

Numerous efforts being taken in past to improve river water quality. Rather than anticipated improvements being achieved, water quality has deteriorated significantly due to rapid growth in population in catchments, defunct sewers/sewerage system and contributions from mostly un-sewered city.

In this relation, DMC has decided to propose a Sewage Treatment Plant Project along with its various components on a priority basis to provide an incremental, immediate and visible improvement in water quality of the river.

Durg Municipal Corporation has awarded the project to M/s Puranik Brothers Consulting Engineers, Nagpur to prepare a Detailed Project Report for proposing a Sewage Treatment Plant Project of Suitable Capacity under Amrut 2.0.

Accordingly, Field investigation agencies were deputed to collect topographic surveys, collect demographic and population data, monitor sewer flows, and to measure and analyse sewage water quality and drain flows.


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Figure 2:1 : Map of Durg with Shivnath River



b. Objectives of the project

The objective of the project is planning and designing of a Systematic and Efficient sewage master plan for the Durg city, so that in future all the sewage if conveyed by conduits shall reach the same treatment points to eliminate pollution and also to explore sustainable buyers for water reuse. The project aim is the coverage of the entire Municipal area by precisely planning and hydraulic designing and dividing the natural drainage pattern according to the topography of the town for the sewage collection system and treated disposal at natural tributary. It also aims to provide effective design of STP to treat waste water of Durg effectively up to its design stage at a reasonable and optimum cost.

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c. Necessity of the Project

Presently in Durg city there is no collection network for waste water, mostly all the households are having sanitation units with septic tanks and the supernatant is directly discharged along with storm water, industrial waste, domestic sewage, and various other components into the Pulgaon Nallah & Shankar Nallah which then connects with Shivrath river.

This approach of disposing untreated sewage into the water bodies is leading to contamination of the water bodies resources and ultimately causing water pollution. In addition to this, this pollution can cause various diseases and unhealthy environment in the vicinity of this river. Therefore, it is utmost necessary to develop a sewage master plan with treatment facility as the quantity of sewage production per day is much higher as compared to the conventional treatment of sewage. Mostly all the households are having closed toilet system, a systematic approach is needed for septage management in combination with sewage treatment. Under the infrastructure development program of Durg, it is decided to establish this facility after proper planning and technical approach for the betterment of the residents living in this area.

The intake wells of Durg and Bhilai Water supply schemes are situated in the upstream of Mahamara Anicut built across the confluence point of Pulgaon Nallah and Shivrath River. The Pulgaon Nallah Brings 40% of the sewage generated by Durg city at the intake point itself making Shivrath river water highly polluted hence it is the alarming situation for Durg and Bhilai cities. On the other hand Shankar Nallah which receives about 60% sewage of Durg city drops all its polluted sewage directly into Shivrath river. About 8 Km downstream of Pulgaon Nallah confluence point thus making entire down stretch of Shivrath river highly polluted. Making many villages and cities in the downstream have no option but to use this polluted water for drinking purposes after meagre treatment.


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d. Planning Approach

Population projection according to future general master plan has been worked out as per the CPHEEO Manual on sewerage and sewage treatment systems and population projections according to drainage districts (As per Natural drainage Pattern) are calculated. The land use could not be made available in absence of city development plan but studies were conducted as per the current trend of city development with respect to establishment of New Durg.

The city with more than so much of urban populations must have a systematically planned sewerage network but this will require huge capital expenditure as well as O & M liabilities on the corporation. The quantum of sewage generated is very huge, and as such, at least the corporation must arrest the raw sewage going in Shivnath River and make the arrangement for the treatment and then shall discharge the treated effluent in the river which is the need of the hour after establishment of the treatment facilities nearby industries and bulk non domestic water consumers shall also be encouraged to purchase the recycle water for their non domestic use thus making the project self-sustainable.

The main objective of this detailed project report is to propose an infrastructural facility in a comprehensive manner including required survey, assessment of the quality and quantity of the effluent. To facilitate the adoption of the appropriate technology option for the effective treatment of sewage.

The planning has been done strategically with locations of proposed STP and preliminary investigations are also carried out for clubbing of all the nallas in such a way that minimum handling and pumping of sewage shall be required. The locations of STP are proposed in a way that there should be least disturbance to the public, easy access and proximity to the intake as well as outlet points. Mostly the lands for STP are chosen amongst Government lands, having easy accessibility.

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The scope of this project is to discharge treated waste water in Shivnath river and eventually arrest the pollution of the river. Once the infrastructure is ready then DMC may find possible buyers of the recycled water for recovering their O & M Part.

Planning of the scheme: The slope of Durg city area is going from middle portion to downwards on both the sides thus bifurcating the natural drainage pattern in two zones. The zone I is comprising of Shankar Nalla catchment and Zone 2 is comprising of Pulgaon Nalla catchment. Thus the possibility of joining both the catchment discharges by interception is not feasible option. Ward No1 to 23, 25, 26, 32 to 34,47,56 to 60 are coming under the catchment of Shankar Nalla and Ward No24, 27 to31, 35 to 46, 48 to 55 are coming under Pulgaon Nalla. The Shankar Nalla is a single basin nalla which collects all the sewage from the drains of Durg city Zone 1 and lastly meet Shivnath River near Village Urla. The Pulgaon Nalla is having three sub drains which meet the Nalla at different locations namely Potia Nalla, Kosardih Nalla and Kelabadi Nalla. The pulgaon nalla meets Shivnath river within the city exactly near the locations of Intake wells of Durg and Bhilai cities. This make it very dangerous situation as WRD has constructed Mahmara Anicut just in the downstream of the confluence of Pulgaon Nalla and Shivnath River. Earlier also efforts were made by DMC to treat the sewage water meeting to Shivnath river but due to non-availability of land only a temporary diversion to drop waste water in the downstream of the Anicut has been made which cannot be a permanent remedy. As per the projected population in these two zones, the projected collection capacity of pulgaon nalla catchment for the year 2040 is 30 MLD considering 80% of the total projected demand at 135 LPCD. The flow is coming approx. 22.47 MLD. Thus considering all the factors it is proposed to provide STP at Pulgaon Nala 30 MLD capacity with a peak factor of 2.25 to cater the need of year 2040 as per the CPHEEO manual.

Shankar Nalla catchment: It is proposed to construct a diversion weir across Shankar nalla just besides the land for STP and from here the sewage water shall be passed through the inlet chamber, Screen chamber and then Grit chamber all in a combined RCC structure in to the Wet Well to be constructed in the STP premises. From here the raw sewage shall be pumped to the inlet of STP. It is proposed to construct 47 MLD capacity of Sewage Treatment Plant with provision to admit Septage based on SBR


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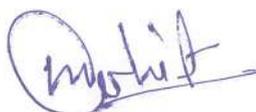
(Sequential Batch Reactor) Technology as this technology is a proven technology both in Chhattisgarh as well as in India. It is proposed that denitrification and phosphorous removal arrangements shall also be done in this STP and the treated sewage shall be discharged in downstream of the Nalla. It is also proposed to construct a Tertiary Treatment Plant just besides the STP considering future reuse of water as most of the bulk Used Water consumers get attracted towards the reuse once the facility is being setup. As per the Government policy treated used water shall be used by power plants within 50 Kms radius for their non domestic use hence the provision of Tertiary Treatment plant is made in the project which shall only be implemented after confirmation from the buyers.

Pulgaon Nalla Catchment: It is proposed to construct a Diversion weir of 40 Meters width in the Nalla nearly 790 m upstream of Mahamara anicut and from here the sewage water shall be brought through 1100 m dia RCC NP3 pipe interceptor through the inlet chamber, Screen chamber and then Grit chamber all in a combined RCC structure in to the Wet Well to be constructed in the STP premises. From here the raw sewage shall be pumped to the inlet of STP. It is proposed to construct 30 MLD capacity of Sewage Treatment Plant with provision to admit Septage based on SBR (Sequential Batch Reactor) Technology as this technology is a proven technology both in Chhattisgarh as well as in India. It is proposed that denitrification and phosphorous removal arrangements shall also be done in this STP and the treated sewage shall be discharged in downstream of the Nalla.

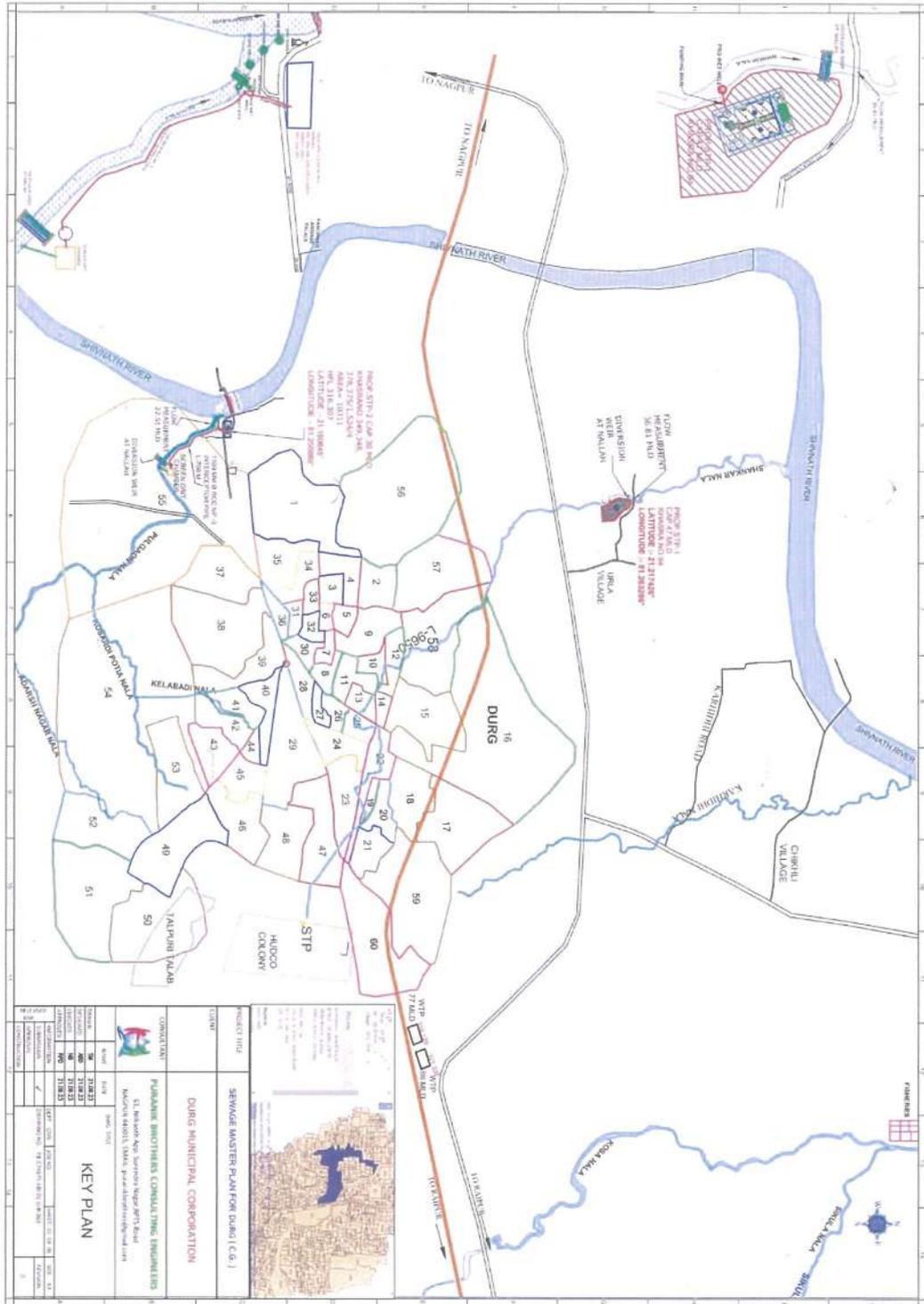
Small nalla originates from ward Nos. 15,17,18,19 &21 with a small quantum of flow to the tune of 2 to 3 MLD and travels through long stretch cultivated farms and ultimately reach Shivnath river near Chikhali after travelling around 6 km. BOD of the stream is very low. Though small quantum of flow observed at beginning, flow near river is very meagre almost dry. Photograph enclosed. These wards and the area along stretch of Nalla are in developing stage. Exact quantum of flow has to be ascertained after the development of area and the suitable treatment scheme shall have to be designed in future. Therefore present small quantum of flow has not been considered for treatment at this juncture.


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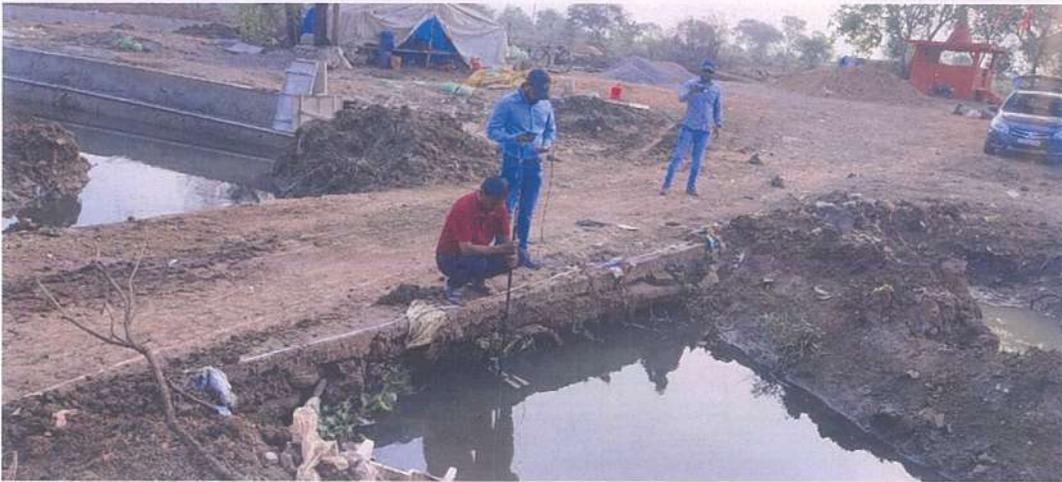
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PULGAON NALA



SHANKAR NALA


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Nala Beginning



End of Nala near Chikhali


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3.0 POPULATION PROJECTIONS

a. Description

The demographic study is used to carry out population projections and its distribution such that the estimates for existing and future wastewater flows into the nallah existing in project area are appropriately calculated in order to optimize design of the components of the scheme and thereby capacity of treatment capacity units.

Sewerage projects considering the overall economy and replacement criteria are recommended to design to meet the requirements over a thirty years period after its completion. Design population i.e., population after thirty years should take in to consideration certain factors such as scope of future growth and development in industrial, commercial, educational, administration and social circles etc. The basic concepts for population projections were established. The task included the following components mentioned in.

b. Population Forecasting

The population of the city has been greatly influenced by various factors such as base population, urbanization trend, land-uses (existing and proposed), social amenities, livelihood opportunities etc. A general understanding of demographic characteristics will provide a guide to select the statistical methods for forecasting. The main guiding principle is CPHEEO manual:

- i. Arithmetical Increase Method
- ii. Geometrical Increase Method
- iii. Incremental Increase Method
- iv. Semi Log Method

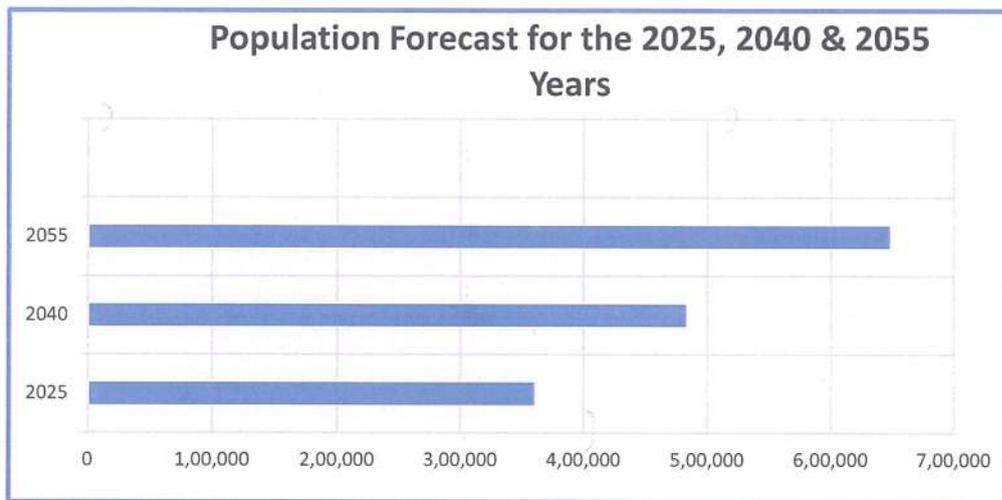
The population of 2011 census for DURG city is 268806, which was 232517 in the year 2001. The socio-economic status of Durg is above average and the Government is also very keen for the upliftment of economically weaker section.

Future population is then determined for the Base (2025), Intermediate (2040) & Ultimate (2055) years and Sewage Generated for the same is calculated by considering 80% of Total Water Demands per CPHEEO Guidelines. The Summary of the final population forecast adopted is mentioned as follows: -

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Table 3-1 : Final Population Forecast adopted for the scheme

Description	Project Horizon	Projected Population
Base Year	2025	360049
Intermediate Year	2040	482895
Ultimate Year	2055	647835




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Table 3-2 : Ward Wise Population Forecast

Ward No.	Ward Name	Population	Projected Population		
		2011	2025	2040	2055
1.	Naya Para	7547	10109	13558	18189
2.	Rajiv Nagar	4923	6594	8844	11865
3.	Mathpara (Dakshin)	4161	5573	7475	10028
4.	Mathpara (Uttar)	3136	4200	5634	7558
5.	Mararpara	4018	5382	7218	9684
6.	Thetwara	2919	3910	5244	7035
7.	Killa mandir	3417	4577	6138	8235
8.	Takiaya Para	5091	6819	9146	12270
9.	Swami Vivekanand Ward	4595	6155	8255	11074
10.	Shankar Nagar (Paschim)	4746	6357	8526	11438
11.	Shankar Nagar (Purva)	4525	6061	8129	10905
12.	Mohan nagar (Paschim)	4486	6009	8059	10812
13.	Mohan nagar (Purva)	4459	5973	8010	10746
14.	Sikola Bhata	4192	5615	7531	10103
15.	Sikola Basti Dakshin	4645	6222	8345	11195
16.	Sikola Basti Uttar	6078	8141	10919	14648
17.	Aoudhyogiknagar Uttar	4891	6551	8786	11788
18.	Aoudhyogiknagar	6089	8156	10939	14675
19.	Shahid bhagat Sing	6599	8839	11855	15904
20.	Shahid bhagat Sing Uttar	3003	4022	5395	7237
21.	Titurdih	5352	7169	9615	12899
22.	Station Para	3581	4796	6433	8630
23.	Dipak Nagar	4165	5579	7482	10038
24.	Aamdi Mandir	4582	6137	8231	11043
25.	Gayatri Mandir	3390	4541	6090	8170
26.	Samtra Wadi	4002	5360	7189	9645
27.	Polasy para	4118	5516	7398	9925
28.	Panchari Para	3481	4663	6253	8389
29.	Aspatal Ward	2581	3457	4637	6220
30.	Tamer Para	2747	3679	4935	6620
31.	Aapa pura	2918	3908	5242	7033
32.	Bramhan para	3915	5244	7033	9435
33.	chandi Mandir	3873	5188	6958	9334
34.	Shivpara	4252	5695	7638	10248
35.	Ramdeo Mandir	4872	6526	8752	11742
36.	Ganji Para	3143	4210	5646	7575
37.	Aazad ward	3446	4616	6191	8305

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Ward No.	Ward Name	Population	Projected Population		
		2011	2025	2040	2055
38	milpare	4623	6192	8305	11142
39	kchahari Ward	6805	9115	12225	16400
40	Surana college	4168	5583	7488	10045
41	Kela badi	5497	7363	9875	13248
42	Kasrdih Paschim	6593	8831	11844	15889
43	Kasrdih Purv	4683	6273	8413	11286
44	Baba gurughasiwai	4337	5809	7791	10452
45	Padmanabhpur Paschim	4051	5426	7277	9763
46	Padmanabhpur Purv	4921	6591	8840	11860
47	Civil Line Uttar	4658	6239	8368	11226
48	Civil Line Dakshin	5059	6776	9088	12192
49	Borsi Paschim	3931	5265	7062	9474
50	Borsi Purv	3885	5204	6979	9363
51	Borsi Uttar	3826	5125	6873	9221
52	Borsi Dakshin	4794	6421	8612	11554
53	Potiya kala Uttar	5251	7033	9433	12655
54	Potiya kala Dakshin	7187	9626	12911	17321
55	Pulgaon	3614	4841	6492	8710
56	Baghera	5049	6763	9070	12168
57	Urala Paschim	4046	5419	7268	9751
58	Urala Purv	4194	5618	7534	10108
59	Katulbod Purv	5498	7364	9877	13250
60	Katulbod Paschim	4198	5623	7541	10117
	TOTAL	268806	360049	482895	647835

Accordingly, based on the population obtained for the years 2025,2040 & 2055 the total Water demand was estimated considering domestic & Institutional, firefighting and UA Flow demand which were used during the design of the Durg Water Supply Scheme. After that, the Sewage Generation/Dry Weather flow is estimated by taking 80% of the Total Water Demand as mentioned in the CPHEEO Guidelines. The details are mentioned in the **Table No. 3.3** as shown below: -

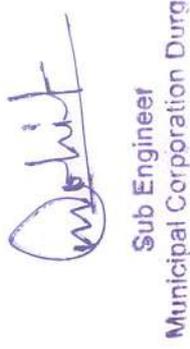
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Table 3-3: Ward Wise Population Forecast & Water Demand Calculations

S. N.	Ward No.	Ward	Population		Demand at Consumer End @ 135 LPCD (in MLD)			Fire Fighting Demand (in MLD)					Total Demand (in MLD)			Demand With 15% Losses (in MLD)			Flow for Ultimate Demand (in LPS)	Total Sewage output 80% of water demand (in MLD)		
			2011	2025	2040	2055	2025	2040	2055	202	204	205	2025	2040	2055	2025	2040	2055		2025	2040	2055
ZONE 1. SHANKAR NALA																						
1	1	Naya Para	7547	10109	13558	18189	1.360	1.830	2.460	0.10	0.12	0.14	1.466	1.953	2.602	1.725	2.297	2.703	31.2819	1.380	1.838	2.163
2	2	Rajiv Nagar	4923	6594	8844	11865	0.890	1.190	1.600	0.08	0.09	0.11	0.976	1.289	1.715	1.148	1.517	1.784	20.6512	0.919	1.214	1.428
3	3	Matpara (Dakshin)	4161	5573	7475	10028	0.750	1.010	1.350	0.07	0.09	0.10	0.829	1.101	1.456	0.975	1.295	1.524	17.6397	0.780	1.037	1.220
4	4	Matpara (Uttar)	3136	4200	5634	7558	0.570	0.760	1.020	0.06	0.07	0.09	0.638	0.839	1.112	0.751	0.987	1.161	13.4423	0.601	0.790	0.930
5	5	Maranpara	4018	5382	7218	9684	0.730	0.970	1.310	0.07	0.09	0.10	0.807	1.060	1.414	0.950	1.247	1.467	16.9736	0.760	0.998	1.174
6	6	Thetwara	2919	3910	5244	7035	0.530	0.710	0.950	0.06	0.07	0.08	0.596	0.786	1.038	0.701	0.925	1.088	12.5967	0.561	0.741	0.871
7	7	Killa mandir	3417	4577	6138	8235	0.620	0.830	1.110	0.07	0.08	0.09	0.691	0.913	1.206	0.813	1.074	1.263	14.6192	0.651	0.859	1.011
8	8	Takiaya Para	5091	6819	9146	12270	0.920	1.230	1.660	0.08	0.10	0.11	1.007	1.331	1.777	1.185	1.566	1.842	21.3189	0.948	1.253	1.474
9	9	Swami Vivekanand Ward	4595	6155	8255	11074	0.830	1.110	1.490	0.08	0.09	0.11	0.913	1.206	1.601	1.074	1.419	1.669	19.3159	0.860	1.135	1.336
10	10	Shankar Nagar (Paschim)	4746	6357	8526	11438	0.860	1.150	1.540	0.08	0.09	0.11	0.944	1.247	1.653	1.111	1.467	1.726	19.9816	0.889	1.174	1.382
11	11	Shankar Nagar (Purva)	4525	6061	8129	10905	0.820	1.100	1.470	0.08	0.09	0.11	0.902	1.195	1.580	1.061	1.406	1.654	19.1439	0.850	1.125	1.324
12	12	Mohan nagar (Paschim)	4486	6009	8059	10812	0.810	1.090	1.460	0.08	0.09	0.11	0.892	1.185	1.570	1.049	1.394	1.640	18.9772	0.840	1.115	1.312
13	13	Mohan nagar (Purva)	4459	5973	8010	10746	0.810	1.080	1.450	0.08	0.09	0.10	0.891	1.174	1.559	1.049	1.382	1.625	18.8124	0.840	1.106	1.301


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14	14	Sikola Bhata	4192	5615	7531	10103	0.760	1.020	1.360	0.07	0.09	0.10	0.839	1.111	1.466	0.987	1.308	1.538	17.8053	0.790	1.047	1.231
15	15	Sikola Basti Dakshin	4645	6222	8345	11195	0.840	1.130	1.510	0.08	0.09	0.11	0.923	1.226	1.622	1.086	1.443	1.697	19.6446	0.869	1.155	1.358
16	16	Sikola Basti Uttar	6078	8141	10919	14648	1.100	1.470	1.980	0.09	0.11	0.12	1.195	1.580	2.108	1.406	1.859	2.187	25.3132	1.125	1.488	1.750
17	17	Aoudhyogik nagar Uttar	4891	6551	8786	11788	0.880	1.190	1.590	0.08	0.09	0.11	0.965	1.289	1.704	1.136	1.516	1.784	20.6460	0.909	1.213	1.428
18	18	Aoudhyogik nagar Dakshin	6089	8156	10939	14675	1.100	1.480	1.980	0.09	0.11	0.12	1.195	1.590	2.108	1.406	1.871	2.201	25.4750	1.125	1.497	1.761
19	19	Shahid bhagat Sing Dakshin	6599	8839	11855	15904	1.190	1.600	2.150	0.09	0.11	0.13	1.289	1.715	2.283	1.517	2.017	2.373	27.4698	1.214	1.614	1.899
20	20	Shahid bhagat Sing Uttar	3003	4022	5395	7237	0.540	0.730	0.980	0.06	0.07	0.09	0.607	0.807	1.070	0.714	0.950	1.118	12.9346	0.572	0.760	0.895
21	21	Titur dih	5352	7169	9615	12899	0.970	1.300	1.740	0.08	0.10	0.12	1.059	1.403	1.860	1.246	1.651	1.942	22.4812	0.997	1.321	1.554
22	22	Station Para	3581	4796	6433	8630	0.650	0.870	1.170	0.07	0.08	0.09	0.723	0.955	1.268	0.851	1.123	1.321	15.2914	0.681	0.899	1.057
23	23	Dipak Nagar	4165	5579	7482	10038	0.750	1.010	1.360	0.07	0.09	0.10	0.829	1.101	1.466	0.975	1.296	1.524	17.6403	0.780	1.037	1.220
25	25	Gayatri Mandir	3390	4541	6090	8170	0.610	0.820	1.100	0.07	0.08	0.09	0.681	0.902	1.195	0.801	1.061	1.249	14.4538	0.641	0.850	1.000
26	26	Samtra Wadi	4002	5360	7189	9645	0.720	0.970	1.300	0.07	0.08	0.10	0.797	1.059	1.404	0.938	1.246	1.466	16.9707	0.751	0.998	1.174
32	32	Bramhan para	3915	5244	7033	9435	0.710	0.950	1.270	0.07	0.08	0.10	0.786	1.038	1.372	0.925	1.222	1.437	16.6347	0.741	0.978	1.150
33	33	chandi Mandir	3873	5188	6958	9334	0.700	0.940	1.260	0.07	0.08	0.10	0.776	1.028	1.362	0.913	1.209	1.423	16.4669	0.731	0.968	1.139
34	34	Shivpara	4252	5695	7638	10248	0.770	1.030	1.380	0.08	0.09	0.10	0.850	1.122	1.487	0.999	1.320	1.553	17.9759	0.800	1.057	1.243
37	37	Civil Line Uttar	4658	6239	8368	11226	0.840	1.130	1.520	0.08	0.09	0.11	0.923	1.226	1.632	1.086	1.443	1.697	19.6467	0.869	1.155	1.358
39	39	Baghera	5049	6763	9070	12168	0.910	1.220	1.640	0.08	0.10	0.11	0.997	1.320	1.756	1.173	1.553	1.828	21.1520	0.939	1.243	1.463
40	40	Urala Paschim	4046	5419	7268	9751	0.730	0.980	1.320	0.07	0.09	0.10	0.808	1.070	1.424	0.950	1.259	1.481	17.1387	0.761	1.007	1.185

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41	58	Urala Purv	4194	5618	7534	10108	0.760	1.020	1.360	0.07	0.09	0.10	0.839	1.111	1.466	0.987	1.308	1.538	17.8056	0.790	1.047	1.231
42	59	Katulbod Purv	5498	7364	9877	13250	0.990	1.330	1.790	0.09	0.10	0.12	1.080	1.435	1.911	1.271	1.688	1.986	22.9841	1.017	1.351	1.589
43	60	Katulbod Paschim	4198	5623	7541	10117	0.760	1.020	1.370	0.07	0.09	0.10	0.839	1.112	1.476	0.987	1.308	1.538	17.8063	0.790	1.047	1.231
Ground water extraction contributing to sewage as per flow measurement (base year) & estimated for ultimate and intermediate																						
Other Factors : Contribution of HUDCO area of Bhalai																						
			15369	20586	27610	37040									35.9	47.6	56.0		36.8	46.6	53.9	
			3	3	2	8									4	3	3		2	8	3	
ZONE 2 PULGAON NALA																						
24	24	Aamdi Mandir	4582	6137	8231	11043	0.830	1.110	1.490	0.08	0.09	0.11	0.913	1.206	1.601	1.074	1.418	1.669	19.3137	0.86	1.13	1.33
27	27	Polasy para	4118	5516	7398	9925	0.740	1.000	1.340	0.07	0.09	0.10	0.818	1.091	1.445	0.963	1.283	1.510	17.4719	0.77	1.03	1.21
28	28	Panchari Para	3481	4663	6253	8389	0.630	0.840	1.130	0.07	0.08	0.09	0.702	0.923	1.227	0.826	1.086	1.278	14.7917	0.66	0.87	1.02
29	29	Aspatal Ward	2581	3457	4637	6220	0.470	0.630	0.840	0.06	0.07	0.08	0.532	0.702	0.923	0.626	0.826	0.971	11.2422	0.50	0.66	0.78
30	30	Tamer Para	2747	3679	4935	6620	0.500	0.670	0.890	0.06	0.07	0.08	0.564	0.744	0.976	0.663	0.875	1.030	11.9193	0.53	0.70	0.82
31	31	Aapa pura	2918	3908	5242	7033	0.530	0.710	0.950	0.06	0.07	0.08	0.596	0.786	1.038	0.701	0.925	1.088	12.5965	0.56	0.74	0.87
35	35	Ramdeo Mandir	4872	6526	8752	11742	0.880	1.180	1.590	0.08	0.09	0.11	0.965	1.279	1.704	1.135	1.504	1.770	20.4828	0.91	1.20	1.42
36	36	Ganji Para	3143	4210	5646	7575	0.570	0.760	1.020	0.06	0.07	0.09	0.638	0.839	1.112	0.751	0.987	1.162	13.4437	0.60	0.79	0.93
44	37	Aazad ward	3446	4616	6191	8305	0.620	0.840	1.120	0.07	0.08	0.09	0.692	0.923	1.216	0.814	1.086	1.277	14.7851	0.65	0.87	1.02
45	38	milipare	4623	6192	8305	11142	0.840	1.120	1.500	0.08	0.09	0.11	0.923	1.216	1.611	1.086	1.431	1.683	19.4807	0.87	1.14	1.35
46	39	kchahari Ward	6805	9115	12225	16400	1.230	1.650	2.210	0.10	0.11	0.13	1.331	1.767	2.345	1.565	2.078	2.445	28.2992	1.25	1.66	1.96
47	40	Surana college	4168	5583	7488	10045	0.750	1.010	1.360	0.07	0.09	0.10	0.829	1.101	1.466	0.975	1.296	1.524	17.6409	0.78	1.04	1.22
48	41	Kela badi	5497	7363	9875	13248	0.990	1.330	1.790	0.09	0.10	0.12	1.080	1.435	1.911	1.271	1.688	1.986	22.9840	1.02	1.35	1.59

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49	42	Kasrdih Paschim	6593	8831	11844	15889	1.190	1.600	2.150	0.09	0.11	0.13	1.289	1.715	2.283	1.517	2.017	2.373	27.4689	1.21	1.61	1.90
50	43	Kasrdih Purv	4683	6273	8413	11286	0.850	1.140	1.520	0.08	0.09	0.11	0.933	1.237	1.632	1.098	1.455	1.712	19.8111	0.88	1.16	1.37
51	44	Baba gurughasi wal	4337	5809	7791	10452	0.780	1.050	1.410	0.08	0.09	0.10	0.860	1.143	1.518	1.012	1.345	1.582	18.3110	0.81	1.08	1.27
52	45	Padmanabhpur Paschim	4051	5426	7277	9763	0.730	0.980	1.320	0.07	0.09	0.10	0.808	1.070	1.424	0.950	1.259	1.481	17.1396	0.76	1.01	1.18
53	46	Padmanabhpur Purv	4921	6591	8840	11860	0.890	1.190	1.600	0.08	0.09	0.11	0.976	1.289	1.715	1.148	1.517	1.784	20.6509	0.92	1.21	1.43
38	48	Civil Line Dakshin	5059	6776	9088	12192	0.910	1.230	1.650	0.08	0.10	0.11	0.997	1.330	1.766	1.173	1.565	1.842	21.3138	0.94	1.25	1.47
54	49	Borsi Paschim	3931	5265	7062	9474	0.710	0.950	1.280	0.07	0.08	0.10	0.786	1.039	1.383	0.925	1.222	1.437	16.6376	0.74	0.98	1.15
55	50	Borsi Purv	3885	5204	6979	9363	0.700	0.940	1.260	0.07	0.08	0.10	0.776	1.028	1.362	0.913	1.209	1.423	16.4690	0.73	0.97	1.14
56	51	Borsi Uttar	3826	5125	6873	9221	0.690	0.930	1.240	0.07	0.08	0.10	0.765	1.017	1.341	0.901	1.197	1.408	16.2981	0.72	0.96	1.13
57	52	Borsi Dakshin	4794	6421	8612	11554	0.870	1.160	1.560	0.08	0.09	0.11	0.954	1.258	1.673	1.123	1.480	1.741	20.1497	0.90	1.18	1.39
58	53	Potiya kala Uttar	5251	7033	9433	12655	0.950	1.270	1.710	0.08	0.10	0.11	1.038	1.372	1.829	1.222	1.615	1.899	21.9848	0.98	1.29	1.52
59	54	Potiya kala Dakshin	7187	9626	12911	17321	1.300	1.740	2.340	0.10	0.12	0.13	1.403	1.860	2.479	1.651	2.188	2.574	29.7926	1.32	1.75	2.06
60	55	Pulgaon	3614	4841	6492	8710	0.650	0.880	1.180	0.07	0.08	0.09	0.723	0.965	1.278	0.851	1.135	1.336	15.4577	0.68	0.91	1.07
Ground water extraction contributing to sewage as per flow measurement (base year) & estimated for ultimate and intermediate																						
Other Factors																						
		Total Zone-2	115113	154186	206793	277427										26.93	35.69	41.98		22.48	29.72	35.00
		Grand Total	268806	360049	482895	647835	48.580	65.180	87.450	4.866	5.635	6.527	53.446	70.815	93.977	62.878	83.312	98.014		59.303	76.397	88.921

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4. NALLAH NETWORK & CATCHMENTS

a. Catchment Characteristics

The character of population development is both urban and rural in nature. The matured and developed areas continue to experience natural growth in the Northern direction. Land use includes a broad range of uses: Residential, Industrial, Institutional, Commercial, and some new unplanned areas.

The general terrain of the Drain corridors and the sub-drain catchments lie in the lower elevations as shown by the green colour representation in the Map while at the centre of the city has a higher elevation as shown by the red colour in this flood map.

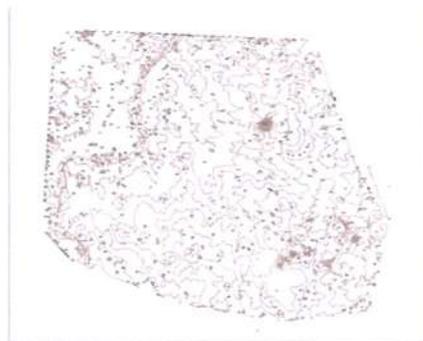
Figure 4:1 : Durg Flood Map



b. Dry Weather Flow

As per the CPHEEO Manual, Dry weather flow is taken as 80% of the Total Sewage Generation of Total Water Demand calculated which is obtained from the relevant methods of population forecasting as discussed in the previous chapter.

Figure 4:2 : Durg Contour Map



5. DESIGN CRITERIA

a. Period

The system is designed for 30 years. For this project, 2025 will be the base year and 2055 will be the ultimate year.

Table 5-1 : DESIGN PERIOD

Sl. No	Design Component	Design Period (Years)	Reason
1	Land Acquisition for STP, sewers etc.	30	Land acquisition in future difficult
2	Sewer network (laterals, Trunk mains, Outfall etc.	30	Replacement difficult and costly
3	Pumping mains	30	Cost may be economical
4	Pumping Stations-Civil Work	30	
5	Pumping Machinery	15	Life of pumping machinery is 15 years
6	Sewage Treatment Plants	15	The construction shall be modular in phased manner as actual population less than design population and in Indian cities initially flows are much less due to connectivity problems.
7	Effluent disposal and utilization	30	Provision of design capacities in the initial stages itself is economical

b. Design parameters

❖ Design Flow

Design flow will be waste water that is expected to be generated in 2055.
Expected flow= 135 (water supply per lpcd) X 0.8 litres per capita.

❖ Infiltration

As per CPHEEO manual minimum infiltration is considered as 250 litres per manhole to 500 litres per manhole. In this project infiltration is considered as 250 litres/manhole/day (Approx 5 % of the peak flow).

❖ **Design Depth of Flow**

As per manual all sewers are designed to run 0.8D at peak discharge where 'D' is the internal diameter of sewer.

❖ **Nomenclature Adopted for Numbering the Sewer Network**

The trunk sewer is identified as the longest line in the network. The other sewers joining the trunk sewer are termed as main sewers. Further classification of sewers includes sub mains, branches, laterals etc. The nomenclature for the designation of manholes is as per the CPHEEO Norms with minimum of deviations.

❖ **Manholes**

The design of manholes depends upon the depth and the diameter of the sewer. Manholes are provided at the junction of sewers, deviations in alignment, change in the dia. of sewer, change in gradient or slope, straight reaches depending upon the size of sewers and at regular intervals to facilitate system maintenance. The maximum spacing between manholes is adopted as about 30 m. For Trunk Main manhole spacing should be as per IS Code 4111. Typical manhole cover and frame would be in steel fibre Reinforced Concrete (SFRC).

Spacing between manholes depends on sewer size.

❖ **Sewer Size and Manhole Spacing is mentioned in the table below.**

Sewer size	Manhole spacing
Sewer < 900 mm	Maximum 30 m
900 – 1,500mm	90 – 150 m
1,600 – 2,000 mm	150 – 200 m
> 2,000 mm	Up to 300 m

❖ **Size & Shape of manhole**

Manholes are generally circular, square or rectangular in shape. The inside dimension should be adequate to permit inspection and cleaning operation without any difficulty.

❖ Property Sewer Connection

As the Project is based on interception and divergent of Nallahs conveying sewage to Shivnath river hence property sewer connection is not considered.

❖ Hydraulic Computations

The Hazen-Williams formula is expressed as

$$V = 0.849 C r^{0.63} S^{0.54}$$

For circular conduits, the expression becomes

$$V = 4.567 \times 10^{-3} C d^{0.63} S^{0.54}, \text{ And}$$

$$Q = 1.292 \times 10^{-5} C d^{2.63} S^{0.54}$$

Where,

Q = Discharge in cubic meter per hour,

D = diameter of pipe in mm

V = velocity in m/s.,

R = hydraulic radius in m

S = Slope of hydraulic grade line and,

C = Hazen-William's coefficient

6. Peak Factor

The per capita rate of the water supply indicates only the average consumption of sewer per day per person over a period of one year. In the design of the sewerage system, it is to be organized that consumption varies with the season, month, day and hour. As far as design of distribution system is concerned, it is the hourly variation in consumption that matters. The fluctuating in consumption is accounted for, by considering peak rate of consumption (which is equal to average rate x a Peak Factor) as the rate of flow in the design of distribution system.

The variation in the demand will be more pronounced in the case of smaller population and will gradually even out with the increase in population. This is so because in a large population different habits and customs of several groups tend to minimize the variation in demand pattern.

The following peak factors are recommended for various population figures:

Table 5-2: Peak factor to be adopted as per Population range

Population range	Peak Factor
Up to 20,000	3.00
20,000 – 50,000	2.50
50,000 – 800,000	2.25
Above 800,000	2.00

**Please Note that: - Detailed design criteria are mentioned in the estimates & design section of with computations and acceptance criteria.*

7. WATER SAMPLE COLLECTION & FLOW MEASUREMENT STUDIES

a. Water Sample Collection:

The work was carried out by M/s. **Puranik Brothers Consulting Engineers, Nagpur** and their Associates in order to identify the parameters of the sample collected. Accordingly, the Samples were collected from the locations mentioned in Table 5.1.

The samples are put for Chemical & Bacteriological tests in Laboratory, and the testing of samples are accordingly completed and the results of the same are attached **at the end of the report.**

Table 7-1 : Location of Water Samples taken

S.N.	Location	Coordinates	Parameters to be tested
1	Near pulgaon Bridge	21°10'37.66"N 81°15'51.59"E	NH3-N(mg/l); BOD(mg/l); COD(mg/l); Cl(mg/l);
2	Near Kotni Bridge	21°12'42.69"N 81°15'48.74"E	DO (mg/l); O&G (mg/l); Alkalinity(mg/l); pH; SO ₄ (mg/l); TSS(mg/l); TDS(mg/l); Kjeldahl Nitrogen

b. Flow Measurement Studies:

The study of the Durg Municipal Project Area revealed that Individual residents and colonies discharges from their respective residential, commercial units to Septic Tanks and community collection units and in turn disposes in network of Lined Drains in whole of city which ultimately discharges in the Pulgaon Nalla & Shankar Nalla of Durg. So, the Flow in the Nallah at starting point of the Project area is seen flowing ample water. So, the Flow in Nallah is far more obviously higher than discharged by the Durg City Project Areas. So, the Measurement of flow is of paramount important for flow estimation for ascertaining Capacity of Sewage to be treated. Moreover, many distribution leakages were found in nearby areas flowing unaccounted in the lined drains much above the theoretical calculations. This wastage may be 25% to 30 % in total.

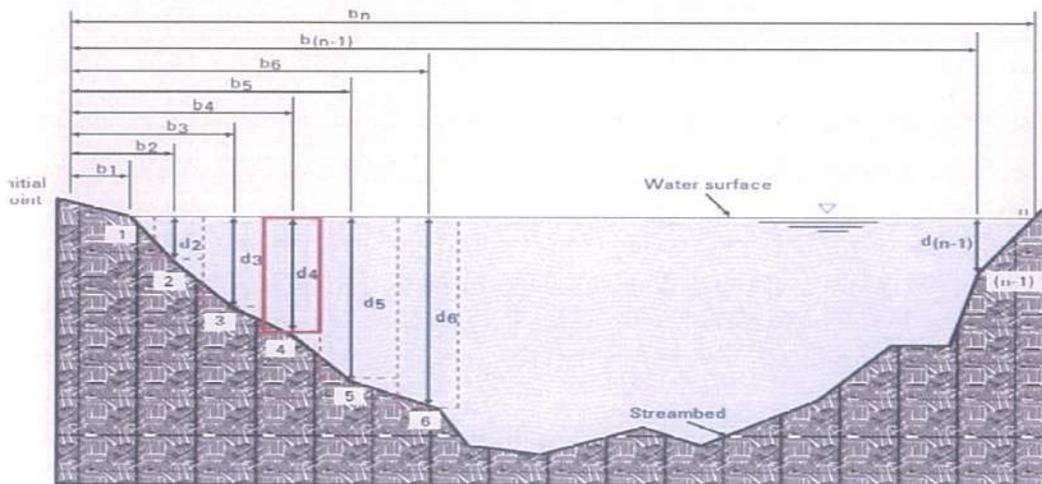
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The sewage discharge in Pulgaon Nallah is calculated as 30 MLD and in Shankar Nallah 47MLD.

Flow measurement studies were carried out for a period of 24 hrs with the help of current velocity meter (**Vertical Axis- 6 Cups/Buckets**). A total of 25 m flow stretch for Pulgaon Nala was **taken for carrying flow measurements at an interval of 2 meters width along Nallah**. The following is the Step-by-Step process carried out for knowing the discharge of the nallah under consideration: -

1. Firstly, 24-hr cycle was divided into 2 hrs interval so that lean, peak and intermediate sewage generated will be recorded. Also, the instrument was standardized by taking a trial reading before commencing the flow measurements.
2. Then, for a particular time interval (**say from 6 am to 8 am**),i.e. at every 2 m width distance from the Starting point at the edge of the Nallah, Depth (D) measured and rotation of Cups were automatically recorded in Display unit of the device for a period of 60 seconds and the Velocity for that particular section at 0.6 D which is the average velocity of the section were until 22 m total width covered.(**Site Photographs are mentioned in Appendix- II**)
3. Similarly, this process was repeated for 12 sets of time intervals. (**Hourly Measurement are mentioned in Appendix- I**)
4. After that, the Discharge of the Nallah was calculated by using **Velocity- Area Method**. **The results were calibrated and is indicated in Table 5.2.**

Figure 7:1 : Sample Explanation of Flow Measurements performed



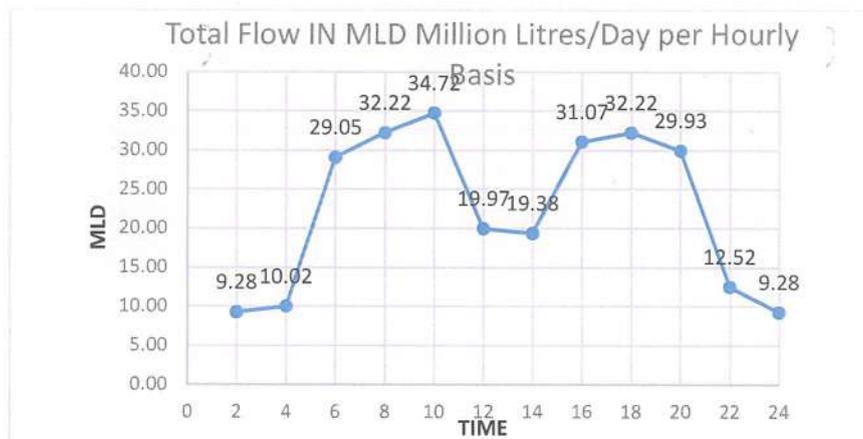
The Summary of the flow measurements is mentioned in the **Table 5.2**as shown below: -

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Table 7-2 : Summary of Flow Measurements

SR.NO	LOCATION	Time	Average Velocity	Average Velocity	Total Sectional Area= (W XD)	Q=V X A (m3/hr)	m3/Hr to L/Day	Total Flow IN MLD
		Hours	m/sec	m/hr	Sqmtrs			Million Litres/Day
1	PULGAON NALA	2	0.05	170.70	2.27	386.64	9279252.00	9.28
2		4	0.05	170.70	2.45	417.36	10016676.00	10.02
3		6	0.15	549.00	2.21	1210.55	29053080.00	29.05
4		8	0.15	549.00	2.45	1342.31	32215320.00	32.22
5		10	0.15	549.00	2.64	1446.62	34718760.00	34.72
6		12	0.11	405.00	2.06	832.28	19974600.00	19.97
7		14	0.11	393.00	2.06	807.62	19382760.00	19.38
8		16	0.16	564.00	2.30	1294.38	31065120.00	31.07
9		18	0.15	549.00	2.45	1342.31	32215320.00	32.22
10		20	0.14	510.00	2.45	1246.95	29926800.00	29.93
11		22	0.06	230.40	2.27	521.86	12524544.00	12.52
12		24	0.05	170.70	2.27	386.64	9279252.00	9.28
								22.47

Figure 7:2 : Hourly Variation of Sewage Generation (Flow Measurement Data)



Theoretically and as per CPHEEO manual about 80% of water consumed contributes to sewage production i.e., 19. It was observed that: -

- Nallah being unlined and at many places the slope is very less because of encroachments and illegal diversions made in the nallah streams.
- Accumulation of sewage is taking place at many places thus contaminating the ground water source.

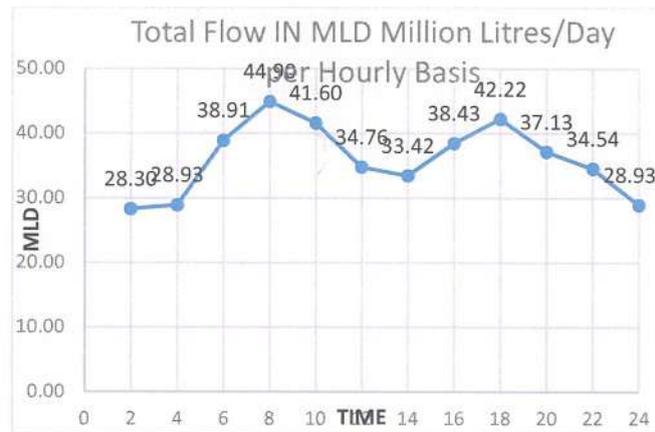

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SR.NO	LOCATION	Time	Average Velocity	Average Velocity	Total Sectional Area= (W XD)	Q=V X A (m3/hr)	m3/Hr to L/Day	Total Flow IN MLD
		Hours	m/sec	m/hr	Sqmtrs			Million Litres/Day
1	SHANKAR NALA	2	0.18	644.40	1.83	1179.25	28302048.00	28.30
2		4	0.18	658.80	1.83	1205.60	28934496.00	28.93
3		6	0.23	820.80	1.98	1621.08	38905920.00	38.91
4		8	0.24	878.40	2.13	1870.99	44903808.00	44.90
5		10	0.24	849.60	2.04	1733.18	41596416.00	41.60
6		12	0.22	787.20	1.84	1448.45	34762752.00	34.76
7		14	0.22	782.40	1.78	1392.67	33424128.00	33.42
8		16	0.22	808.80	1.98	1601.42	38434176.00	38.43
9		18	0.23	837.60	2.10	1758.96	42215040.00	42.22
10		20	0.22	801.60	1.93	1547.09	37130112.00	37.13
11		22	0.22	780.00	1.85	1439.10	34538400.00	34.54
12		24	0.18	658.80	1.83	1205.60	28934496.00	28.93
								36.01



Ground water contribution is added to sewage for (base year) and estimated for intermediate and ultimate as per flow measurement while calculating discharge. Sewage discharge from ward no. 70 i.e Hudco Colony in Bhilai comes to Shankar nala, in Durg, hence added while calculating total discharge.

Important Note: -Keeping in the view of the above points mentioned in the previous chapters, it can be observed that the Sewage Generated as per the population forecasted for the year 2040 for Shankar Nallah is 47 MLD approximately and the discharge calculated for the Pulgaon nallah by flow measurement data is 30 MLD approximately.


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8. DESIGN PHILOSOPHY

a. General: -

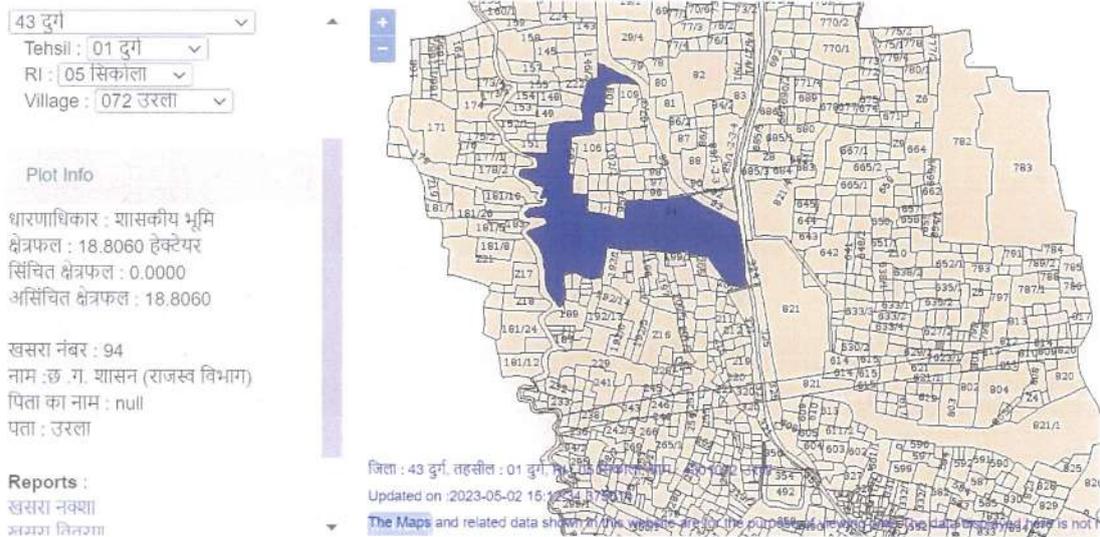
The selection of sites for location of various components are based by priority on the following order of ownership:

- DMC land or Revenue Land
- Govt. Control land

The design philosophies for the various project components are provided below.

It is pertinent to mention that, a location is proposed where Inlet Chamber can be established at Khasra Nos: - 94 and 143 as shown in the Cadastral Map or Bhu Naksha of District Durg:

Figure 7:3 : Cadastral Map of Dist. Durg



b. Diversion weirs cum Intercepting chambers and ancillary structures: -

Intercepting chambers and ancillary structures have been designed with the following philosophies being considered:

- a. Interception chambers and related structures have been sited near the Bank of the Nallah near Kotni and Pulgaon in shankar nallah and pulgaon nallah respectively.
- b. Drainage over & above the Dry Weather Flow is not considered while designing of interception chambers and related structures
- c. Allow for adjustable (through Sluice Gate) weirs at the outfalls of the sub-drains for flexible operations.
- d. Intercepting chambers have been designed to remove majority of grit.
- e. Allowance for trapping and removal of solids and floatable should be available for all interception methods
- f. Minimum power requirements should be required at interception points
- g. Allowance for simple, easily maintainable structures and equipment.
- h. Allowance for operations, access and maintenance of the Nallah especially at the intercepting/trapping points have been made.
- i. Overflows have been allowed for at the interception points
- j. Easily adjustable inlet structure opening by Sluice Gate have been considered for the philosophy.

Structures connecting intercepting chambers and interceptor sewers such as drop shafts and vortex drops have been designed to minimize turbulence. Corrosion protection linings have been considered for these structures.

c. Pumping Station & Rising Mains: -

Pumping stations and rising main will be designed with the following philosophies being considered:

- a. Possibility of installing cutter pumps which will make the paste of all the solid ingredients shall be checked.
- b. Consideration for future sewer connections to pump stations has been made in the depths of the pump stations.
- c. Rising mains and pumps have been designed considering the capacities required to pump flows to the Inlet of each STP.
- d. Pump station infrastructure have been designed to accommodate flow of year 2040. However, the pumping equipment to be included within project to be installed and commissioned initially shall be sized to accommodate the flows of year 2025 as well.
- e. Submersible Type of pumps for Low Flow applications & Dry-Well/Wet-Well pumps for High Flow locations.
- f. Components designed and sized for efficient operation.
- g. Cost effective equipment sizing – right sized pumps.
- h. Balance the cost of purchase & construction against cost of operation & maintenance.
- i. Design methodology based on current, appropriate, and available standards and practices.
- j. Standardized equipment has been considered.
- k. Provide unobstructed access for O&M.
- l. Provide simple, easily maintained structure & equipment.

****Please Note that: -*

The design period for interceptor sewer, and weirs are considered as 30 years. The design period for Pumps, sewage treatment plants are considered as 15 years as per the CPHEEO Manual, however it is ensured that the land for future capacity installations is acquired by BMC by now itself.

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d. Site selection: -

2 locations were selected for Proposing 47 MLD STP and 30 MLD STP with SBR Technology: -

43 दुर्ग
Tehsil : 01 दुर्ग
RI : 05 सिक्कला
Village : 072 उरला

Plot Info
धारणाधिकार : शासकीय भूमि
क्षेत्रफल : 18.8060 हेक्टर
सिंचित क्षेत्रफल : 0.0000
असिंचित क्षेत्रफल : 18.8060

खसरा नंबर : 94
नाम : छ. ग. शासन (राजस्व विभाग)
पिता का नाम : null
पता : उरला

Reports :
खसरा नक्शा
202221 किरा211

जिला : 43 दुर्ग, तहसील : 01 दुर्ग, सिक्कला
Updated on : 2023-05-02 15:00:00
The Maps and related data shown in this website are for reference only. Land use and other details are not to be taken as final.

1. **Khasra No 94 for STP at Shankar Nala:** - This site was located near to urla village. And this site is suitable for STP.

Khasra No.349,348,378,375/1,524/4 98: - Khasara No.349,348,378,375/1,524/4 98 village Pulgaon. Govt. land of 1.03 Hect is available and shall be sufficient for STP Considering the higher capacity of plant, it is proposed to construct STP with SBR Technology. All mechanical, electrical components are considered in the estimate with automation and PLC-SC

9. PROJECT COMPONENTS

The Interceptor Sewer System is made up of the following components:

- a. Intercepting Chambers and ancillary structures. These are structures located at or near Nallah outfalls into River or prior to flowing towards River and includes the adjustable weir structures for trapping of Nallah flows, structures / mechanisms for trapping of solids, floatable and silt / grit, drop shafts and lateral connectors to connect the interception chamber into the interceptor sewers.
- b. Pump Station and Rising Mains

In addition, other essential components of the project which will be discussed here are Construction methods for the Interceptor Sewer and Operation & Maintenance for the Interceptor Sewer System.

a. Interceptor Chamber Structures: -

Screens:

Screens or racks are installed at the entrance of the intercepting chambers to trap flotsam and debris which have not been trapped by the first options have been considered; Static bar racks / screens and Mechanical bar screens.

a. Static Bar Screens:

Static trash racks and coarse screens can be used effectively for preliminary treatment because they capture a significant amount of aesthetically undesirable floating debris and trash contained in the wastewater. Removal efficiencies are tied closely to the design size of the racks, and can range from 25-90 percent of the total solids. Finer screens have higher removal efficiencies, but are more susceptible to clogging and tearing and may require maintenance very frequently. The effectiveness of screening units is reduced significantly by the presence of oil and grease in the flow and large quantities of rags and plastics. Small conventional bar racks often require manual cleaning with long handled rakes or pitch forks.

b. Mechanical Bar Screens:

Mechanically cleaned bar screens typically have a 0.64 to 2.54 centimetres clear spacing between bars. The bars are set 0 to 30 degrees from the vertical. Electrically driven rake mechanisms will either continuously or periodically remove material entrained on the bar screen itself.

A comparison between static and mechanical screens are provided in the table below: -

Table 7-3 : Comparison between Static & Mechanical Screens

Components	Static Screens	Mechanical Screens
Cost of equipment	Low. Screens can be locally fabricated based on fabrication drawings.	High. Mechanical screens are typically, as a single piece of equipment by vendors.
Labour intensiveness for operation and maintenance	High. Labour is required to constantly maintain the screens to prevent blinding and clogging.	Low Screens are mechanically cleaned and can be set to a pressure differential or Time frequency for cleaning.

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Components	Static Screens	Mechanical Screens
Serviceability requirements	Low	High.
	As this is not a mechanical equipment, no servicing of equipment is required.	Mechanical equipment Requires regular servicing. As screens are Typically supplied by vendors, vendor support is required which leads to higher maintenance costs.
Power requirements	Static screens are Manually operated. No power is required.	Power is required as Mechanical screens Require electrically Operated where Hydraulic pistons are used, power is required for the hydraulic pumps.
Security of equipment	Static screens are cast in place with the concrete Interceptor chamber structures. Risk of theft and sabotage is low.	Mechanical screens have Various mechanical and Electrical components. Mechanical screens may also not be constructed in a monolithically with the Chamber structure, leading to risk of theft and sabotage.

Static bar screens are recommended for project based on the following reasons:

- a. Equipment cost is low.
- b. Power requirements is low or non - existent.

There will be no requirements to carry out costly works for laying of power lines to these chamber locations, some of which will be located within rural areas.

Static screens can be secured.

Land availability dictates that intercepting chambers be located within Nallah beds or adjacent to Nallah beds, away from populated areas. In addition, some of these Nallahs are located in rural areas, presenting problems in policing and control. Equipment which has fewer movable parts and


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are able to be rigidly secured within concrete structures will minimize the risk of theft and sabotage.

Although labour intensiveness for operation and maintenance of static screens is considerably higher, mitigation measures can be put into place such as:

- a. Manually operated raking mechanisms can be designed and installed to ensure cleaning of the static screens can be done in a safe and efficient manner.
- b. Bar screens or racks can be installed with a pivot arm to allow it to be raised for ease of cleaning.

Based on the above reasons, static screens provide the most technical and cost feasible solution for ensuring that solids and floatable are trapped.

c. Grit Capture & Removal: -

Grit is the heavy suspended mineral matter present in wastewater (sand, gravel, rocks, cinders), which is usually removed in a rectangular horizontal-flow detention chamber or in the enlargement of a sewer channel. Detention reduces the velocity of the influent and permits separation of the heavier material by differential settling. Grit loading rates can vary dramatically from location to location. Since these loads are a combination of erosion and wastewater loads, there are likely to be significant on this project, and need to be managed and designed for with the new trapping facilities. 2 options have been considered for capture and removal of grit from the intercepted dry weather flows in the Nallahs; Grit Removal Channels and Vortex - type Grit Removal chambers.

a. Grit Removal Channels

Grit removal channels have been used successfully to capture sand, gravel and large debris from wastewater at treatment plants and on outfalls for over 100 years. Normally the grit channel is a wide spot in the pipe or at the head of a treatment unit that allows large particles to settle out. Typically, velocities in grit channels are less than 0.6 m/s and provisions are made to isolate and take one channel out of service for removal and disposal of the grit while the second channel is in service. This technology is simple but requires proper flow and velocity control in order to effectively remove grit and large debris from the wastewater. An adjustable weir or other flow device is located at the downstream end of the chamber to allow the head to vary through the structure and to isolate the structure for cleaning

b. Vortex – Type grit removal chambers

Vortex grit removal uses flow and velocity control to separate grit from the wastewater and putrescible substances. Grit slurry is sent to a hydro-cyclone and grit is separated from the underflow and discharged to a roll-off container or truck.

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A comparison between grit removal channels and vortex – type grit removal chambers are provided in the table below: -

Table 7-4 : Comparison between Grit Removal & Vortex Type Chambers

Components	Grit Removal Channels	Vortex – type grit removal chambers
Cost of equipment	Low.	High
	These are concrete structures which are simple to construct	Requires specific physical Attributes to work. Usually supplied as a single piece of equipment by vendors.
Ease of operation	High	Low
	The technology is simple, easy to operate and reliable.	Requires specific hydraulic conditions to achieve desired grit removal. Controls of these hydraulic conditions require specific technical expertise.
Labour intensiveness for operation and maintenance	Labour is required maintain the channels to prevent grit build up and ensure sufficient flow / detention time.	Labour is required to maintain the chamber
Land requirements	High.	Low.
	Requires larger footprint to achieve detention times for grit settlement	

Grit Removal channels are recommended for use in this project based on the following reasons:

- a. Cost of equipment is lower.
- b. Vortex – type removal chambers are typically supplied vendor supplied and require specific hydraulic parameters to work. This will likely drive-up equipment prices. Grit channels are concrete structures which can be constructed in situ using local resources.
- c. Ease of operation.

- d. Grit channels utilize simple concepts of detention time for grit settlement and are easy to operate.
- e. Applicability to site conditions.
- f. Nallahs outfalls into the main drains possess a variety of flow conditions. Grit channels can be used across different flow conditions with the use of adjustable weirs to control the flow velocities. With a wider margin of operation, it allows more flexibility by operators. Vortex grit removal require very specific physical dimensions in relation to the hydraulic design and require specific hydraulic conditions for grit to be removed. Based on the required hydraulic controls it is difficult to apply this technology to so many different physical site constraints present in the project area. Due to the potential for extreme ranges in peak grit loading rates observed in the sub drains, this technology will not be suitable as the preferred grit removal technology.

Based on the above reasons, grit channels provide the most technical and cost feasible solution for capture and removal of grit from the dry weather flows.

d. Adjustable Weir for Trapping of DWF (Dry Weather Flows):

Weirs are devices which divert DWF while allowing wet weather flows to continue outfalls from the Nallahs into the River. The weir system has been designed to be adjustable for the design target years. Various types shall be considered on this project, but follow the same basic principle of being adjustable depending on changing parameters.

e. Transfer via Vortex Drops, Drop Shafts Etc. To The Interceptor Sewer

Flow transfers from intercepting chambers to the interceptor sewer will be carried via vortex drops and drop shafts. These have been designed to minimize turbulence for the prevention of odour release and scouring of sewers.

f. Standardization Of Sizes For Intercepting Chambers And Ancillary Structures

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In order to prevent the design of custom structures on this project for each of sub drains, an attempt to standardize the configuration has been made. Sub drains have been classified based on the dry weather flow quantum as evaluated and the physical sizes of sub drains.

- a. Adjustable weirs for trapping of dry weather flows
- b. Solids/Floatable Booms
- c. Static Coarse Bar Screens
- d. Grit Removal Channels
- e. Higher Level of Monitoring

The recommended option uses two stages of solids / floatable control; skimming and floating booms capture floatable and bring them to the shoreline upstream of the adjustable weir structure. Static bar screens are located at each of the twin channel entrance to the grit chamber. Grit removal is accomplished by velocity-controlled grit chambers. Adjustable weirs are located downstream of the grit chamber as a control mechanism to ensure that velocities for settlement can be achieved. Overflows are then channelled to a sump before conveyance to the nearest interceptor sewer manhole via either a vortex drop or a drop chamber.

i. Pumping Stations and Rising Mains

This component includes the new sewerage pumping stations to be constructed and associated rising mains. In the design of the Interceptor Sewer System, pumping stations and rising mains have dual purposes: -

- a. Where distances between subsequent Nallahs are long and laying of an interceptor sewer will be unproductive, pumping stations and rising mains have been considered to minimize the depths of sewers which would otherwise have been required.
- b. Serve as terminal pump stations where all intercepted dry weather flows from the sub drains will be collected and pumped to the STP.

Wet Well Pumping Stations

Wet well with pumping stations have pumps and motors which are submerged in the influent. In this case, only a wet well is required.

Wet well type pumping stations are recommended for this project based on the following:

Smaller size of structure and related infrastructure resulting in lower construction costs.

Civil and structural costs constitute a major component in the total cost of a pumping station. This is especially so for proposed pumping stations for the Interceptor Sewer System where the depths of pump stations have to be deeper due to the depths of the Interceptor Sewers, constrained by Nallah invert levels as mentioned in earlier chapters. Using a wet well pumping station would result in savings on civil and structural costs as an additional deep shaft structure will not be required.

In summary the wet well type pumping station is a technically and economically feasible option and is hence recommended. Large capacity submersible pumps in wet well only pumping stations are also commonly used in India with O&M costs comparable to dry well type pumping stations.

j. Sewage Treatment Plant

The technology for STP is sequential batch reactor (SBR) technology which is having time tested track record of performance as well as efficiency of O & M. The rates in the PHE SOR have been adopted for estimation but as per the prevailing market rates; the cost per MLD of STP has been derived to arrive at the cost of STP in addition to the scope of components which are not considered in SOR such as wet well, SCADA & PLC, pumping machinery, land development and other items. The basic concept while framing the STP technology has been kept as lowest life cycle cost with optimisation of energy charges as well as chemicals as per the variable loadings of incoming sewage.

The Comparative study carried out at national level which is published in CPHEEO manual is cited in the following pages as below.

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Table 7-5 : Comparison of Treatment Costs of Various Technologies for Sewage Treatment in India

S. No.	Assessment Parameter/ Technology	ASP ^a	MBBR ^c	SBR ^a	UASB+EA ^b	M BR ^a	W Sp ^a
1.0	Performance after Secondary Treatment						
1.1	Effluent BOD, mg/L	<20	<30	<10	<20	<5	<40
1.2	Effluent SS, mg/L	<30	<30	<10	<30	<5	<100
1.3	Faecal coliform removal, log unit	upto 2<3	upto 2<3	upto 3<4	upto 2<3	upto 5<6	upto 2<3
1.4	T N Removal Efficiency, %	10 20	10 20	70 80	10 20	70 80	10 20
2.0	Performance After Tertiary Treatment						
2.1	Effluent BOD, mg/L	<10	<10	<10	<10	<10	<10
2.2	Effluent SS, mg/L	<5	<5	<5	<5	<5	<5
2.3	Effluent NH ₃ N, mg/L	<1	<1	<1	<1	<1	<1
2.4	Effluent TP, mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2.5	Effluent Total Coliforms, MPN/ 100 m L	10	10	10	10	10	10
3.0	Capital cost						
3.1	Average Capital Cost (Secondary Treatment), . Lacs/ M LD	68.00	68.00	75.00	68.00	300.00	23.00
3.2	Average Capital Cost (Tertiary Treatment) . Lacs/ M LD	40.00	40.00	40.00	40.00		40.00
3.3	Total Capital Cost (Secondary + Tertiary) . Lacs/ M LD	108.00	108.00	115.00	108.00	300.00	63.00
3.4	Civil Works, % of total capital costs	60.00	40.00	30.00	65.00	20.00	90.00
3.5	E & M Works, % of total capital costs	40.00	60.00	70.00	35.00	80.00	10.00
4.0	Area Requirements						
4.1	Average Area, m 2 per MLD Secondary Treatment + Secondary Sludge Handling	900.00	450.00	450.00	1000.00	450.00	6000.00
4.2	Average Area, m 2 per MLD Tertiary Treatment + Tertiary Sludge Handling	100.00	100.00	100.00	100.00	0.00	100.00
4.3	Total Area, m per MLD Secondary + Tertiary Treatment	1000.00	550.00	550.00	1100.00	450.00	6100.00
Sludge Treatment: * Thickener + Centrifuge; ** Drying							
Process Type : a Aerobic; b Anaerobic c Anoxic/Anaerobic/Aerobic							

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S. No.	Assessment Parameter/ Technology	ASP ^a	MBBR ^c	SBR ^a	UASB+EA ^b	M BR ^a	W SP ^a
5.0	Operation & M maintenance Costs						
5.1	Energy Costs (Per MLD)						
5.1.1	Avg. Technology Power Requirement, kWh/ d / M LD <i>Secondary Treatment + Secondary Sludge Handling</i>	180.00	220.00	150.00	120.00	300.00	2.00
5.1.1	Avg. Technology Power Requirement, kWh/ d / M LD <i>Tertiary Treatment + Tertiary Sludge Handling</i>	1.00	1.00	1.00	1.00	1.00	1.00
5.1.1	Avg. Non Technology Power Req., kWh/ d / M LD <i>Secondary Treatment</i>	4.50	2.50	2.50	4.50	2.50	2.50
5.1.1	Avg. Non Technology Power Req., kWh/ d / M LD <i>Tertiary Treatment</i>	0.20	0.20	0.20	0.20		0.20
5.1.1	Total Daily Power Requirement (avg.), kWh/ d / M LD	185.70	223.70	153.70	125.70	302.50	5.70
5.1.1	Daily Power Cost (@ 6.0 per KW h), . / M LD/h <i>(Including Standby power cost)</i>	46.43	55.93	38.43	31.43	75.93	1.43
5.1.1	Yearly Power Cost, . lacs pa/ M LD	4.07	4.90	3.37	2.75	6.65	0.49
5.2	Repairs cost (Per MLD)						
5.2.1	Civil Works per Annum , as % of Civil Works Cost	3.00	3.00	3.00	3.00		3.00
5.2.2	E&M Works, as % of E& M Works Cost	1.00	1.00	1.00	1.00		1.00
5.2.3	Civil Works Maintenance, . Lacs pa / M LD	1.94	1.30	1.04	2.11		1.70
5.2.4	E & M Works Maintenance, .Lacs pa/ MLD	0.43	0.65	0.81	0.38		0.06
5.2.5	Annual repairs costs, . Lacs pa/ M LD	2.38	1.94	1.84	2.48		1.76
5.3	Chemical Cost (Per MLD)						

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5.3.1	Recurring Chemical/ Polymer Costs, . Lacs pa/ MLD <i>Secondary Treatment</i>	0.40	0.40	0.40	0.40	0.40	0.40	0.00
5.3.2	Recurring Chemical, . Lacs pa/ MLD <i>(Alum, Chlorine, Polymer) Costs, Tertiary Treatment</i>	4.00	4.00	2.00	5.00	6.00	6.00	6.00
5.3.3	Other Chemical Cost, . Lacs pa/ MLD	0.90	0.90	0.90	0.90	1.20	1.20	1.20
5.3.4	Total Chemical Cost, Lacs pa/ MLD	5.30	5.30	3.30	6.30	7.20	7.20	7.20
5.4.1	Manpower Cost (Assuming 50 MLD Plant)							
5.4.2	Manager, . pa (1 No.)	3.60	3.60	3.60	3.60	3.60	3.60	3.60
5.4.3	Chemist/ Engineer, . pa (1 No.)	3.60	3.60	3.60	3.60	3.60	3.60	3.60
5.4.4	Operators, . Pa (@. 12000 pm)	8.64	5.76	4.32	8.64	4.32	8.64	4.32
5.4.5	Skilled technicians, . pa (@ 10000 pm)	7.20	4.80	3.60	7.20	1.20	7.20	1.20
5.4.6	Unskilled personnel, . pa (@. 7000 pm)	5.04	2.88	2.16	5.04	8.64	5.04	8.64
5.4.7	Total Salary Costs, . Lacs pa	28.08	20.64	17.28	28.08	21.36	28.08	21.36
5.4.8	Benefits (50% of total salary), . Lacs pa	14.04	10.32	8.64	14.04	10.68	14.04	10.68
5.4.9	Salary + Benefits, . Lacs pa	42.12	30.96	25.92	42.12	32.04	42.12	32.04
5.4.10	Total annual O& M costs, . Lacs pa	629.26	638.11	451.22	618.96	832.55	618.96	504.86
6.0	NPV (2010) of Capital + O& M Cost for 15 years, Lacs	14838.9	14971.6	12518.32	14684.4	27488.2	10722.96	
	Present (2010) Treatment Cost, paisa/ L	2	7	0.46	2	7	1.00	0.39
7.0	Average Capital Cost, . Lacs/ MLD <i>upto Secondary Treatment</i>	68.00	68.00	75.00	68.00	23.00	68.00	23.00

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7.1	Yearly Power Cost, . lacs pa/ M LD upto Secondary Treatment	4.04	4.87	3.34	2.73	0.10
7.2	Annual Repairs Cost, . Lacs pa/ M LD upto Secondary Treatment	1.50	1.22	1.16	1.56	1.11
7.3	Annual Chemical Cost, Lacs pa/ M LD upto Secondary Treatment	0.85	0.85	0.85	0.85	0.60
7.4	Manpower Cost, Lacs pa for 50 mld plant upto secondary t treatment	33.70	24.77	20.74	33.70	25.63
7.5	Total Annual O& M Costs, . Lacs pa upto Secondary Treatment	353.02	372.11	288.15	290.72	116.09
7.6	NPV (2010) of Capital + O& M Cost for 15 years, . Lacs upto Secondary Treatment	8695.35	8981.58	8072.24	7760.85	2891.39
7.7	Present (2010) Treatment Cost ,paisa / L upto Secondary Treatment	0.32	0.33	0.29	0.28	0.11

- No Sludge Drying Beds. However, can be provided to cater 25 % of sludge dewatering under emergency conditions
- No FPU after UASB, only Extended Aeration (EA Process)
- UASB not Recommended for influent SO₄> 25 mg/L
- No Biological Phosphorus Removal, Coagulants are necessary
- No Energy Recovery system recommended only if BOD <250 mg/L
- Less than 5h HRT MBBR is not acceptable
- Less than 14 h HRT SBR is not acceptable for plants with peak factor 2.5
- Repair + Chemical + Manpower Cost of MBR is 500 Lac per 50 MLD
- O&M of MBR includes all chemical (Cleaning, Polymer etc.,) cost
- Capital cost of MBR includes membrane replacement cost for 15 years
- All WSPs should have mechanical pre-treatment works (All types of screens & Grit chambers)
- SBR data is based on data collected from working Indian SBR with bio selector, OUR control, RAS, Nitrogen removal
- Manpower cost is assumed to be 20 percent less for treatment only upto secondary stage

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Table 7-6 : Comparison of Treatment Process of Various Technologies for Sewage Treatment in India

Sr. No.	Parameter	Technologies							Remarks
		Oxidation pond	Aerated Lagoon	UASB (Up flow anaerobic sludge blanket)	ASP (activated sludge process)	MBBR (Moving Bed BioFilm Reactor)	SBR (Sequential Batch Reactor)	Membrane Bio Reactor (MBR)	
1	Treatment Process	Combination of Aerobic-Anaerobic - biological Process. OUTDATED TECHNOLOGY.	facultative (semi aerobic) - biological suspended growth process. OUTDATED TECHNOLOGY	Anaerobic-biological GETTING OBSOLETE	Aerobic suspended growth - biological GETTING REPLACED WITH MODIFIED /IMPROVED VERSIONS	Aerobic attached growth -biological (modified Activated Sludge Process) MODIFIED NEWTECHNOLOGY	Aerobic suspended growth - biological (Improvvised Activated Sludge Process) ADVANCE IMPROVISEDTECHNOLOGY	Aerobic suspended growth - biological (Improvvised Activated Sludge Process) ADVANCE IMPROVISEDTECHNOLOGY	
2	Process in brief	BOD reduction takes place due to oxidation by Sunlight in anaerobic,anaerobic, or aerobic-anaerobic environment. Complete treatment happens in series of ponds.	BOD reduction takes place aerobically and/ or combination with anaerobic (facultative) Suspended growth Process. This is modification of oxidation ponds.	This is strictly anaerobic Process.BOD reduction takes place by converting organic matter to methane/carbon di-oxide and other gases, through Bacterial synthesis. UASB lagoon/ASP treatment is must.	An Aerobic biological process where aeration followed by settling/sludge recycle happens in a separate tanks. In case of conventional treatment, separate sludge digestion/ stabilisation is provided.	An Aerobic biological process where aeration followed by settling/sludge recycle happens in a separate tanks. Separate sludge digestion/ stabilisation is provided.	An Aerobic biological process where aeration, settling and decanting happens in a single tank including nutrient removal and sludge digestion. SBR is a batch process, which eliminates the inefficiencies of continuous systems like Activated Sludge Process, Extended Aeration etc	It is a biological reactor with a suspended biomass. The solid-liquid separation in membrane bioreactor is achieved by a microfiltration membrane No secondary clarifier is used and has the ability to operate at high MLSS concentrations. Separate Sludge digestion/stabilisation is provided.	
3	"SIZE-WISE" Suitability of the process	Suitable for any size, no limitation. Larger sizes demand much higher space	Suitable for any size, no limitation. Larger sizes demand much higher	Suitable for any size, no limitation. Larger sizes demand much	Suitable for any size, no limitation.	Suitable for any size. However, not recommended for high capacities (50 MLD and Above).	Suitable for any size, no limitation.	Suitable for any size. However not used for high capacities.	
4	PERFORMANCE AFTER SECONDARY TREATMENT	50 mg/lit	50 mg/lit	30 mg/lit (UASB+ASP)	20-30 mg/lit	20-30 mg/lit	5 mg/lit	5 mg/lit	CPCB/CPHHEO limit- 10 mg/lit
	Biological Oxygen Demand(BOD)	250 mg/lit	250 mg/lit	100 mg/lit (UASB+ASP)	100 mg/lit	100 mg/lit	50 mg/lit	50 mg/lit	CPCB/CPHHEO limit-50 mg/lit
	Chemical Oxygen Demand(COD)								

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	100 mg/lit	100 mg/lit	100 mg/lit (UASB+ASP)	100 mg/lit	50 mg/lit	10 mg/lit	5 mg/lit	CPCB/CPEHEO limit- 10 mg/lit
Total Suspended Solids (TSS)	no treatment	no treatment	no treatment	no treatment	no treatment	5 mg/lit	no treatment	CPCB/CPEHEO limit- 10 mg/lit
Ammonical Nitrogen (NH4-N)	no treatment	no treatment	no treatment	no treatment	no treatment	10 mg/lit	no treatment	CPCB/CPEHEO limit- 5 mg/lit
Total Nitrogen (TN)	no treatment	no treatment	no treatment	no treatment	no treatment	2 mg/lit	no treatment	CPCB/CPEHEO limit- 10 mg/lit
Total Phosphorous (TP)	no treatment	no treatment	no treatment	no treatment	100 MPN/100 (after disinfection)	100 MPN/100 (after disinfection)	100 MPN/100 (after disinfection)	CPCB/CPEHEO limit- 2 mg/lit
Faecal coliforms	no treatment	no treatment	no treatment	no treatment	100 MPN/100 (after disinfection)	100 MPN/100 (after disinfection)	100 MPN/100 (after disinfection)	100 MPN/100

Sr. No.	Parameter	Biological Treatment Technologies-Comparison Technologies							Remarks
		Oxidation pond	Aerated Lagoon	UASB (Up flow anaerobic sludge blanket)	ASP (activated sludge process)	MIBBR (Moving Bed Biofilm Reactor)	SBR (Sequential Batch Reactor)	Membrane Bio Reactor (MBR)	
5	Additional treatment required to achieve the latest outlet norms	Being obsolete technology. Upgradation or pre-post treatments are not possible	Being obsolete technology. Upgradation or pre-post treatments are not possible	Nutrient removal treatment & final tertiary treatment (filtration, etc) are required	Nutrient removal treatment & final tertiary treatment (filtration, etc) are required	Nutrient removal treatment & final tertiary treatment (filtration, etc) are required	No additional treatment is required.	separate Nutrient removal treatment is required.	Except SBR all technologies will require nutrient removal. Except for SBR & MBR all treatment technologies requires tertiary (filtration, etc) to achieve the latest outlet norms.
6	Bio-Sludge digestion/stabilisation	Sludge digestion takes places in pond itself & by-product gases are liberated in atmosphere directly. There is no mechanism to control the system or to remove inert matters/sludge settled at the bottom. This creates odour problem in area.	Sludge digestion takes places in lagoon itself & by-product gases are liberated in atmosphere directly. There is no mechanism to control the system or to remove inert matters/sludge settled at the bottom. This creates odour problem in area.	Sludge is digested in UASB reactor itself. However, since further treatment such as Lagoon/ASP is required. Excess sludge from these treatment needs stabilisation /digestion separately. This is must, else excess bio-sludge at disposal point will create odour problem	Excess bio-sludge needs separate digestion/stabilisation treatment. This is must, else excess bio-sludge at disposal point will create odour problem.	Excess bio-sludge needs separate digestion/stabilisation treatment. This is must, else excess bio-sludge at disposal point will create odour problem	Since SBR is operated like extended aeration excess bio sludge generated is totally stabilised in nature and hence can safely disposed off.	Excess bio-sludge needs separate digestion/stabilisation treatment. This is must, else excess bio-sludge at disposal point will create odour problem.	

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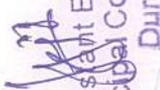


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7	Usage of treated effluent	Treated effluent "as such" cannot be used for even low end purposes such as construction, floor washing etc. Tertiary treatment must be provided even for low-end uses.	Treated effluent "as such" cannot be used for even low end purposes such as construction, floor washing etc. Tertiary treatment must be provided even for low-end uses.	Treated effluent "as such" cannot be used for even low end purposes such as construction, floor washing etc. Secondary treatment in form of ASP, followed by tertiary treatment must be provided even for low-end uses.	Can be used for gardening. However, needs tertiary treatment for other non-potable purposes.	Can be used for non-potable purposes such as gardening, car washings, industrial washings, etc. However, biological nutrient removal prior to use is recommended.
8	Inlet flow variations	Can handle	Can handle	Can not handle	Can not handle	Can handle

Biological Treatment Technologies-Comparison								
Sr. No.	Parameter	Technologies				Remarks		
		Oxidation pond	Aerated Lagoon	UASB (Up flow anaerobic sludge blanket)	ASP (activated sludge process)		MBBR (Moving Bed BioFilm Reactor)	SBR (Sequencial Batch Reactor)
9	Level of automation/energy efficient equipment	No automation	No automation	Very few automation	Very few automations. However, additional automation is possible.	Very few automation	Fully automatic with manual override. Air requirement is optimized through oxygen uptake rate control (OUR). Feedback is taken through PLC/SCADA) from dissolved oxygen meter installed in SBR basins and fed to VFD, which makes the blower to run efficiently all the time. This total system ensures air is supplied proportionately to the inlet load all times of operation.	Fully automatic with manual override. However, energy requirement is very high due to type of process itself.
10	Future Augmentation	Not possible	Not possible	Not possible	Possible	Possible	Possible	Possible
11	CAPITAL COSTS							


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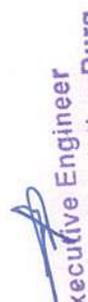

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	25-30	30-40	85-90 (UASB followed by ASP)	85-90	85-90	90-100	300-325	Cost may increase or decrease based on local conditions For MBR nutrient removal system is required.
approx. Capital cost for plant, Rs. Lakhs/MLD	25-30	30-40	85-90 (UASB followed by ASP)	85-90	85-90	90-100	300-325	Cost may increase or decrease based on local conditions For MBR nutrient removal system is required.
additional cost for nutrient removal & tertiary treatment, Rs. Lakhs/MLD	Not possible to include additional treatment	Not possible to include additional treatment	40	40	40	0	25	For MBR nutrient removal system is required.
Total plant cost to achieve the latest outlet quality, Rs. Lakhs/MLD	Not possible to achieve the outlet quality	Not possible to achieve the outlet quality	115-125	125-130	125-130	90-100	325-350	Cost may increase or decrease based on local conditions
12 AREA REQUIREMENTS								
Approx. Area requirement, for plant (m ² /MLD)	10000	6000	1000	700	350	400	450-500	
additional area required for tertiary treatment (m ² /MLD)	--	--	100	100	100	0	50	For MBR nutrient removal system is required.


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Sr. No.	Parameter	Biological Treatment Technologies-Comparison						Remarks	
		Oxidation pond	Aerated Lagoon	UASB (Up flow anaerobic sludge blanket)	ASP (activated sludge process)	MBBR (Moving Bed BioFilm Reactor)	SBR (Sequential Batch Reactor)		Membrane Bio Reactor (MBR)
	Total area required for plant to achieve the latest outlet quality (m ² /MLD)	--	--	1100	800	450	400	500 - 550	
13	Approx. POWER requirement, for plant kWh/MLD	Negligible	Negligible	110- 125	190 - 220	190-220	130- 150	250- 300	
14	Overall O&M COST including power in Rs. / m ³	negligible	Negligible	1.5 - 2.0	3.5 - 4.0	3.5 - 4.0	2 - 2.5	6 - 7	
15	Merits	Very less or no manpower required. No power requirement for main plant. Minimal sludge production. Can handle intermittent flows. Robust and can withstand shock loadings.	Very less manpower required. Power requirement is only for aerators. Minimal sludge production. Can handle intermittent flows. Robust and can withstand shock loadings.	This is an anaerobic process so it has the advantage of low energy consumption. There is biogas production. Low production of surplus sludge.	It is the best and efficient amongst all conventional treatment to achieve the old outlet quality standards.	It is best and efficient outlet quality as compare to the ASP & meeting the old outlet quality standards.	Latest outlet quality norms can meet with SBR technology without any separate tertiary treatment. Energy efficient treatment. Power consumption is optimised through control of aeration rate and duration. Secondary clarifiers are eliminated. There is flexibility in adjusting reaction time and tank volume to meet variable loading. No odour problem. Very less personnel is required. Excess bio-sludge is fully stabilised. In built nutrient removal system. Underwater parts are in Stainless-steel.	It is best and efficient treatment saving the area as compare to the conventional treatment and better outlet quality as compare to the all technologies & meeting the latest outlet quality standards except Nutrients.	

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Sr. No.	Parameter	Biological Treatment Technologies-Comparison						Remarks	
		Oxidation pond	Aerated Lagoon	UASB (Up flow anaerobic sludge blanket)	ASP (activated sludge process)	MBBR (Moving Bed BioFilm Reactor)	SBR (Sequential Batch Reactor)		Membrane Bio Reactor (MBR)
16	Demerits	<p>Obsolete technology. Latest outlet quality norms cannot be achieved. Large footprint. Eutrophication resulting to high suspended solids. Sensitive to industrial waste discharges. Mosquitoes and other Pest infestation. Odour resulting nuisance for the nearby dwellers.</p>	<p>Obsolete technology. Latest outlet quality norms cannot be achieved. Large footprint.</p>	<p>Power generation schemes have been implemented at many locations in India but have a mixed performance track record. There are only few locations where power is generated successfully. This is due to less flow during the initial years of STP, lesser quantum of organic solids than expected, seasonal variations specially dilution of sewage in monsoons, etc. Further, 30 -40% of the power generated is consumed to run the captive power plant (gas engines and associated auxiliary units) itself. High ammonium remains in effluent which results in ammonia toxicity Vulnerable to pH and temperature changes. Large footprint. Latest outlet quality norms cannot be achieved without additional nutrient removal & tertiary treatment.</p>	<p>Larger footprint and power consumption as compare to latest technologies. Additional sludge stabilisation and nutrient removal treatment is required. Latest outlet quality norms not be achieved without additional nutrient removal & tertiary treatment.</p>	<p>In case, virgin PVC media is not used, plant may not perform well. High power consumption as coarse bubble aeration is used which reduces oxygen transfer efficiency. Latest outlet quality norms cannot be achieved without additional nutrient removal & tertiary treatment.</p>	<p>It requires skill manpower supervision, as and when required.</p>	<p>Very high capital and O&M cost. It requires skill manpower for supervision. Periodic cleaning and replacement of membranes. High membrane replacement cost(replacement once in every 6 years).Fouling of membrane. Separate Nutrient removal treatment is required.</p>	



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Q. WHY SEQUENCING BATCH REACTOR (SBR) BASED SEWAGE TREATMENT PLANTS ARE PREFERRED OVER OTHER CONVENTIONAL AS WELL AS OTHER NEW TECHNOLOGIES?

- 1. Efficient Treatment Cost/life cycle cost** : Cost of any STP shall be based on Life cycle cost i.e. capital + land + O&M cost. **Based on 7 IIT reports prepared for MOuD, Govt. of India, SBR technology has least life cycle cost among all technologies.**
Also while designing STP, it was important to see the efficient treatment cost in terms of **O&M cost Rs. per KL**
- SBR Plant is with energy efficient devices
 - Variable Frequency Drives (VFD) are installed for air blower operations, which contributes major power consumption STPs. **Air requirement is optimized through oxygen uptake rate control (OUR).**
 - **Thus SBR plant saves power by almost 50% compared to MBBR, ASP, and MBR technology.**
 - Plant is automatic with PLC based SCADA operations which requires minimum manpower (**only one operator is required in each shift**).
 - **All underwater parts are in Stainless Steel which ensures longer life of the plant**, lowers wear and tear of the equipment and results in low equipment maintenance.
 - All other equipment makes are A class reputed makes ensures quality and longer life.
 - SBR technology gives excellent treated sewage quality which reduces chemical consumption i.e. chlorine & polyelectrolyte
 - Built in nutrient removal system, hence no need to go for separate nutrient removal system.
- 2. Efficient Management of Odour** : - SBR Technology is aerobic process wherein, air (oxygen) is purged into the system. Odour causing gases like Sulphur dioxide, Ammonia converts into nitrogen and sulphates which are neutral and odour free compounds.
- Second source of odour is from excess bio-sludge to be wasted. In SBR technology, **bio-sludge is fully stabilized in SBR basin itself**. Hence excess bio-sludge is completely odour free. Where as in other technologies, bio-sludge need to stabilize again by providing digester, etc.
- 3. Operations during lower loading rates** : - SBR technology is true batch reactor technology. Due to batch treatment, variable flow condition can easily absorb. treatment of sewage is carried out in batches During less inlet flow condition, the batch treatment turns down to lowest to save energy. **Hence SBR plant can be operated with variable loads from 0 to 250%.** Also outlet quality is not compromised even with variable loads.

- In case of other technology option, it is not possible to operate the plant at varying loads.**
- 4. Efficient utilization of Land** : - **SBR based plant requires 40-50% less area** as compare to conventional treatments due to lesser units as it does not require any clarifiers (primary & secondary), sludge digesters, gas holders, etc.
- Besides, in SBR plant, units can be clubbed together to save land requirement. Less per MLD land requirement for entire plant including internal roads, buildings, pathways, etc.
- 5. Efficient energy Requirements** : - Variable Frequency Drives (VFD) are installed for air blower operations, which contributes major power consumption STPs. Air requirement is optimized through oxygen uptake rate control (OUR). Feedback is taken (through PLC/SCADA) from dissolved oxygen meter installed in SBR basins and fed to VFD, which makes the blower to run efficiently all the time. This total system ensures air is supplied proportionately to the inlet load all times of operation.
- Besides, plants being operated through PLC/SCADA control, all treatment unit operations are operated in controlled and optimized conditions. Hence, energy consumption is optimized. **This is not possible in case of other technologies.**
- 6. Efficient sludge Management** : - There is no requirement of primary clarifier for SBR based plant. Hence, no separate treatment is required for primary untreated sludge.
- Bio-sludge generated from the plant is fully stabilized in SBR basins itself. **This sludge is completely chemical free, odourless and can be used as soil conditioner.**
 - Bio-Sludge is mechanically dewatered to reduce the quantum to make it transportable, in case disposal is required.

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- 7. Ease of operations** : - Less number of units as compare to conventional treatment, hence less number of operations
- Plant is automatic and controlled by PLC-SCADA based operations.
- **Doses not require any special manpower to operate the plant.**
- Minimum manpower required for operation due to automation
- **Plant operating process variables can be changed according to the plant load. Hence, less manual intervention.**
- **Similar SBR based plants operating at Goa are being operated by semiskilled operators since 2005-06 and in Navi Mumbai from 2008 and many more in rural parts of Punjab, Uttarakhand, etc.**

- 8. Effluent quality** : In latest CPHEEO manual recommended norms and directives issued by CPCB to state pollution Control Boards on April 21, 2015, outlet quality from STP shall be;

Parameter	Latest CPHEEO recommendations & latest CPCB directives
BOD	10
COD	50
TSS	10
Total Nitrogen	10
Total	2
Phosphorus	
Faecal coliform	100

Above results can be easily obtained with SBR technology. In other technology option, we have to add nutrient removal system before biological treatment and also final tertiary treatment after biological treatment. This will add to huge capital and operating cost. Above stated norms are mandatory for all STPs.

Figure 7:4 : Activated Sludge Process

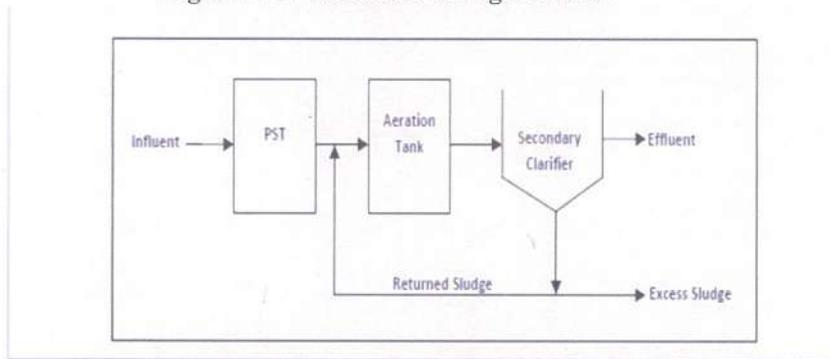


Figure 7:5 : Moving Bed Biofilm Reactor Process

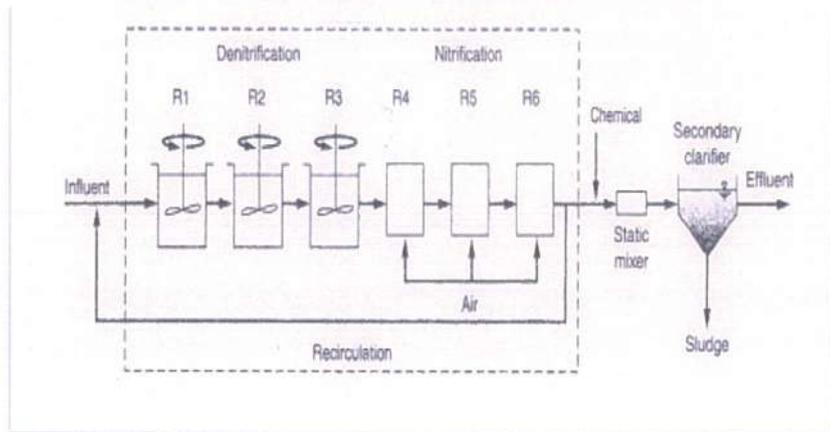


Figure 7:6 : Sequencing Batch Reactor Process

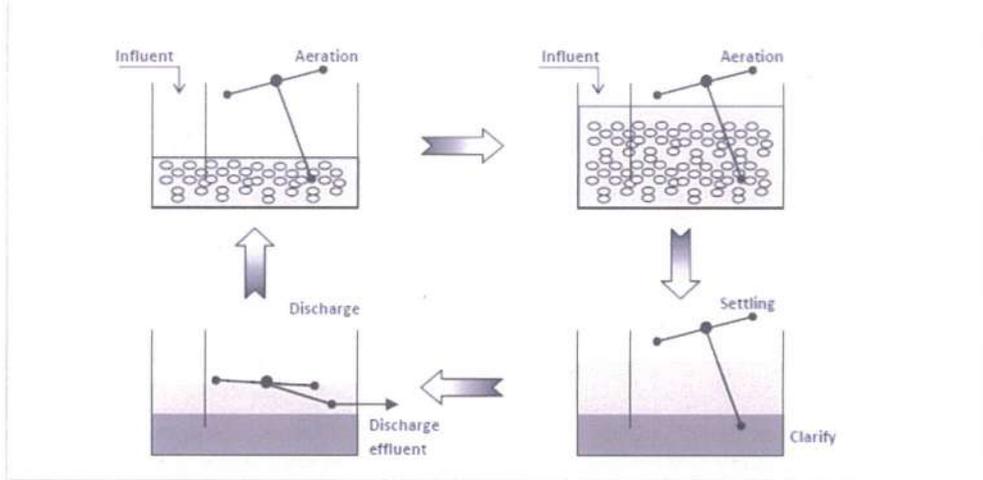


Figure 7:7 : Up flow Anaerobic Sludge Blanket Process followed by ASP

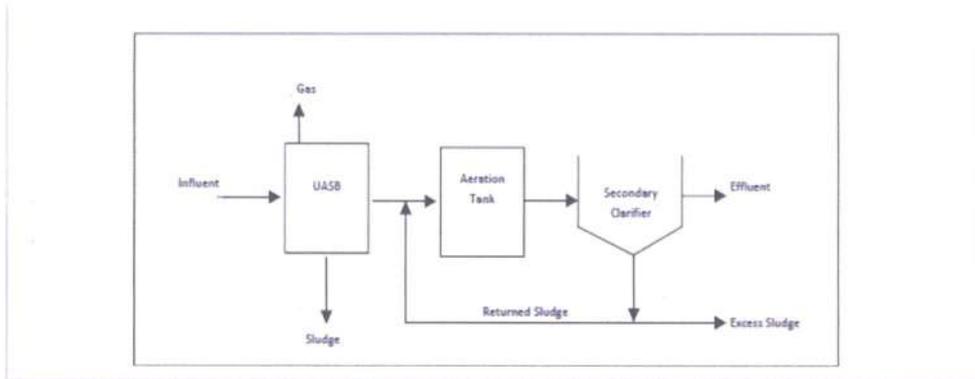


Figure 7:8 : Membrane Bioreactor Process

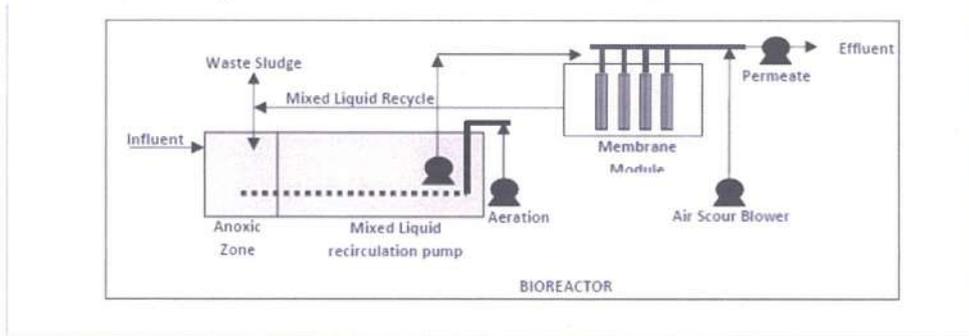
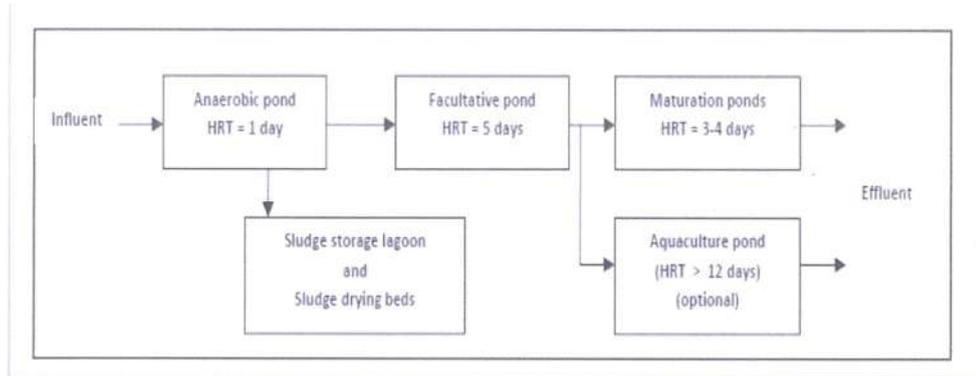


Figure 7:9 : Waste Stabilization Pond Process



SBR Waste water Treatment Plants will be adopted with following steps

- Reasons for providing SBR
 - Operating principals
 - Phases in SBR
 - Advantages
 - Limitations

Sequencing Batch Reactor In a conventional activated sludge system, unit processes would be accomplished by using separate tanks. Sequencing batch reactor is a modification of activated sludge process which has been successfully used to treat municipal and industrial wastewater. The difference between the two technologies is that the SBR performs equalization, biological treatment, and secondary clarification in a single tank using a timed control sequence.

Reasons for providing SBR In areas where there is a limited amount of space is available. Older wastewater treatment facilities can be retrofitted to an SBR because the basins are already present.

SBR Operating Principles SBR technology is a method of wastewater treatment in which all phases of the treatment process occur sequentially within the same tank. The sequencing batch reactor is a fill and draw activated sludge system. In this system, wastewater is added to a single “batch” reactor, treated to remove undesirable components, and then discharged.

Figure 7:10 : Schematic Diagram showing SBR operating principles

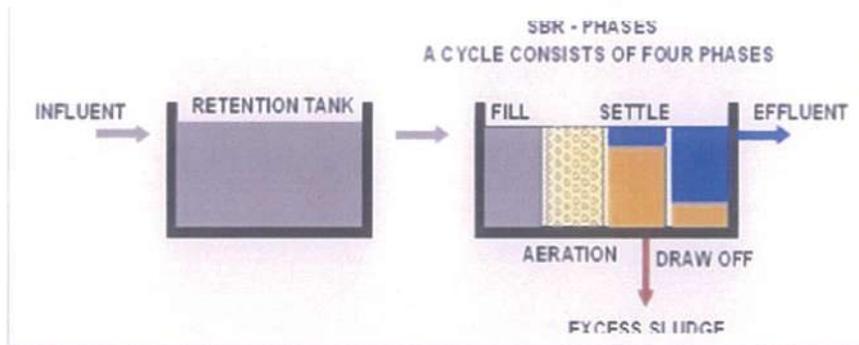
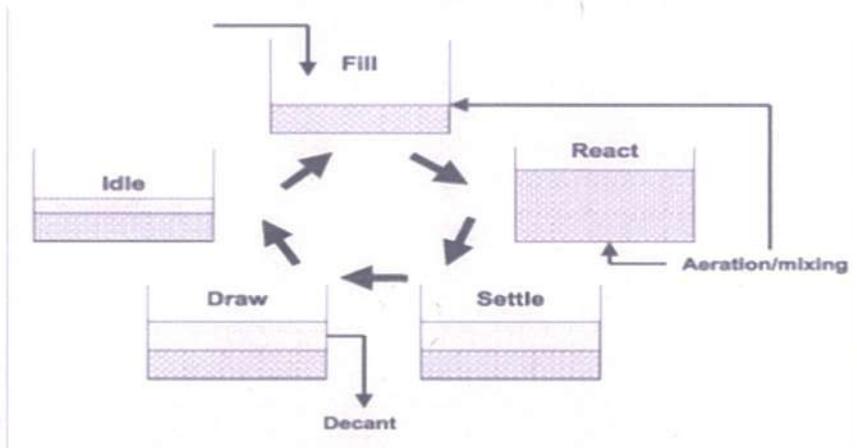


Figure 7:11 : Various Phases of SBR Process

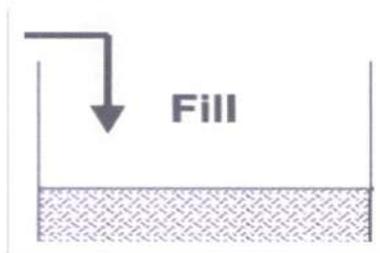


Let us discuss phases of the SBR Process one by one as shown below: -

Fill Phase

During the fill phase, the basin receives influent wastewater. The influent brings food to the microbes in the activated sludge, creating an environment for biochemical reactions to take place.

Figure 7:12 : Fill Phase



Types of fill phase

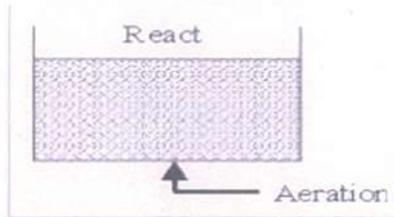
- Static fill
- Mixed fill
- Aerated fill

React Phase

During this phase, no wastewater enters the basin and the mechanical mixing and aeration units are on.

This phase allows for further reduction of wastewater parameters

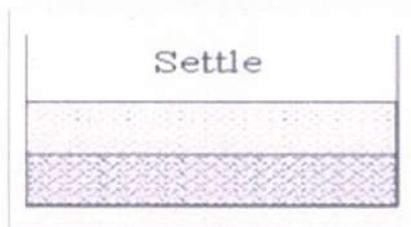
Figure 7:13 :React Phase



Settle Phase

During this phase, activated sludge is allowed to settle under quiescent condition. The activated sludge tends to settle as a flocculent mass.

Figure 7:14 :Settle Phase



Decant Phase

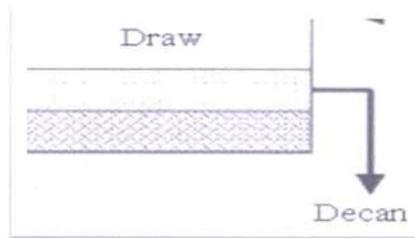
Clarified treated effluent (supernatant) is removed from the tank. No surface foam or scum is decanted.


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Figure 7:15 :Decant Phase



Idle Phase

This step occurs between the decant and the fill phases. The idle period is used when the system is waiting for enough effluent to process.

Advantages of SBR

- Equalization, primary clarification, biological treatment and secondary clarification can be achieved in a single reactor vessel.
- SBR requires small space.
- SBR has controllable react time and quiescent settling.
- Minimal footprint.
- High nutrient removal capabilities.
- The BOD removal efficiency is generally 85 to 90%
- Filamentous growth elimination

Limitations of SBR

- A higher level of sophistication is required especially for larger systems, of timing units and controls.
- Higher level of maintenance associated with more sophisticated controls, automated switches, and automated valves.
- Potential plugging of aeration devices during selected operating cycles, depending on the aeration system used by the manufacturer.

Conclusion

- ✓ Sequencing batch reactors (SBR) are useful for areas where the available land is limited. Equalization, primary clarification, biological treatment and secondary clarification can be achieved in a single reactor vessel.
- ✓ SBRs are a variation of the activated-sludge process. They differ from activated-sludge plants because they combine all of the treatment steps and processes into a single basin whereas conventional facilities rely on multiple basins.

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- ✓ The pollutant removal efficiency of SBR system is higher for nitrogen and phosphate. The SBR system can remove heavy metal such as Zn, Cu, Pb with organic pollutant
- ✓ and nitrogen.
- ✓ Hence adoption of SBR wastewater treatment plant in the project.

4.9 Assessment of Solar PV Capacity

SR. NO	PARTICULAR	DESCRIPTION
1	STP PROJECT NAME	47 MLD STP DURG (C.G.)
2	POWER CONSUMPTION PER DAY	13,000 KWH
3	REQUIRED SOLAR PV CAPACITY	3.5 MWP
4	SOLAR GENERATION PER DAY	14,000 KWH (APPROX.)
5	REQUIRED AREA FOR SOLAR PV SYSTEM	8.4 ACRE
6	ESTIMATED COST (APPROX.)	Rs. 14,87,50,000/- (Rs. 04,25,00,000/- PER MWP)
SR. NO	PARTICULAR	DESCRIPTION
1	STP PROJECT NAME	30 MLD STP DURG (C.G.)
2	POWER CONSUMPTION PER DAY	10,800 KWH
3	REQUIRED SOLAR PV CAPACITY	03 MWP
4	SOLAR GENERATION PER DAY	12,000 KWH (APPROX.)
5	REQUIRED AREA FOR SOLAR PV SYSTEM	7.2 ACRE
6	ESTIMATED COST (APPROX.)	Rs. 12,75,00,000/- (Rs. 04,25,00,000/- PER MWP)

**GROUND MOUNTED SOLAR PANELS IN SOLAR GENERATION
PLANT**




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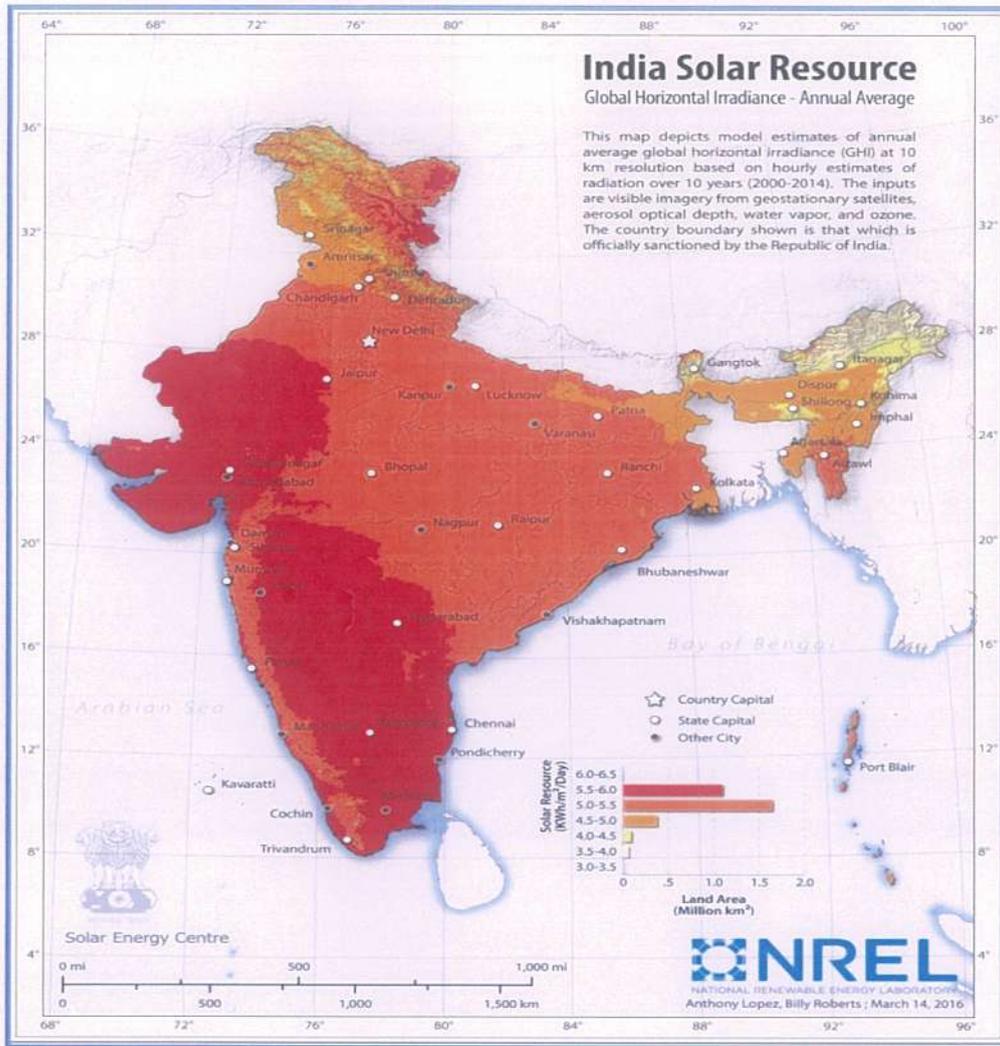

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Sub Engineer
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Details Of Available Solar Power

SOLAR RADIATION:

- ✓ Solar photovoltaic Systems for electrical production require sufficient solar radiation, which is the global radiation. Acceptable production costs of solar electricity occur where radiation level exceeds about 1700 kWh/m²/year. Higher the isolation higher is the energy production at output side (considering standard conditions).

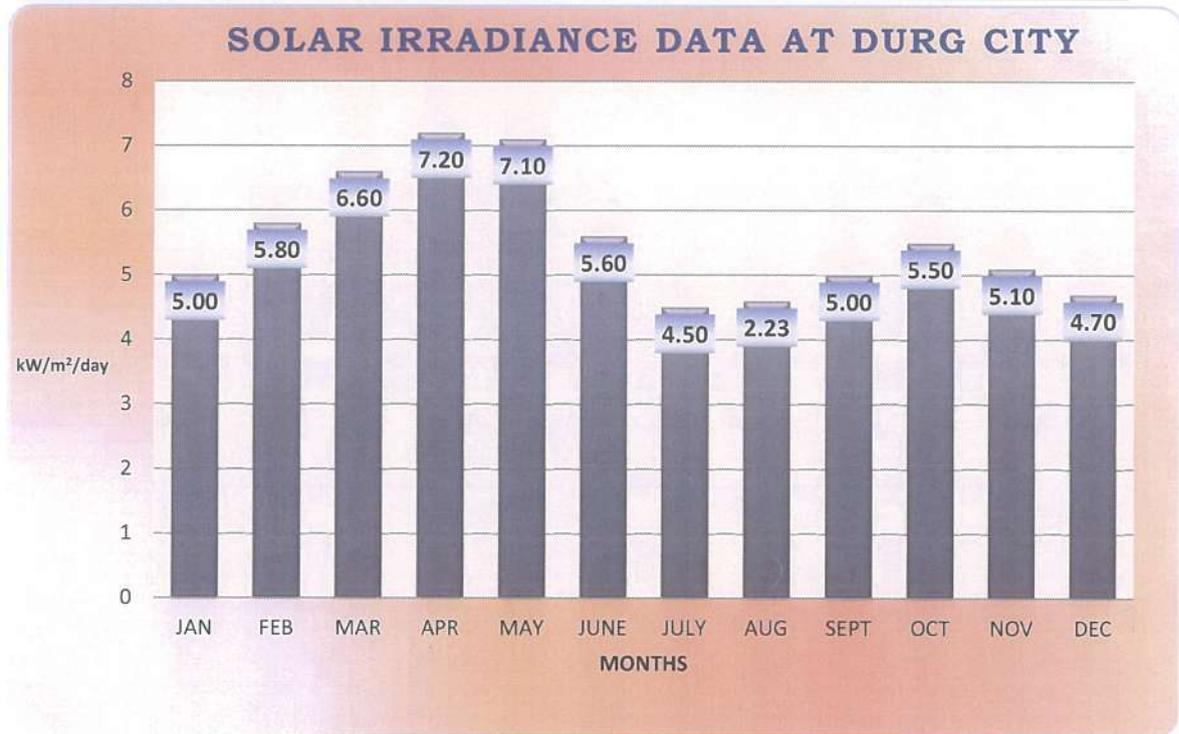


In India the range of solar radiation varies between 4.4-6.4 kWh/m²/day, which lies under the acceptable value. The feasibility of the site is decided on the basis of the solar radiation values obtained from the resources. The solar radiation data has been taken from Metronome, this is a dependable source.

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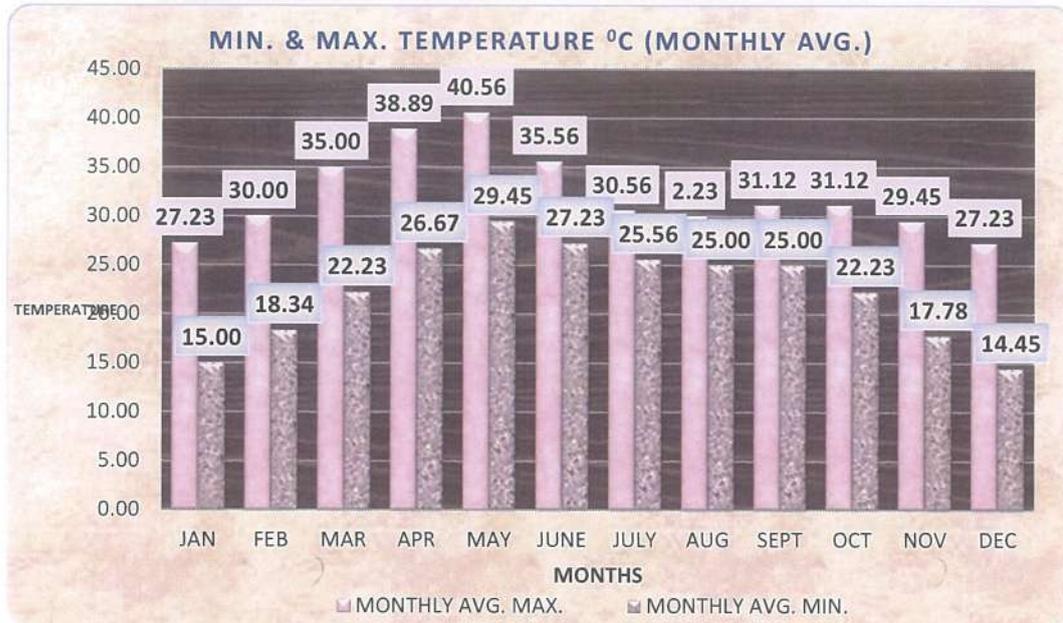
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Solar Irradiance Data at Durg City

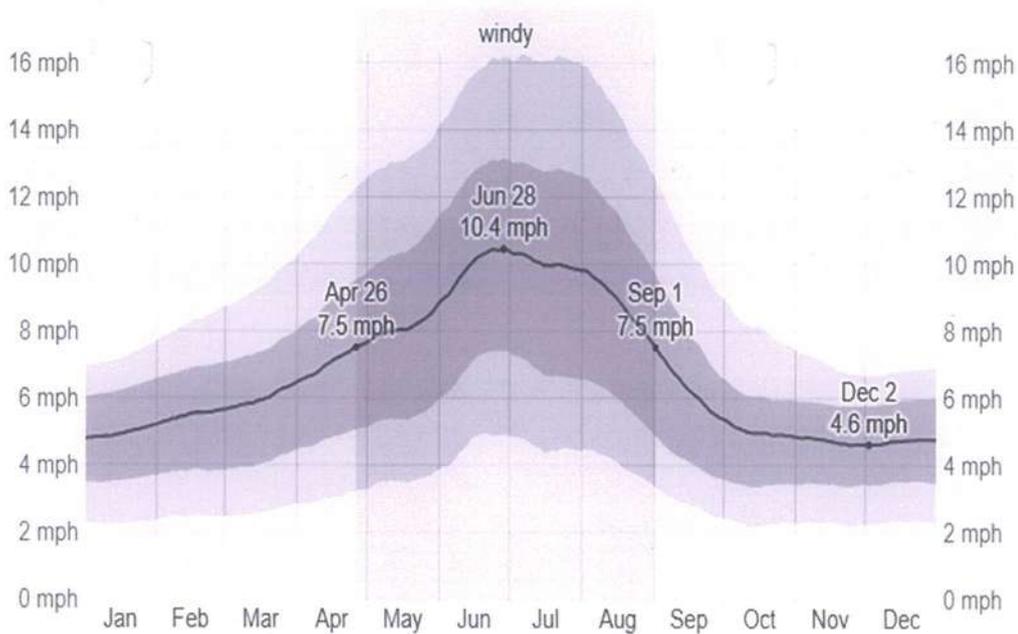
Power generated by a solar cell is dependent on the incident solar radiation which varies according to the geographical location (latitude and longitude), season and tilt and orientation of the solar panel.

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Min. & Max. Temperature at Durg City

Wind Speed:



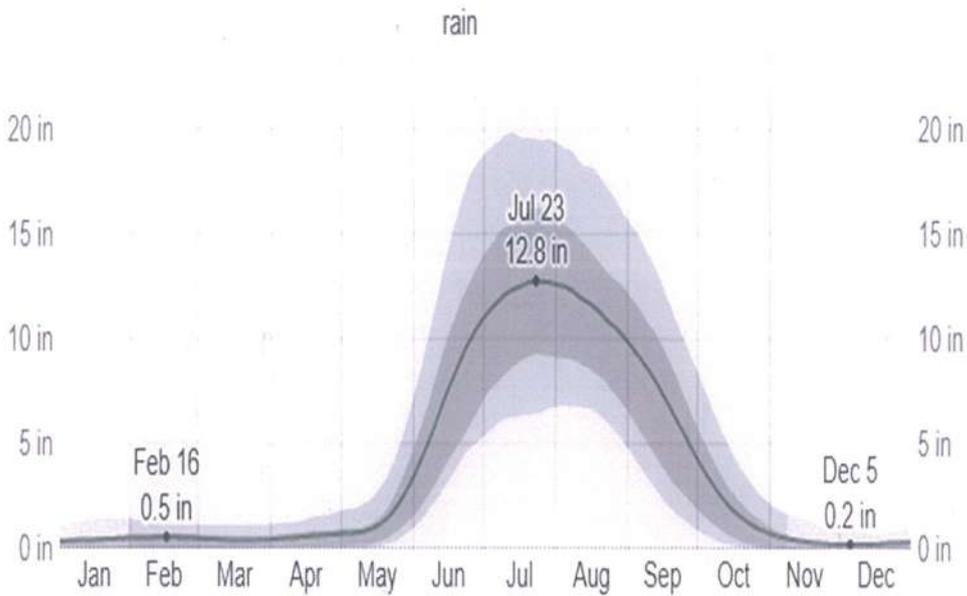
Wind Speed Data at Durg City

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Rainfall:



Rainfall Data at Durg City

Roof Top Solar Panels

Solar rooftop panels rely on photovoltaic cells within the panels to absorb the energy emitted by the sun and converts it into electricity. These cells are made of conductive materials like silicon, acting as a semiconductor.

Solar Rooftop are solar panels placed on top of roofs of commercial, institutional or residential buildings. They capture the light energy emitted by the sun and convert it into electrical energy. This setup is also known as solar rooftop photo-voltaic (SPV) system.

It's to choose an ideal option to accomplish all the needs. If space is limited and low investment cost, solar rooftop panels are great to install. On the other hand, ground-mounted


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solar panels are best where there is more space available and more power generation is required for more environmental benefits.

Total 3.5 MWp is required for the operation of 47 MLD STP. 8.4 Acre (3.40 Hect) of land is required and 3 MWp is required for the operation of 30 MLD STP 7.2 Acre (2.91 Hect) of land is required for installation of solar panels. Till the land is available it is proposed to install roof top solar panel on the various building and structures where ever possible. Roof top area available is given in table.

STATEMENT OF 47 MLD DURG AREA FOR ROOF TOPS						
SR.NO.	BUILDING LIST	L	D	HT	QTY.	AREA IN Sqm
A	HT ROOM	6000	5000	4500	1	30
B	METERING ROOM	6000	5000	4500	1	30
C	TRANSFORMER YARD	12000	5000		1	60
D	DG ROOM	12000	5000	4500	1	60
E	SBR AIR BLOWER	25000	10000	5000	1	250
F	ADMIN BUILDING	15000	10000	7000	1	150
G	CHLORINATION CUM CHLORINE TOONER HOUSE	12000	5000	4500	1	60
H	CENTRIFUGE FEED PUMP HOUSE	13000	5000	4500	1	65
I	CENTRIFUGE HOUSE	13000	7000	9500	1	91
J	SECURITY CABIN	3000	3000	3000	1	9
K	PANEL ROOM FOR RAW SEWAGE SUMP	11000	6000	4500	1	66
L	CONTROL PANEL ROOM FOR UV & PANEL FOR TREATED WATER TRANSFER PUMPS	13600	6500	5000	1	88.4
M	PARKING LOT	3000	30000	2500	1	90.0
N	SBR BESIN WALKWAY	77600	1000		3	232.800
		76000	1000		2	152.000
O	SBR BESIN	77600	76000		1	5897.600
					Total	7332

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STATEMENT OF 30 MLD DURG AREA FOR ROOF TOPS						
SR.NO.	BUILDING LIST	L	D	HT	QTY.	AREA IN Sqm
A	TRANSFORMER YARD	10000	5000		1	50
B	DG ROOM	12000	6000	4500	1	72
C	HT PANEL ROOM	5000	5000	4500	1	25
D	METERING ROOM	5000	5000	4500	1	25
F	SBR AIR BLOWER ROOM ADMIN BUILDING	17000	15000	10000	1	255
H	CHLORINATOR & CHLORINE TONNER ROOM	12500	5000	4500	1	62.5
I	CONTROL PANEL ROOM FOR UV & TREATED WATER TRANSFER PUMPS	12500	5000	4500	1	62.5
J	CENTRIFUGE FEED PUMP HOUSE	10000	5000	4500	1	50
K	CENTRIFUGE HOUSE	10000	7500	9500	1	75
L	SECURITY CABIN	3000	3000	3000	1	9
M	PARKING LOT	3000	30000	2500	1	90
N	SBR BESIN WALKWAY	124000	1000		2	248.000
		30100	1000		5	150.500
O	SBR BESIN	124000	30100		1	3732.4
					Total	4907

Sr. No.	STP At	Capacity of STP in MLD	Load Required in MW _h /Month	Capacity of Solar Power Plant (MW _P)	Land Required in (Hectors)	Roof Top Area available at Plant Site in (Sq.m.)	Area Required for Solar Power Generation in (Hectors)	Possible Captive Solar Power Generation Capacity at Plant (MW _P)
a	b	c	d	e	f	g	h = (g/10000)	i = (h x 1.0)
1	Durg	30	130	3.00	2.91	4906.90	0.49	0.49
2	Durg	<u>47</u>	<u>108</u>	<u>3.50</u>	<u>3.40</u>	<u>7331.80</u>	<u>0.73</u>	<u>0.73</u>
	Total	77	238	6.50	6.31	12238.70	1.22	1.22

Conclusion

1. It Can Be Seen From The Technical Analysis That The Solar PV System Is 100% Suitable And Feasible For The Proposed Sewage Treatment Plant.
2. The Pollution Reduction Is 0.8 KG Of Co₂ Per Unit Generation From Solar System.
3. Solar Unit Generation Cost Is Constant For 25-30 Years However The Rise In CSPGCL Unit Tariff Rate Per Year Is Above 9%.
4. The Scheme Can Be Very Well Accommodated Within The Rules And Regulation Of CSPGCL Solar open access On-Grid System.
5. Land required for generating 6.50 MWp (3.0 +3.50 MWp) is 6.31 Hect. Land available for roof top solar plant on 30 & 47 MLD capacity STP plant is 0.49 Hect & 0.73 Hect respectively. Therefore 0.49 MWp & 0.73 MWp totaling 1.22 MWp power can be generated through roof top solar paneling.

PROPOSED SEWAGE SCHEME FOR DURG

CAPACITY CALCULATIONS FOR STP

- Capacities for STP has been worked out for the projected population of intermediate stage year 2040 with the following methodology.
- Projected populations for present stage 2025, Intermediate stage 2040 and Ultimate stage 2055 has been worked out as per the various methods specified in CPHEEO manual. Projected population for intermediate stage is 482895 souls.
- Daily Domestic Water demand in MLD has been calculated considering the rate of 135 lpcd. Daily Domestic demand works out to 83.32 MLD

Water Demand Calculated as per DPR of water supply scheme of **DURG under Amrut Mission** is given below :-

Description	Projected Population	Demand @ 135 lpcd(MLD)	Total Demand including 15 % UFW (MLD)
Current Year 2016	2,98,501	40.30	50.49
Base Year 2020	3,24,881	43.86	54.87
Intermediate Year 2035	4,50,620	60.83	75.66
Ultimate Year 2050	6,37,854	86.11	106.53

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- Water Demand and sewage generation Calculations as per Sewage Master Plan of **DURG under Amrut 2.0 Mission** is given below :-

Description	Projected Population	Total Demand including 15 % UFW (MLD)	Generation of Sewage as per CPHEEO Norms
Base Year 2025	360049	62.91	59.320
Intermediate Year 2040	482895	83.32	76.389
Ultimate Year 2055	647835	110.57	98.938

SS

- Generation of Sewage as per CPHEEO Norms is 80% of the total demand in MLD. Sewage generated shall be 66.659 MLD
- Ground Water Extraction contributing to sewage is considered as per flow measurement in MLD.
- Treated Sewage from the HUDCO area Bhilai is reaching the Shankar Nala. Therefore capacity of STP is increased by 6 MLD considering the flow received.
- Final capacity is worked out as 76.389 MLD.
- Hence capacity of proposed STP for Durg shall be is 77 MLD. Out of which zone wise calculations confirms the capacity of Shankar Nala as 47 MLD and capacity of STP at Pulgaon Nala as 30 MLD

Components of Projects –

Scheme comprises of two packages for following two outfalls.

Package I for outfall at Shankar Nallah. 47 MLD

Package II outfall at Pulgaon Nallah.30 MLD

Package I – Shankar Nallah

It is proposed to construct 47 MLD capacity STP for the sewage generation for projected population of 2040. Inlet screen chamber, wet well, pumping main shall be designed for projected flow with peak factor 2.25 Details of the various components are as follows.

1 Diversion Weir :-

It is proposed to construct a RCC diversion weir across Shankar nallah on the land S. No. 94 village Urala. Total Govt. land available is 18.8 Hect. Required land can be spared for STP. Length of weir is 15 m and height above bed is 0.80 m. Foundation depth is 3.10 m. Sewage will be diverted through 800 mm connecting pipe to wet well through inlet and screen chamber, inceptor chamber. The weir shall be equipped with FRP Gates for controlling the flow. In monsoon the storm water shall overflow from top of the weir.

2 Inlet Chamber –

It is proposed to be constructed for 105.75 MLD flow (considering peak flow of 2.25) for detention period of 10 sec. It is proposed to construct RCC chamber of 4.6 m x 4.6 m x 5.0 m (excluding 0.9m free board).

3 Coarse and Fine screen –

It is proposed to be constructed for 105.75 MLD flow (considering peak flow of 2.25) for designed velocity 0.7 m/sec. It is proposed to construct RCC chamber of 7.0 m (4.0+3.0) m x 4.6 m x 1.0 m. with a bifurcating wall dividing the unit in two parts for easy maintenance of each part. Screen will be inclined at 45 degree and depth of flow will be 0.6m in coarse screen and in fine screen.

4 Grit Chamber –

It is proposed to be constructed for 105.75 MLD flow (considering peak flow of 2.25) for detention time of 1 min.. It is proposed to construct RCC chamber of 13.0 m x 13.0 m x 1.0 m.(6.0 m w.r.t ground) with a bifurcating wall dividing the unit in two parts for easy maintenance of each part.

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5 Wet Well –

Wet Well shall be designed for the projected discharge of 2055 i.e 30 years designed period with peak flow of 2.25. It will be 16 m x 12m x (11.50+2.50m above GL) in size with an overhead pump house. Height of pump house shall be 6.0 m for the easy movement of gantry. Bottom Floor of well shall be provided with suction pit below the strainer of pump to accommodate 1.0 m silting pocket. It is proposed to provide PLC/SCADA system for WET well with all necessary provision of electromagnetic transmitter, actuator valve, electromagnetic flow meter and required electrical and mechanical equipment

6 Raw Sewage pumps –

Pumps shall be provided for the projected discharge of 2040 i.e 15 years designed period with peak flow of 2.25 i.e for 270.12 LPS for total head of 19.77 m. Total 6 nos of 180 HP (4 Working +2 Stand by) VT Pumps to cater low avg. and peak flow.

7 Pumping main –

Pumping main is designed for projected flow of 2055 i.e designed period of 30 years. 800 mm dia DI K 9 class pipeline is proposed for a length of 100.0 m.

8 STP :-

STP shall be designed for the projected flow of 2040. Capacity is worked out considering Ground water extraction contributing to sewage and flow from HUDCO Bhilai totalling to 47 MLD. STP is proposed to be constructed on Khasara No. 98 village Urala. Out of available Govt. land of 18.8 Hect, 1.50 Ha area shall be sufficient for STP Considering the higher capacity of plant, it is proposed to construct STP with SBR Technology. All mechanical, electrical components are considered in the estimate with automation and PLC- SCADA.

9 Electric Sub Station at STP Site :-

Two 2500 KVA transformers are proposed to be provided for 33/3.3 KV substation proposed to be constructed at STP site including all equipment and accessories and necessary civil work.

10 Allied Civil works :-

It is proposed to construct 500m compound wall for STP with MS Gate. It is also proposed to construct 2 Nos. of G type and 6 Nos. of H type quarters with septic tank at STP plot. Provision of Rs. 150 lakhs for the deposit to CSPDCL for electric transmission line has been made in cost estimate.

Package II – Pulgaon Nallah

It is proposed to construct 30 MLD capacity STP for the sewage generation for projected population of 2040. Inlet screen chamber, wet well, pumping main shall be designed for projected flow with peak factor 2.25 Details of the various components are as follows.

1 Diversion Weir :-

It is proposed to construct a RCC diversion weir across Pulgaon nallah. Length of weir is 40 m and height above bed is 0.80 m. Foundation depth is 3 m. Sewage will be diverted through 1100 mm connecting pipe to wet well through inlet and screen chamber. Inceptor chamber. The weir shall be equipped with FRP Gates for controlling the flow. In monsoon the storm water shall overflow from top of the weir.

2 Inlet Chamber –

It is proposed to be constructed for 67.5 MLD flow (considering peak flow of 2.25) for detention period of 10 sec. It is proposed to construct RCC chamber of 3.70 m x 3.70 m x 1.0 m (2.5 m w.r.t ground)

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3 Coarse and Fine screen –

It is proposed to be constructed for 67.5 MLD flow (considering peak flow of 2.25) for designed velocity 0.7 m/sec. It is proposed to construct RCC chamber of 6.70 m (3.7+3.0) m x 3.7 m x 1.0 m. with a bifurcating wall dividing the unit in two parts for easy maintenance of each part. Screen will be inclined at 45 degree and depth of flow will be 0.60 m in coarse screen and in fine screen.

4 Grit Chamber –

It is proposed to be constructed for 67.5 MLD flow (considering peak flow of 2.25) for detention time of 1 min.. It is proposed to construct RCC chamber of 10.0m x 10.0 m x 3.50 m. with a bifurcating wall dividing the unit in two parts for easy maintenance of each part.

5 Interceptor from Diversion weir across Pulgaon Nallah to STP along Pulgaon Nallah :-

It is proposed to lay 1100 mm dia RCC NP3 class pipe as interceptor line from Diversion weir across Pulgaon Nallah to STP of 790 Rm length.

6 Wet Well –

Wet Well shall be designed for the projected discharge of 2055 i.e 30 years designed period with peak flow of 2.25. It will be 9 m x 14m x (12.97+2.50m above GL) in size with an overhead pump house.. Height of pump house shall be 6.0 m for the easy movement of gantry. Bottom Floor of well shall be provided with suction pit below the strainer of pump to accommodate 1.0 m silting pocket. It is proposed to provide PLC/SCADA system for WET well with all necessary provision of electromagnetic transmitter, actuator valve, electromagnetic flow meter and required electrical and mechanical equipment

7 Raw Sewage pumps –

Pumps shall be provided for the projected discharge of 2040 i.e 15 years designed period with peak flow of 2.25 i.e for 171.99 LPS for total head of 15.86 m. Total 6 pumps 100 HP (4 Working +2 Stand by) VT Pumps for low avg. and peak flow respectively.

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8 Pumping main –

Pumping main is designed for projected flow of 2055 i.e designed period of 30 years. 600 mm dia DI K 9 class pipeline is proposed for a length of 200.0 m.

9 STP :-

STP shall be designed for the projected flow of 2040. Capacity is worked out considering Ground water extraction contributing to sewage totalling to 30 MLD. STP is proposed to be constructed on Khasara No.349,348,378,375/1,524/4 98 village Pulgaon. Govt. land of 1.03 Hect is available and shall be sufficient for STP Considering the higher capacity of plant, it is proposed to construct STP with SBR Technology. All mechanical, electrical components are considered in the estimate with automation and PLC- SC

10 Electric Sub Station at STP Site :-

2 x 1600 KVA transformers are proposed to be provided for 33/3.3 KV substation proposed to be constructed at STP site including all equipment and accessories and necessary civil work.

11 Allied Civil works :-

It is proposed to construct 500m compound wall for STP &400 m long for Wet well intercepting chamber at pumping station plot with MS Gate. It is also proposed to construct 2 Nos. of G type and 6 Nos. of H type quarters with septic tank at STP plot. Provision of Rs. 300 lakhs for the deposit to CSPDCL for electric transmission line in cost estimate.

12 RCC Lining to Pulgaon Nala:-

Provision of 800 mm long 12 m wide RCC lining of the existing pulgaon nala has been made to avoid rain cuts and scouring of the nala during high floods as per the instructions of DMC.

PART B – Solar Power Generation

Solar Power Generation Plant :-

It is proposed to erect and commissioned 0.73 MWp for the solar power generation at Shankar Nala STP and 0.49 MWp at Pulgaon Nala STP for reducing the O & M expenditure. It is proposed that the agency shall consider the fabrication required for erection of solar panel during the design of SBR basins itself. All the available roofs of various buildings shall be mounted with roof top solar panels to generate 0.73 MWp and 0.49 MWp at Shankar Nall respectively as computed in DPR.

PART C–Operation and Maintenance Cost.

Cost estimate has been framed for the Operation and Maintenance cost for the complete drainage scheme for both the package for 15 years. Cost includes establishment cost, cost of consumables/ chemicals required excluding cost of power.

- 1 Annual Maintenance Cost for 15 years (for 47 MLD STP) Shankar Nallah.
- 2 Annual Maintenance Cost for 15 years (for 30 MLD STP)Pulgaon Nallah.
- 3 Annual Maintenance Cost for 15 years for solar plant at 47 MLD STP.
- 4 Annual Maintenance Cost for 15 years for solar plant at 30 MLD STP

8.0 COSTING OF THE PROJECT

Table 8-1: General Abstract

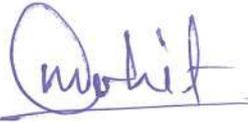
S.R No	PARTICULARS	Amount (Rs. In lacs)
(PART A) PACKAGE I - 47 MLD SEWAGE TREATMENT PLANT AT SHANKAR NALA		
1	CONSTRUCTION OF RCC DIVERSION WEIR ON SHANKAR NALA	128.23
2	INLET, SCREEN & GRIT CHAMBER AT SHANKAR NALA	80.98
3	WET WELL WITH OVERHEAD PUMP HOUSE ON SHANKAR NALA	322.31
4	CONSTRUCTION OF ELECTRIC SUB STATION AT STP SITE 33/3.3 KV SUB STATION OF 2 x 2500 KVA TRANSFORMER	114.34
5	RAW SEWER PUMPING MACHINERY AT WET WELL ON SHANKAR NALA 1) For Average flow, Q -270.12 lps, H- 19.77 m	436.32
6	PUMPING MAIN 800 MM DIA 100 M LENGTH DI-K9	49.65
TOTAL (Package-I) Rs. (in Lakh)		1131.83
PACKAGE II - 30 MLD SEWAGE TREATMENT PLANT AT PULGAON NALA		
7	CONSTRUCTION OF RCC DIVERSION WEIR ON PULGAON NALA	240.64
8	INLET, SCREEN & GRIT CHAMBER AT PULGAON NALA	51.01
9	INTERCEPTOR RCC NP3 PIPE DIA. 1100MM PIPELINE LENGTH 850.7M.	365.14
10	WET WELL WITH OVERHEAD PUMP HOUSE ON PULGAON NALA	306.15
11	CONSTRUCTION OF ELECTRIC SUB STATION AT STP SITE 33/3.3 KV SUB STATION OF 1 x 1600 KVA TRANSFORMER	103.89
12	RAW SEWER PUMPING MACHINERY FROM WET WELL ON PULGAON NALA 1) For Average flow, Q -171.99 lps, H- 15.86 m	242.40
13	PUMPING MAIN 600 MM DIA 200 M LENGTH DI-K9	59.90
TOTAL (Package-II) Rs. (in Lakh)		1369.13

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14	SEWAGE TREATMENT PLANT 47 MLD FOR SHANKAR NALA AND 30 MLD FOR PULGAON NALA	7955.00
15	ALLIED CIVIL WORKS (COMPOUND WALL , QUARTERS & DEPOSITS TO CSPDCL ETC.)	896.03
	TOTAL (Part A) Rs. (in Lakh)	11351.99
PART B - SOLAR POWER GENERATION (ROOF TOP)		
17	ESTIMATE FOR 1.22 MWp SOLAR POWER PLANT (0.73 MWp For Shankar Nala and 0.49 Mwp For Pulgaon Nala	640.50
	TOTAL (Part B) Rs. (in Lakh)	640.50
	Total Part A + Part B	11992.49
PART C - OPERATION AND MAINTENANCE COSTS		
18	Annual Maintenance Cost for 15 years (for 47 MLD STP) Consisting of Consumption of Chemicals, Establishment Charges & (Excluding Electrical charges)	4135.98
19	Annual Maintenance Cost for 15 years (for 30 MLD STP) Consisting of Consumption of Chemicals, Establishment Charges & (Excluding Electrical charges)	2530.93
20	Annual Maintenance Cost Of Solar for 15 years (for 47 MLD Shankar Nala STP)	107.10
21	Annual Maintenance Cost Of Solar for 15 years (for 30 MLD Pulgaon Nala STP)	107.10
	TOTAL (Part C) Rs. (in Lakh)	6881.11
	Total Amount (Part A + Part B + Part C) Rs. In Lacs	18873.60
	Total Amount (Part A + Part B + Part C) Rs. In Cr	188.74


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4. Finance

Year	Govt. India 33.33%	State Aid 46.67%	ULB 20%
Fund	3783.62	5297.97	2270.4
2024-25	1248.59	1748.33	749.23
2025-26	1286.43	1801.31	771.94
2026-27	1248.59	1748.33	749.23
Total	3783.62	5297.97	2270.40

Table 8-1: Per Capita Cost

Sr No.	Description of Item	Amount Rs. In Lacs
1	Total Cost of The Project (Part A)	11351.99
	Total Cost (A) =	11351.99

Year	Population	Per Capita Cost
2025	360049.00	3153.00
2040	482895.00	2351.00
2055	647835.00	1753.00

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REVENUE REALISATION

The revenue generation matrix of Durg is as elaborated below: -

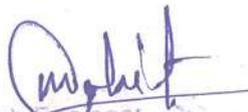
Sr. No.	Year	Particulars	Quantity of water in KL	Rate per KL	Total Revenue per Day	Total Revenue per Month	Total Revenue per Year	Total Cost of O&M	Net Revenue per year after O&M
1	2025	DURG	77000	10.50	8,08,500	2,42,55,000	29,10,60,000	14,67,46,610	14,43,13,391
2	2040	DURG Considering 30% increase	77000	13.65	10,51,050	3,15,31,500	37,83,78,000	19,07,70,592	18,76,07,408
3	2055	DURG Considering 30% increase	77000	17.75	13,66,365	4,09,90,950	49,18,91,400	24,80,01,770	24,38,89,630

POPULATION & DEMAND

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Sub Engineer
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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0

BLOCK : DURG

DISTRICT : DURG

Final Population Projection for Durg

Year	Census Population	Increment per Decade	Incremental Increase	Growth Rate of city (%)
1971	70754			
1981	118597	47843		68
1991	150645	32048	-15795	27
2001	232517	81872	49824	54
2011	268806	36289	-45583	16
Total		198052	-11554	164.6
Average		Average = 49513	(Average = 3851)	Geomean = 0.353

Population Projection

Year	Population	Arithmetic Increase	Incremental Increase	Geometric Increase
		Pop2011+(Year-2011)/10*Avg	Pop2011+ (Year-2011)/10*Avg +(Year-2011)/10*((Year-2011)/10+1)/2*Avg	Pop2011*Power((1+Geomean),(Year-2011)/10)
2011		2,68,806	2,68,806	2,68,806
2012		273757	2,73,545	2,77,053
2013		278709	2,78,246	2,85,552
2014		283660	2,82,909	2,94,313
2015		288611	2,87,533	3,03,342
2016		293563	2,92,118	3,12,648
2017		298514	2,96,665	3,22,240
2018		303465	3,01,174	3,32,126
2019		308416	3,05,643	3,42,315
2020		313368	3,10,075	3,52,817
2021		318319	3,14,468	3,63,641
2022		323270	3,18,822	3,74,797
2023		328222	3,23,138	3,86,295
2024		333173	3,27,415	3,98,146
2025		338124	3,31,654	4,10,361
2026		343076	3,35,854	4,22,950
2027		348027	3,40,016	4,35,926
2028		352978	3,44,139	4,49,300
2029		357929	3,48,224	4,63,084
2030		362881	3,52,270	4,77,290
2031		367832	3,56,278	4,91,933
2032		372783	3,60,247	5,07,025
2033		377735	3,64,178	5,22,580
2034		382686	3,68,070	5,38,612
2035		387637	3,71,924	5,55,136
2036		392589	3,75,739	5,72,167
2037		397540	3,79,516	5,89,721
2038		402491	3,83,254	6,07,813
2039		407442	3,86,953	6,26,460
2040		412394	3,90,614	6,45,679
2041		417345	3,94,237	6,65,487
2042		422296	3,97,821	6,85,904
2049		456955	4,21,831	8,47,474
2050		461907	4,25,107	8,73,474
2051		466858	4,28,345	9,00,271

Puranik Brothers Consulting Engineers, Nagpur


Executive Engineer
Municipal Corporation Durg

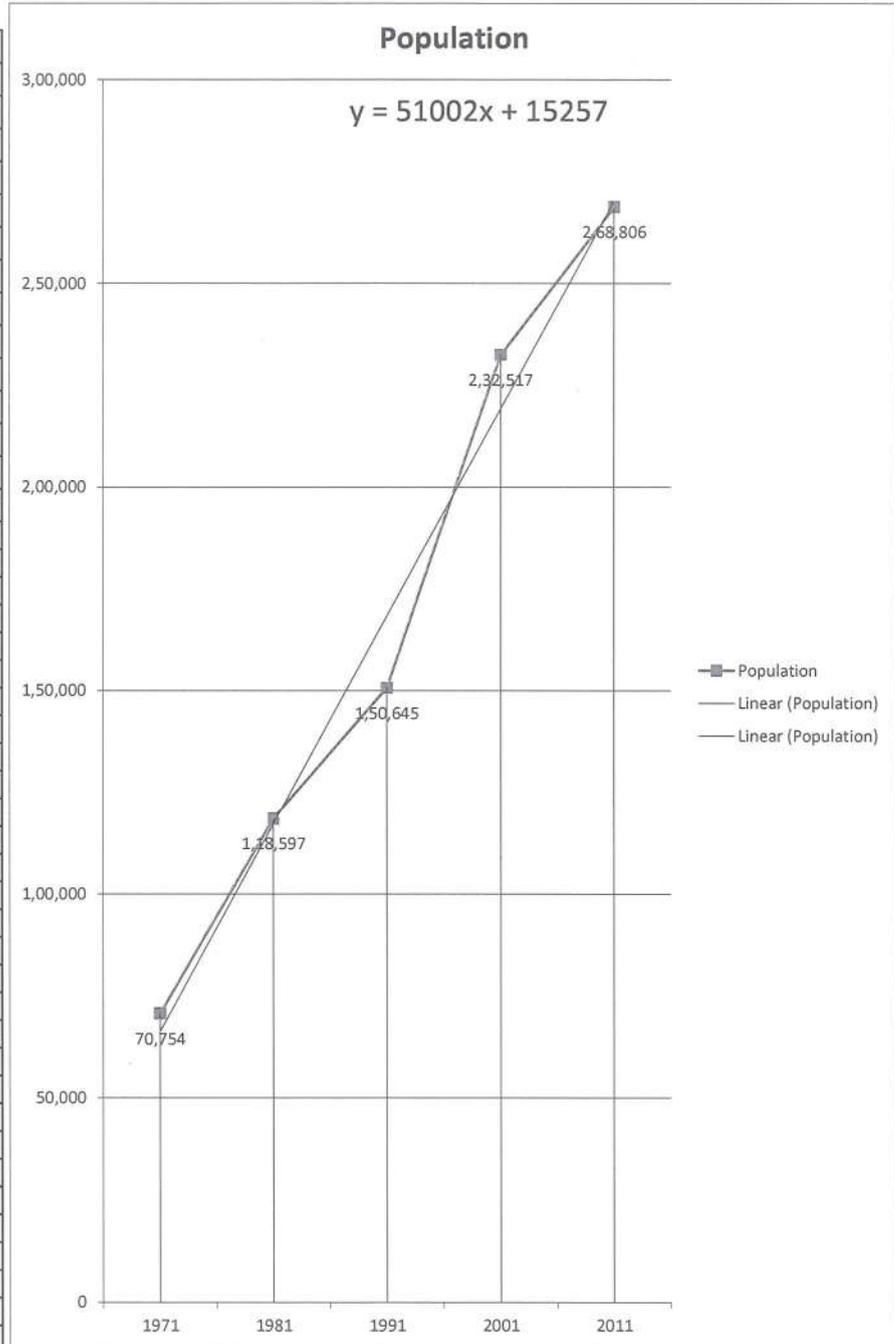

Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

2052		471809	4,31,544	9,27,890
2053		476761	4,34,704	9,56,357
2054		481712	4,37,826	9,85,697
2055		486663	4,40,909	10,15,937

Simple Graph Method

Year	Population
1971	70,754
1981	1,18,597
1991	1,50,645
2001	2,32,517
2011	2,68,806
2012	2,75,367
2013	2,80,467
2014	2,85,568
2015	2,90,668
2016	2,95,768
2017	3,00,868
2018	3,05,968
2019	3,11,069
2020	3,16,169
2021	3,21,269
2022	3,26,369
2023	3,31,469
2024	3,36,570
2025	3,41,670
2026	3,46,770
2027	3,51,870
2028	3,56,970
2029	3,62,071
2030	3,67,171
2031	3,72,271
2032	3,77,371
2033	3,82,471
2034	3,87,572
2035	3,92,672
2036	3,97,772
2037	4,02,872
2038	4,07,972
2039	4,13,073
2040	4,18,173
2041	4,23,273
2042	4,28,373
2043	4,33,473
2044	4,38,574
2045	4,43,674
2046	4,48,774
2047	4,53,874
2048	4,58,974
2049	4,64,075
2050	4,69,175
2051	4,74,275
2052	4,79,375
2053	4,84,475
2054	4,89,576
2055	4,94,676



Puranik Brothers Consulting Engineers, Nagpur

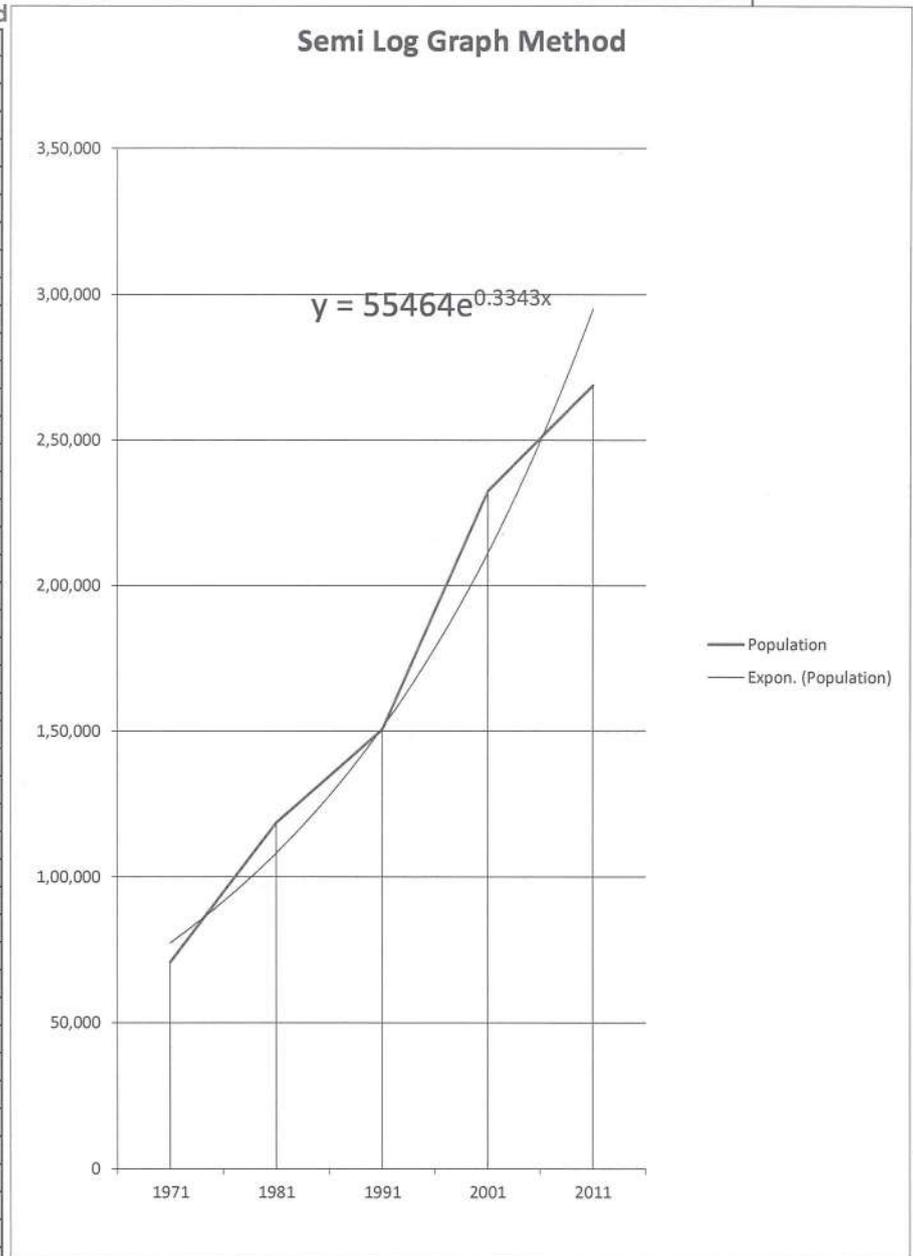
[Signature]
Executive Engineer
 Municipal Corporation Durg

[Signature]
Assistant Engineer
 Municipal Corporation
 Durg

[Signature]
Sub Engineer
 Municipal Corporation Durg

Semi Log Graph Method

Year	Population
1971	70,754
1981	1,18,597
1991	1,50,645
2001	2,32,517
2011	2,68,806
2012	3,05,107
2013	3,15,480
2014	3,26,204
2015	3,37,294
2016	3,48,760
2017	3,60,616
2018	3,72,875
2019	3,85,551
2020	3,98,658
2021	4,12,211
2022	4,26,224
2023	4,40,713
2024	4,55,695
2025	4,71,187
2026	4,87,205
2027	5,03,767
2028	5,20,893
2029	5,38,601
2030	5,56,910
2031	5,75,842
2032	5,95,418
2033	6,15,660
2034	6,36,589
2035	6,58,230
2036	6,80,606
2037	7,03,744
2038	7,27,667
2039	7,52,405
2040	7,77,983
2041	8,04,430
2042	8,31,777
2043	8,60,053
2044	8,89,291
2045	9,19,522
2046	9,50,781
2047	9,83,103
2048	10,16,524
2049	10,51,081
2050	10,86,812
2051	11,23,759
2052	11,61,961
2053	12,01,462
2054	12,42,305
2055	12,84,538



Puranik Brothers Consulting Engineers, Nagpur

[Signature]
 Executive Engineer
 Municipal Corporation Durg

[Signature]
 Assistant Engineer
 Municipal Corporation
 Durg

[Signature]
 Sub Engineer
 Municipal Corporation Durg

Summary					
Year	Population				
	Arithmetic	Geometric	Incremental	Simple Graph	Semi Log
1971	70,754	70,754	70,754	70,754	70,754
1981	1,18,597	1,18,597	1,18,597	1,18,597	1,18,597
1991	1,50,645	1,50,645	1,50,645	1,50,645	1,50,645
2001	2,32,517	2,32,517	2,32,517	2,32,517	2,32,517
2011	2,68,806	2,68,806	2,68,806	2,68,806	3,05,107
2012	2,73,757	2,77,053	2,73,545	2,75,367	3,05,107
2013	2,78,709	2,85,552	2,78,246	2,80,467	3,15,480
2014	2,83,660	2,94,313	2,82,909	2,85,568	3,26,204
2015	2,88,611	3,03,342	2,87,533	2,90,668	3,37,294
2017	2,98,514	3,22,240	2,96,665	3,00,868	3,48,760
2017	2,98,514	3,22,240	2,96,665	3,00,868	3,60,616
2018	3,03,465	3,32,126	3,01,174	3,05,968	3,72,875
2019	3,08,416	3,42,315	3,05,643	3,11,069	3,85,551
2020	3,13,368	3,52,817	3,10,075	3,16,169	3,98,658
2021	3,18,319	3,63,641	3,14,468	3,21,269	4,12,211
2022	3,23,270	3,74,797	3,18,822	3,26,369	4,26,224
2023	3,28,222	3,86,295	3,23,138	3,31,469	4,40,713
2024	3,33,173	3,98,146	3,27,415	3,36,570	4,55,695
2025	3,38,124	4,10,361	3,31,654	3,41,670	4,71,187
2026	3,43,076	4,22,950	3,35,854	3,46,770	4,87,205
2027	3,48,027	4,35,926	3,40,016	3,51,870	5,03,767
2028	3,52,978	4,49,300	3,44,139	3,56,970	5,20,893
2029	3,57,929	4,63,084	3,48,224	3,62,071	5,38,601
2030	3,62,881	4,77,290	3,52,270	3,67,171	5,56,910
2031	3,67,832	4,91,933	3,56,278	3,72,271	5,75,842
2032	3,72,783	5,07,025	3,60,247	3,77,371	5,95,418
2033	3,77,735	5,22,580	3,64,178	3,82,471	6,15,660
2034	3,82,686	5,38,612	3,68,070	3,87,572	6,36,589
2035	3,87,637	5,55,136	3,71,924	3,92,672	6,58,230
2036	3,92,589	5,72,167	3,75,739	3,97,772	6,80,606
2037	3,97,540	5,89,721	3,79,516	4,02,872	7,03,744
2038	4,02,491	6,07,813	3,83,254	4,07,972	7,27,667
2039	4,07,442	6,26,460	3,86,953	4,13,073	7,52,405
2040	4,12,394	6,45,679	3,90,614	4,18,173	7,77,983
2041	4,17,345	6,65,487	3,94,237	4,23,273	8,04,430
2042	4,22,296	6,85,904	3,97,821	4,28,373	8,31,777
2043	4,27,248	7,06,946	4,01,367	4,33,473	8,60,053
2044	4,32,199	7,28,635	4,04,874	4,38,574	8,89,291
2045	4,37,150	7,50,988	4,08,342	4,43,674	9,19,522
2046	4,42,102	7,74,028	4,11,772	4,48,774	9,50,781
2047	4,47,053	7,97,774	4,15,164	4,53,874	9,83,103
2048	4,52,004	8,22,249	4,18,517	4,58,974	10,16,524
2049	4,56,955	8,47,474	4,21,831	4,64,075	10,51,081
2050	4,61,907	8,73,474	4,25,107	4,69,175	10,86,812
2051	4,66,858	9,00,271	4,28,345	4,74,275	11,23,759
2052	4,71,809	9,27,890	4,31,544	4,79,375	11,61,961
2053	4,76,761	9,56,357	4,34,704	4,84,475	12,01,462
2054	4,81,712	9,85,697	4,37,826	4,89,576	12,42,305
2055	4,86,663	10,15,937	4,40,909	4,94,676	12,84,538
	Similar lowest select due to less % of growth	2nd Highest	Lowest	Similar	Highest

The Figures of Population Forecast by Above Three Methods
are summarised as below :

Puranik Brothers Consulting Engineers, Nagpur


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Year	Arithmetical Method	Geometrical Progression Method	Incremental Increase Method	Population Adopted for Design	Adopted Population	Population Projection Factor
2025	3,38,124	4,10,361	3,31,654	3,60,046	3,60,046	1.339
2040	4,12,394	6,45,679	3,90,614	4,82,896	4,82,896	1.796
2055	4,86,663	10,15,937	4,40,909	6,47,837	6,47,837	2.410

POPULATION PROJECTION BASED ON FACTOR ARRIVED AT

S.No.	Ward Number		Population	Projected Population		
			2011	2025	2040	2055
1	Ward No. 1	Naya Para	7547	10109	13558	18189
2	Ward No. 2	Rajiv Nagar	4923	6594	8844	11865
3	Ward No. 3	Matpara (Dakshin)	4161	5573	7475	10028
4	Ward No. 4	Matpara (Uttar)	3136	4200	5634	7558
5	Ward No. 5	Mararpara	4018	5382	7218	9684
6	Ward No. 6	Thetwara	2919	3910	5244	7035
7	Ward No. 7	Killa mandir	3417	4577	6138	8235
8	Ward No. 8	Takiaya Para	5091	6819	9146	12270
9	Ward No. 9	Swami Vivekanand Ward	4595	6155	8255	11074
10	Ward No. 10	Shankar Nagar (Paschim)	4746	6357	8526	11438
11	Ward No. 11	Shankar Nagar (Purva)	4525	6061	8129	10905
12	Ward No. 12	Mohan nagar (Paschim)	4486	6009	8059	10812
13	Ward No. 13	Mohan nagar (Purva)	4459	5973	8010	10746
14	Ward No. 14	Sikola Bhata	4192	5615	7531	10103
15	Ward No. 15	Sikola Basti Dakshin	4645	6222	8345	11195
16	Ward No. 16	Sikola Basti Uttar	6078	8141	10919	14648
17	Ward No. 17	Aoudhyogik nagar Uttar	4891	6551	8786	11788
18	Ward No. 18	Aoudhyogik nagar Dakshin	6089	8156	10939	14675
19	Ward No. 19	Shahid bhagat Sing Dakshin	6599	8839	11855	15904
20	Ward No. 20	Shahid bhagat Sing Uttar	3003	4022	5395	7237
21	Ward No. 21	Titur dih	5352	7169	9615	12899
22	Ward No. 22	Station Para	3581	4796	6433	8630
23	Ward No. 23	Dipak Nagar	4165	5579	7482	10038
24	Ward No. 24	Aamdi Mandir	4582	6137	8231	11043
25	Ward No. 25	Gayatri Mandir	3390	4541	6090	8170
26	Ward No. 26	Samtra Wadi	4002	5360	7189	9645
27	Ward No. 27	Polasy para	4118	5516	7398	9925
28	Ward No. 28	Panchari Para	3481	4663	6253	8389
29	Ward No. 29	Aspatal Ward	2581	3457	4637	6220
30	Ward No. 30	Tamer Para	2747	3679	4935	6620
31	Ward No. 31	Aapa pura	2918	3908	5242	7033
32	Ward No. 32	Bramhan para	3915	5244	7033	9435
33	Ward No. 33	chandi Mandir	3873	5188	6958	9334
34	Ward No. 34	Shivpara	4252	5695	7638	10248

Puranik Brothers Consulting Engineers, Nagpur


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35	Ward No. 35	Ramdeo Mandir	4872	6526	8752	11742
36	Ward No. 36	Ganji Para	3143	4210	5646	7575
37	Ward No. 37	Aazad ward	3446	4616	6191	8305
38	Ward No. 38	milpare	4623	6192	8305	11142
39	Ward No. 39	kchahari Ward	6805	9115	12225	16400
40	Ward No. 40	Surana college	4168	5583	7488	10045
41	Ward No. 41	Kela badi	5497	7363	9875	13248
42	Ward No. 42	Kasrdih Paschim	6593	8831	11844	15889
43	Ward No. 43	Kasrdih Purv	4683	6273	8413	11286
44	Ward No. 44	Baba gurughasi wai	4337	5809	7791	10452
		Padmanabhpur				
45	Ward No. 45	Paschim	4051	5426	7277	9763
46	Ward No. 46	Padmanabhpur Purv	4921	6591	8840	11860
47	Ward No. 47	Civil Line Uttar	4658	6239	8368	11226
48	Ward No. 48	Civil Line Dakshin	5059	6776	9088	12192
49	Ward No. 49	Borsi Paschim	3931	5265	7062	9474
50	Ward No. 50	Borsi Purv	3885	5204	6979	9363
51	Ward No. 51	Borsi Uttar	3826	5125	6873	9221
52	Ward No. 52	Borsi Dakshin	4794	6421	8612	11554
53	Ward No. 53	Potiya kala Uttar	5251	7033	9433	12655
54	Ward No. 54	Potiya kala Dakshin	7187	9626	12911	17321
55	Ward No. 55	Pulgaon	3614	4841	6492	8710
56	Ward No. 56	Baghera	5049	6763	9070	12168
57	Ward No. 57	Urala Paschim	4046	5419	7268	9751
58	Ward No. 58	Urala Purv	4194	5618	7534	10108
59	Ward No. 59	Katulbod Purv	5498	7364	9877	13250
60	Ward No. 60	Katulbod Paschim	4198	5623	7541	10117
		TOTAL	268806	360049	482895	647835


Assistant Engineer
Municipal Corporation
Durg (C.G)


Executive Engineer
Municipal Corporation
Durg (C.G)


Sub Engineer
Municipal Corporation Durg

**DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
STP CAPACITY CALCULATIONS & DEMAND CALCULATIONS**

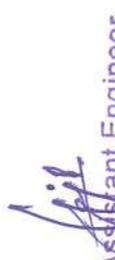
S.N.	Ward No.	Ward	Population					Demand at Consumer End @ 135 LPCD (in MLD)					Fire Fighting Demand (in MLD)					Total Demand (in MLD)					Demand With 15% Losses (in MLD)					Flow for Ultimate Demand (in LPS)					Total Sewage output 80% of water demand (in MLD)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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ZONE-1 SHANKAR NALA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
1	1	Naya Para	7547	10109	13558	18189	1360	1830	2460	0.106	0.123	0.142	1.466	1.953	2.602	1.725	2.297	2.703	31.2819	1.380	1.838	2.163	1.919	2.428	2.859	3.288	3.717	4.146	4.575	5.004	5.433	5.862	6.291	6.720	7.149	7.578	8.007	8.436	8.865	9.294	9.723	10.152	10.581	11.010	11.439	11.868	12.297	12.726	13.155	13.584	14.013	14.442	14.871	15.300	15.729	16.158	16.587	17.016	17.445	17.874	18.303	18.732	19.161	19.590	20.019	20.448	20.877	21.306	21.735	22.164	22.593	23.022	23.451	23.880	24.309	24.738	25.167	25.596	26.025	26.454	26.883	27.312	27.741	28.170	28.599	29.028	29.457	29.886	30.315	30.744	31.173	31.602	32.031	32.460	32.889	33.318	33.747	34.176	34.605	35.034	35.463	35.892	36.321	36.750	37.179	37.608	38.037	38.466	38.895	39.324	39.753	40.182	40.611	41.040	41.469	41.898	42.327	42.756	43.185	43.614	44.043	44.472	44.901	45.330	45.759	46.188	46.617	47.046	47.475	47.904	48.333	48.762	49.191	49.620	50.049	50.478	50.907	51.336	51.765	52.194	52.623	53.052	53.481	53.910	54.339	54.768	55.197	55.626	56.055	56.484	56.913	57.342	57.771	58.200	58.629	59.058	59.487	59.916	60.345	60.774	61.203	61.632	62.061	62.490	62.919	63.348	63.777	64.206	64.635	65.064	65.493	65.922	66.351	66.780	67.209	67.638	68.067	68.496	68.925	69.354	69.783	70.212	70.641	71.070	71.499	71.928	72.357	72.786	73.215	73.644	74.073	74.502	74.931	75.360	75.789	76.218	76.647	77.076	77.505	77.934	78.363	78.792	79.221	79.650	80.079	80.508	80.937	81.366	81.795	82.224	82.653	83.082	83.511	83.940	84.369	84.798	85.227	85.656	86.085	86.514	86.943	87.372	87.801	88.230	88.659	89.088	89.517	89.946	90.375	90.804	91.233	91.662	92.091	92.520	92.949	93.378	93.807	94.236	94.665	95.094	95.523	95.952	96.381	96.810	97.239	97.668	98.097	98.526	98.955	99.384	99.813	100.242	100.671	101.100	101.529	101.958	102.387	102.816	103.245	103.674	104.103	104.532	104.961	105.390	105.819	106.248	106.677	107.106	107.535	107.964	108.393	108.822	109.251	109.680	110.109	110.538	110.967	111.396	111.825	112.254	112.683	113.112	113.541	113.970	114.399	114.828	115.257	115.686	116.115	116.544	116.973	117.402	117.831	118.260	118.689	119.118	119.547	119.976	120.405	120.834	121.263	121.692	122.121	122.550	122.979	123.408	123.837	124.266	124.695	125.124	125.553	125.982	126.411	126.840	127.269	127.698	128.127	128.556	128.985	129.414	129.843	130.272	130.701	131.130	131.559	131.988	132.417	132.846	133.275	133.704	134.133	134.562	134.991	135.420	135.849	136.278	136.707	137.136	137.565	137.994	138.423	138.852	139.281	139.710	140.139	140.568	140.997	141.426	141.855	142.284	142.713	143.142	143.571	144.000	144.429	144.858	145.287	145.716	146.145	146.574	147.003	147.432	147.861	148.290	148.719	149.148	149.577	150.006	150.435	150.864	151.293	151.722	152.151	152.580	153.009	153.438	153.867	154.296	154.725	155.154	155.583	156.012	156.441	156.870	157.299	157.728	158.157	158.586	159.015	159.444	159.873	160.302	160.731	161.160	161.589	162.018	162.447	162.876	163.305	163.734	164.163	164.592	165.021	165.450	165.879	166.308	166.737	167.166	167.595	168.024	168.453	168.882	169.311	169.740	170.169	170.598	171.027	171.456	171.885	172.314	172.743	173.172	173.601	174.030	174.459	174.888	175.317	175.746	176.175	176.604	177.033	177.462	177.891	178.320	178.749	179.178	179.607	180.036	180.465	180.894	181.323	181.752	182.181	182.610	183.039	183.468	183.897	184.326	184.755	185.184	185.613	186.042	186.471	186.900	187.329	187.758	188.187	188.616	189.045	189.474	189.903	190.332	190.761	191.190	191.619	192.048	192.477	192.906	193.335	193.764	194.193	194.622	195.051	195.480	195.909	196.338	196.767	197.196	197.625	198.054	198.483	198.912	199.341	199.770	200.199	200.628	201.057	201.486	201.915	202.344	202.773	203.202	203.631	204.060	204.489	204.918	205.347	205.776	206.205	206.634	207.063	207.492	207.921	208.350	208.779	209.208	209.637	210.066	210.495	210.924	211.353	211.782	212.211	212.640	213.069	213.498	213.927	214.356	214.785	215.214	215.643	216.072	216.501	216.930	217.359	217.788	218.217	218.646	219.075	219.504	219.933	220.362	220.791	221.220	221.649	222.078	222.507	222.936	223.365	223.794	224.223	224.652	225.081	225.510	225.939	226.368	226.797	227.226	227.655	228.084	228.513	228.942	229.371	229.800	230.229	230.658	231.087	231.516	231.945	232.374	232.803	233.232	233.661	234.090	234.519	234.948	235.377	235.806	236.235	236.664	237.093	237.522	237.951	238.380	238.809	239.238	239.667	240.096	240.525	240.954	241.383	241.812	242.241	242.670	243.099	243.528	243.957	244.386	244.815	245.244	245.673	246.102	246.531	246.960	247.389	247.818	248.247	248.676	249.105	249.534	249.963	250.392	250.821	251.250	251.679	252.108	252.537	252.966	253.395	253.824	254.253	254.682	255.111	255.540	255.969	256.398	256.827	257.256	257.685	258.114	258.543	258.972	259.401	259.830	260.259	260.688	261.117	261.546	261.975	262.404	262.833	263.262	263.691	264.120	264.549	264.978	265.407	265.836	266.265	266.694	267.123	267.552	267.981	268.410	268.839	269.268	269.697	270.126	270.555	270.984	271.413	271.842	272.271	272.700	273.129	273.558	273.987	274.416	274.845	275.274	275.703	276.132	276.561	276.990	277.419	277.848	278.277	278.706	279.135	279.564	279.993	280.422	280.851	281.280	281.709	282.138	282.567	282.996	283.425	283.854	284.283	284.712	285.141	285.570	285.999	286.428	286.857	287.286	287.715	288.144	288.573	289.002	289.431	289.860	290.289	290.718	291.147	291.576	292.005	292.434	292.863	293.292	293.721	294.150	294.579	295.008	295.437	295.866	296.295	296.724	297.153	297.582	298.011	298.440	298.869	299.298	299.727	300.156	300.585	301.014	301.443	301.872	302.301	302.730	303.159	303.588	304.017	304.446	304.875	305.304	305.733	306.162	306.591	307.020	307.449	307.878	308.307	308.736	309.165	309.594	310.023	310.452	310.881	311.310	311.739	312.168	312.597	313.026	313.455	313.884	314.313	314.742	315.171	315.600	316.029	316.458	316.887	317.316	317.745	318.174	318.603	319.032	319.461	319.890	320.319	320.748	321.177	321.606	322.035	322.464	322.893	323.322	323.751	324.180	324.609	325.038	325.467	325.896	326.325	326.754	327.183	327.612	328.041	328.470	328.899	329.328	329.757	330.186	330.615	331.044	331.473	331.902	332.331	332.760	333.189	333.618	334.047	334.476	334.905	335.334	335.763	336.192	336.621	337.050	337.479	337.908	338.337	338.766	339.195	339.624	340.053	340.482	340.911	341.340	341.769	342.198	342.627	343.056	343.485	343.914	344.343	344.772	345.201	345.630	346.059	346.488	346.917	347.346	347.775	348.204	348.633	349.062	349.491	349.920	350.349	350.778	351.207	351.636	352.065	352.494	352.923	353.352	353.781	354.210	354.639	355.068	355.497	355.926	356.355	356.784	357.213	357.642	358.071	358.500	358.929	359.358	359.787	360.216	360.645	361.074	361.503	361.932	362.361	362.790	363.219	363.648	364.077	364.506	364.935	365.364	365.793	366.222	366.651	367.080	367.509	367.938	368.367	368.796	369.225	369.654	370.083	370.512	370.941	371.370	371.799	372.228	372.657	373.086	373.515	373.944	374.373	374.802	375.231	375.660	376.089	376.518	376.947	377.376	377.805	378.234	378.663	379.092	379.521	379.950	380.379	380.808	381.237	381.666	382.095	382.524	382.953	383.382	383.811	384.240	384.669	385.098	385.527	385.956	386.385	386.814	387.243	387.672	388.101	388.5

S.N.	Ward No.	Ward	Population			Demand at Consumer End @ 135 LPCD (in MLD)			Fire Fighting Demand (in MLD)			Total Demand (in MLD)			Demand With 15% Losses (in MLD)			Flow for Ultimate Demand (in LPS)			Total Sewage output 80% of water demand (in MLD)			
			2011	2025	2040	2055	2025	2040	2055	2025	2040	2055	2025	2040	2055	2025	2040	2055	2025	2040	2055	2025	2040	2055
ZONE 2 PULGAON NALLA																								
24	24	Aamdi Mandir	4582	6137	8231	11043	0.830	1.110	1.490	0.083	0.086	0.111	0.913	1.206	1.601	1.074	1.418	1.689	19.3137	0.86	1.13	1.33		
27	27	Polay para	4118	5516	7398	9925	0.740	1.000	1.340	0.078	0.091	0.105	0.818	1.091	1.445	0.963	1.283	1.510	17.4719	0.77	1.03	1.21		
28	28	Panchari Para	3481	4863	6263	8389	0.630	0.840	1.130	0.072	0.083	0.097	0.702	0.923	1.227	0.826	1.086	1.278	14.7917	0.66	0.87	1.02		
29	29	Aspatal Ward	2581	3457	4637	6220	0.470	0.630	0.840	0.062	0.072	0.083	0.532	0.702	0.923	0.626	0.826	0.971	11.2422	0.50	0.66	0.78		
30	30	Tamer Para	2747	3679	4935	6620	0.500	0.670	0.890	0.064	0.074	0.086	0.564	0.744	0.976	0.663	0.875	1.030	11.9193	0.53	0.70	0.82		
31	31	Aapa pura	2918	3908	5242	7033	0.530	0.710	0.950	0.066	0.076	0.088	0.596	0.786	1.038	0.701	0.925	1.088	12.5965	0.56	0.74	0.87		
35	35	Ramdeo Mandir	4872	6526	8752	11742	0.880	1.180	1.590	0.085	0.099	0.114	0.965	1.279	1.704	1.135	1.504	1.770	20.4828	0.91	1.20	1.42		
36	36	Ganji Para	3143	4210	5646	7675	0.570	0.760	1.020	0.068	0.079	0.092	0.638	0.839	1.112	0.751	0.987	1.162	13.4437	0.60	0.79	0.93		
44	37	Aazad ward	3446	4616	6191	8305	0.620	0.840	1.120	0.072	0.083	0.096	0.692	0.923	1.216	0.814	1.086	1.277	14.7851	0.65	0.87	1.02		
45	38	milpare	4623	6192	8305	11142	0.840	1.120	1.500	0.083	0.096	0.111	0.923	1.216	1.611	1.086	1.431	1.683	19.4807	0.87	1.14	1.35		
46	39	kchahari Ward	6805	9115	12225	16400	1.230	1.650	2.210	0.101	0.117	0.135	1.331	1.767	2.345	1.565	2.078	2.445	28.2992	1.25	1.66	1.96		
47	40	Surana college	4168	5583	7488	10045	0.750	1.010	1.360	0.079	0.091	0.106	0.829	1.101	1.466	0.975	1.296	1.524	17.6409	0.78	1.04	1.22		
48	41	Kela badi	5497	7363	9875	13248	0.990	1.330	1.790	0.090	0.105	0.121	1.080	1.435	1.911	1.271	1.688	1.986	22.9840	1.02	1.35	1.59		
49	42	Kasroth Paschim	6593	8831	11844	15889	1.190	1.600	2.150	0.099	0.115	0.133	1.289	1.715	2.283	1.517	2.017	2.373	27.4689	1.21	1.61	1.90		
50	43	Kasroth Purv	4683	6273	8413	11286	0.850	1.140	1.520	0.083	0.097	0.112	0.933	1.237	1.632	1.098	1.455	1.712	19.8111	0.88	1.16	1.37		
51	44	Baba gunghasi wai	4337	5809	7791	10452	0.780	1.050	1.410	0.080	0.093	0.108	0.860	1.143	1.518	1.012	1.345	1.582	18.3110	0.81	1.08	1.27		
52	45	Padmanabpur Paschim	4051	5426	7277	9763	0.730	0.980	1.320	0.078	0.090	0.104	0.808	1.070	1.424	0.950	1.259	1.481	17.1396	0.76	1.01	1.18		
53	46	Padmanabpur Purv	4921	6591	8840	11860	0.890	1.190	1.600	0.086	0.099	0.115	0.976	1.289	1.715	1.148	1.517	1.784	20.6509	0.92	1.21	1.43		
38	48	Civil Line Dakshin	5059	6776	9088	12192	0.910	1.230	1.650	0.087	0.100	0.116	0.997	1.330	1.766	1.173	1.565	1.842	21.3138	0.94	1.25	1.47		
54	49	Borsi Paschim	3931	5265	7062	9474	0.710	0.950	1.280	0.076	0.089	0.103	0.786	1.039	1.383	0.925	1.222	1.437	16.6376	0.74	0.98	1.15		
55	50	Borsi Purv	3885	5204	6979	9363	0.700	0.940	1.260	0.076	0.088	0.102	0.776	1.028	1.362	0.913	1.209	1.423	16.4690	0.73	0.97	1.14		
56	51	Borsi Uttar	3826	5125	6873	9221	0.690	0.930	1.240	0.075	0.087	0.101	0.765	1.017	1.341	0.901	1.197	1.408	16.2981	0.72	0.96	1.13		
57	52	Borsi Dakshin	4794	6421	8612	11554	0.870	1.160	1.560	0.084	0.098	0.113	0.954	1.258	1.673	1.123	1.480	1.741	20.1497	0.90	1.18	1.39		
58	53	Potiya kala Uttar	5251	7033	9433	12655	0.950	1.270	1.710	0.088	0.102	0.119	1.038	1.372	1.829	1.222	1.615	1.899	21.9848	0.98	1.29	1.52		
59	54	Potiya kala Dakshin	7187	9626	12911	17321	1.300	1.740	2.340	0.103	0.120	0.139	1.403	1.860	2.479	1.651	2.188	2.574	29.7926	1.32	1.75	2.06		
60	55	Pulgaon	3614	4841	6492	8710	0.650	0.880	1.180	0.073	0.085	0.098	0.723	0.965	1.278	0.851	1.135	1.336	15.4577	0.68	0.91	1.07		
Ground water extraction contributing to sewage as per flow measurement (base year) & estimated for ultimate and intermediate																								
			115113	154186	206793	277427																		
Total Zone-2			268806	360049	482895	647835	48.580	65.180	87.450	4.866	5.635	6.527	53.446	70.815	93.977	62.878	83.312	98.014			22.48	29.72	35.00	
Grand Total																				59.303	76.397	88.921		
																				46.68	47 MLD			
																				29.72	30 MLD			
																				76.40	77 MLD			

For STP @ Shankar Nalla
46.68 47 MLD
For STP @ Pulgaon Nalla
29.72 30 MLD
Total Capacity
76.40 77 MLD

The Capacity of Shankar nalla STP comes out to be 47 MLD for intermediate stage.
The Capacity of pulgaon nalla STP comes out to be 30 MLD for intermediate stage.


Sub Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Executive Engineer
Municipal Corporation Durg

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0				
Block : Durg		District : Durg		
Capacity Calculation of Secondary Sewage Treatment Plant				
Sr. No.	Daily Requirement	Present Stage 2025	Immediate Stage 2040	Ultimate Stage 2055
1	Population (Souls)	360049	482895	647835
2	Rate of water Supply for Domestic purpose through house connection	135 lpcd	135 lpcd	135 lpcd
3	Daily domestic demand in MLD	48.61 MLD	65.19 MLD	87.46 MLD
4	Fire Firefighting Demand in MLD	4.87	5.64	6.53
5	Total Demand including institutional and firefighting demand in MLD	53.48	70.83	93.99
6	Total Demand Including 15 % Losses in MLD	62.91 MLD	83.32 MLD	110.57 MLD
7	Generation of Sewage as per CPHEEO Norms 80% in MLD	50.330 MLD	66.659 MLD	88.458 MLD
8	Ground Water Extraction contributing to sewage as per flow measurement in MLD	2.990 MLD	3.730 MLD	4.480 MLD
9	Other Factor :- Hudco Area contributing in Shankar Nala Durg in MLD	6.000	6.000	6.000
10	Final Capacity (in MLD)	59.320	76.389	98.938
11	Hence capacity of proposed STP		77.0 MLD	
	Proposed Capacity of Shankar Nala		47.00	MLD
	Proposed Capacity of Pulgaon Nala		30.00	MLD

Puranik Brothers Consulting Engineers, Nagpur


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0

Tool for Design of Sewage Pumping Station (WET WELL-1) Near Shankar Nala

Guidance: In yellow cells information to be filled as per particular requirement. In green cells review the information and update/revise if needed.

Sr. no	Design of Sewage Lifting Station	Unit	PS for STP
A	Input Information: In yellow cells information to be filled as per particular requirement		
1	a. Peak Sewage flow in MLD 2055	MLD	121.33
	a.1. Peak Sewage flow	lps	1404.31
	b. Peak Sewage flow in MLD 2040	MLD	105.02
	b.1. Peak Sewage flow	lps	1215.55
2	Peak factor		2.25
3	Liquid depth in wet well assumed	m	3.00
4	Invert Level	m	303.50
	Level of STP inlet Chamber	m	322.80
5	Ground Level	m	314.00
6	Delivery length of pumping Main	m	100.00
7	Level of Delivery Point above GL of SPS	m	19.30
B	Review/Update If needed: In green cells review information and update if needed		
8	Detention time in Wetwell	mins	15.00
9	Velocity of flow during peak flow	m/s	3.00
10	Velocity of flow during average flow	m/s	0.60
11	Proposed pumps Working	numbers	4
12	Stand by pumps		50.00%
13	Material of pumping Main pipe		DI K-9 Pipe
C	Design of Sewage Pumping Station		
1	Peak Sewage flow 2055	lpd	121332590
2	Average Sewage flow 2055	lpd	53925596
3	Average Sewage flow 2055	lps	624.14
	Wetwell Design		
4	Volume of the Wetwell Required	Cum	561.72
5	Area of the Wetwell Required	Sq.m	187.24
6	Diameter of the wetwell	m	15.44
7	Diameter of the wetwell, say	m	15.50
8	Size of the Rectangular Well Length	m	16.00
	Width	m	12.00


Assistant Engineer
Municipal Corporation
Durg (C.G)


Executive Engineer
Municipal Corporation
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Municipal Corporation Durg

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DESIGN OF PUMPING MACHINERY & RISING MAIN
From Proposed Wetwell at Shankar Nala PS to STP

1	Condition of Flow	Intermediate flows			Intermediate flows			Ultimate flows		
		Low	Avg	Peak	Low	Avg	Peak	Low	Avg	Peak
2	Stage									
3	Average flow, cum/day		36821.0			46677.0			53925.60	
4	Proportion	0.5	1	2.25	0.5	1	2.25	0.5	1	2.25
5	Design flow, cum/day	18411	36821	82847	23338.5	46677	105023.25	26962.798	53925.596	121332.59
6	Hazen williams C	140	140	140	140	140	140	140	140	140
7	Desired velocity, m/s	0.8	1.6	3.6	0.8	1.6	3.6	0.8	1.6	3.6
8	Area needed, sqm	0.266	0.266	0.266	0.338	0.338	0.338	0.390	0.390	0.390
9	Diameter needed, m	0.583	0.583	0.583	0.656	0.656	0.656	0.705	0.705	0.705
10	Diameter needed, mm	1300	1300	1300	1300	1300	1300	1300	1300	1300
11	Radius, m	0.291	0.291	0.291	0.328	0.328	0.328	0.352	0.352	0.352
12	Radius power 0.63	0.460	0.460	0.460	0.495	0.495	0.495	0.518	0.518	0.518
13	S power 0.54	0.015	0.029	0.066	0.014	0.027	0.061	0.013	0.026	0.058
14	Slope 1 in	0.000	0.001	0.007	0.000	0.001	0.006	0.000	0.001	0.005
15	Length in m	2489.72	689.74	153.64	2859.16	792.09	176.44	3110.35	861.68	191.94
16	Friction in pipeline, m	0.04	0.14	0.65	0.03	0.13	0.57	0.03	0.12	0.52
17	Velocity head, m	0.033	0.13	0.661	0.033	0.13	0.661	0.033	0.13	0.661
18	Friction factor in fittings	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
19	Static lift, m	0.4653	1.833	9.3201	0.4653	1.833	9.3201	0.4653	1.833	9.3201
20	Total head, m	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30	19.30
21	Efficiency of pumpset	19.77	21.13	28.62	19.77	21.13	28.62	19.77	21.13	28.62
22	Discharge, lps	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
23	Kw required	213.08	426.17	958.88	270.12	540.24	1215.55	312.07	624.14	1404.31
24	HP required	64.47	137.87	420.10	81.73	174.77	532.55	94.42	201.91	615.26
25	area m2 for 800 mm dia	86	185	563	110	234	714	127	271	825
26	velocity for 800 mm dia	0.213084	0.426169	0.95888	0.270122	0.540243	1.215547	0.312069	0.624139	1.404312
27	Provide 800 mm dia DI K-9 Pipe so that we get at least velocity of 1.08 m/s for average flow in intermediate stage & pumps for intermediate stage	0.5024	0.5024	0.5024	0.5024	0.5024	0.5024	0.5024	0.5024	0.5024
28		0.42	0.85	1.91	0.54	1.08	2.42	0.62	1.24	2.80

As per the calculations shown in table above provide 180 HP (4 Working + 2 Stand by) VT Pumps.

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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0

Tool for Design of Sewage Pumping Station (WET WELL-2) Near Pulgaon Nala

Guidance: In yellow cells information to be filled as per particular requirement. In green cells review the information and update/revise if needed.

Sr. no	Design of Sewage Lifting Station	Unit	PS for STP
A Input Information: In yellow cells information to be filled as per particular requirement			
1	a. Peak Sewage flow in MLD 2055	MLD	78.74
	a.1. Peak Sewage flow	lps	911.34
	b. Peak Sewage flow in MLD 2040	MLD	66.87
	b.1. Peak Sewage flow	lps	773.95
2	Peak factor		2.25
3	Liquid depth in wet well assumed	m	3.00
4	Invert Level of Wet Well Pump	m	302.15
	Level of STP Inlet Chamber		317.54
5	Ground Level	m	315.12
6	Delivery length of pumping Main	m	200.00
7	Level of Delivery Point above GL of SPS	m	15.39
B Review/Update if needed: In green cells review information and update if needed			
8	Detention time in Wetwell	mins	15.00
9	Velocity of flow during peak flow	m/s	3.00
10	Velocity of flow during average flow	m/s	0.60
11	Proposed pumps Working	numbers	4
12	Stand by pumps		50.00%
13	Material of pumping Main pipe		DI K-9 Pipe
C Design of Sewage Pumping Station			
1	Peak Sewage flow	lpd	78739813
2	Average Sewage flow	lpd	34995472
3	Average Sewage flow	lps	405.04
Wetwell Design			
4	Volume of the Wetwell Required	Cum	364.54
5	Area of the Wetwell Required	Sq.m	121.51
6	Diameter of the wetwell	m	12.44
7	Diameter of the wetwell, say	m	12.50
8	Size of the Rectangular Well Length	m	14.00
	Width	m	9.00


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DESIGN OF PUMPING MACHINERY & RISING MAIN
 From Proposed Wetwell at Pulgaon Naala PS to STP

1	Condition of Flow	Intermediate flows			Intermediate flows			Ultimate flows		
		Low	Avg	Peak	Low	Avg	Peak	Low	Avg	Peak
2	Stage		22482.4		29719.7		34995.47			
3	Average flow, cum/day		1		1		1			
4	Proportion	0.5		2.25	0.5		2.25	0.5		2.25
5	Design flow, cum/day	11241	22482	50585	14859.829	29719.658	68869.23	17497.736	34995.472	78739.813
6	Hazen williams C	140	140	140	140	140	140	140	140	140
7	Desired velocity, m/s	0.8	1.6	3.6	0.8	1.6	3.6	0.8	1.6	3.6
8	Area needed, sqm	0.163	0.163	0.163	0.215	0.215	0.215	0.253	0.253	0.253
9	Diameter needed, m	0.455	0.455	0.455	0.523	0.523	0.523	0.568	0.568	0.568
10	Diameter needed, mm	1300	1300	1300	1300	1300	1300	1300	1300	1300
11	Radius, m	0.228	0.228	0.228	0.262	0.262	0.262	0.284	0.284	0.284
12	Radius power 0.63	0.394	0.394	0.394	0.430	0.430	0.430	0.452	0.452	0.452
13	S power 0.54	0.017	0.034	0.077	0.016	0.031	0.071	0.015	0.030	0.067
14	S	0.001	0.002	0.009	0.000	0.002	0.007	0.000	0.001	0.007
15	Slope 1 in	1867.11	517.26	115.22	2197.21	608.71	135.59	2416.96	669.59	149.15
16	Length in m	200	200	200	200	200	200	200	200	200
17	Friction in pipeline, m	0.11	0.39	1.74	0.09	0.33	1.48	0.08	0.30	1.34
18	Velocity head, m	0.033	0.13	0.661	0.033	0.13	0.661	0.033	0.13	0.661
19	Friction factor in fittings	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
20	Friction in fittings, m	0.4653	1.833	9.3201	0.4653	1.833	9.3201	0.4653	1.833	9.3201
21	Static lift, m	15.39	15.39	15.39	15.39	15.39	15.39	15.39	15.39	15.39
22	Total head, m	15.86	17.23	24.71	15.86	17.23	24.71	15.86	17.23	24.71
23	Efficiency of pumpset	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
24	Discharge, lps	130.11	260.21	585.48	171.99	343.98	773.95	202.52	405.04	911.34
25	Kw required	31.58	68.61	221.48	41.75	90.70	292.78	49.16	106.80	344.76
26	HP required	42	92	297	56	122	393	66	143	462
27	Discharge in m ³ /s	0.130107	0.260213	0.58548	0.171989	0.343978	0.773949	0.20252	0.40504	0.91134
28	area m ² for 600 mm dia velocity for 600 mm dia	0.2826	0.2826	0.2826	0.2826	0.2826	0.2826	0.2826	0.2826	0.2826
	Provide 600 mm dia DI K-9 Pipe so that we get at least velocity of 1.22 m/s for average flow in intermediate stage & pumpsets for intermediate stage	0.46	0.92	2.07	0.61	1.22	2.74	0.72	1.43	3.22

As per the calculations shown in table above provide 100 HP (4 Working +2 Stand by) VT Pumps.


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DESIGN OF SUB STATIONS AT STP SITE

1. Electric Sub Station for Raw Sewerage Sump & 47 MLD STP at Shankar Nala

Load For STP Pumps and Motors = 1471.00 HP (Load List are attached)
Load for Wet Well Pumps & Motors = 720 HP

TOTAL 2191.00 HP
KVA= $2191 \times 0.746 \times 1.1 / 0.85 =$ 2115.217 KVA

Taking next commercial range= 1 Unit x 2500 KVA/33/3.3 KV

Hence provide 2 x 2500 KVA/33 /3.3 KV (1W+1S) Out door electric sub station at STP well site .

2. Electric Sub Station for Raw Sewerage Sump & 30 MLD STP at Pulgaon Nala

Load For STP Pumps and Motors = 970.00 HP (Load List are attached)
Load for Wet Well Pumps & Motors = 440 HP

TOTAL 1410.00 HP
KVA= $1410 \times 0.746 \times 1.1 / 0.85 =$ 1361.231 KVA

Taking next commercial range= 1 Unit x 1600 KVA/33/3.3 KV

Hence provide 2 x 1600 KVA/33 /3.3 KV (1W+1S) Out door electric sub station at STP well site .


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1 ELECTRICAL LOAD LIST & POWER CONSUMPTION for 47 MLD STP													
SL NO	EQUIPMENT	FLOW m ³ /hr	HEAD mwc	BHP	HP REQD	HP INSTD	Motor Rating KW	Working	Standby	Total	W	S	T
1	Mechanical Fine Bar Screen				1.60	2.0	1.5	2	0	2	4.00	0.00	4.00
2	Flat Belt Conveyor				1.60	2.0	1.5	1	0	1	2.00	0.00	2.00
3	Grit Removal Mechanism				1.60	2.0	1.5	2	0	2	4.00	0.00	4.00
	a. Grit Collection Mechanism				2.40	3.0	2.2	2	0	2	6.00	0.00	6.00
	b. Grit Washing/Classifier Mechanism				0.80	1.0	0.8	2	0	2	2.00	0.00	2.00
	c. Organic Return Pumps				268.22	270.0	200.0	4	2	6	1080.00	540.00	1620.00
4	SBR Air Blowers - Roots	6960	0.66	227.99	268.22	270.0	200.0	4	2	6	1080.00	540.00	1620.00
5	RAS Pumps	260	5	9.54	10.61	12.5	9.3	4	0	4	50.00	0.00	50.00
6	Decanters				0.53	0.75	0.55	4	0	4	3.00	0.00	3.00
7	SAS Pumps	235	10	17.25	19.17	20.0	15.0	4	0	4	80.00	0.00	80.00
8	Auto Valves/Sluice Gates				0.80	1.0	0.8	16	0	16	16.00	0.00	16.00
9	Chlorination System												
	a. Water Booster Pumps	10			4.00	5.0	3.7	1	1	2	5.00	5.00	10.00
	b. NaOH Recirculation Pump				0.80	1.0	0.8	1	0	1	1.00	0.00	1.00
	c. Air Blower				8.00	10.0	7.5	1	0	1	10.00	0.00	10.00
10	Fibre Disc Filter												
10	Sludge Sump Mixer				4.00	5.0	3.7	1	0	1	5.00	0.00	5.00
11	Centrifuges	24			32.00	40.0	30.0	3	1	4	120.00	40.00	160.00
12	Centrifuge Feed Pumps	24	25	7.34	9.18	10.0	7.5	3	1	4	30.00	10.00	40.00
13	Dewatering Polymer Dosing System												
	a. Agitators for Dosing Tanks				1.20	1.5	1.1	2	0	2	3.00	0.00	3.00
	b. Dosing Pumps	0.25			0.80	1.0	0.8	3	1	4	3.00	1.00	4.00
14	Service Water Pumps				4.00	5.0	3.7	1	1	2	5.00	5.00	10.00
15	Electrical Hoist with Travelling Trolley												
	a. 3 HP				2.40	3.0	2.2	4	0	4	12.00	0.00	12.00
16	Plant Area Lighting				24.00	30.0	22.0	1	0	1	30.00	0.00	30.00
	GRAND TOTAL							76	20	96	1471	601	2072

CONVERSION FROM HP TO KW	
HP	kw
0.5	0.37
0.75	0.55
1	0.75
1.5	1.1
2	1.5
3	2.2
5	3.7
7.5	5.5
10	7.5
12.5	9.3
15	11
20	15
25	18.5
30	22
40	30
50	37
120	90
150	110
175	130
270	200
335	250
422	315

1 ELECTRICAL LOAD LIST & POWER CONSUMPTION- 30 MLD STP Durg															
SL NO	EQUIPMENT	FLOW m3/hr	HEAD mwc	BHP	HP REQD	HP INSTD	Motor Rating KW	Working	Standby	Total	W	S	T	CONVERSION FROM HP TO KW	
														HP	kw
1	Mechanical Fine Bar Screen				1.60	2.0	1.5	1	0	1	2.00	0.00	2.00	0.5	0.37
2	Flat Belt Conveyor				1.60	2.0	1.5	1	0	1	2.00	0.00	2.00	0.75	0.55
3	Grit Removal Mechanism													1	0.75
	a. Grit Collection Mechanism				1.60	2.0	1.5	1	0	1	2.00	0.00	2.00	1.5	1.1
	b. Grit Washing/Classifier Mechanism				2.40	3.0	2.2	1	0	1	3.00	0.00	3.00	2	1.5
	c. Organic Return Pumps				1.20	1.5	1.1	1	0	1	1.50	0.00	1.50	3	2.2
4	SBR Air Blowers - Roots	4480	0.66	132.12	155.44	175.0	130.0	4	2	6	700.00	350.00	1050.00	5	3.7
5	RAS Pumps	165	5	6.06	7.13	7.5	5.5	4	0	4	30.00	0.00	30.00	7.5	5.5
6	Decaners				0.53	0.75	0.55	4	0	4	3.00	0.00	3.00	10	7.5
7	SAS Pumps	150	10	11.01	12.96	15.0	11.0	4	0	4	60.00	0.00	60.00	12.5	9.3
8	Auto Valves/Sluice Gates				0.80	1.0	0.8	16	0	16	16.00	0.00	16.00	15	11
9	Chlorination System													20	15
	a. Water Booster Pumps	7			4.00	5.0	3.7	1	1	2	5.00	5.00	10.00	25	18.5
	b. NaOH Recirculation Pump				0.80	1.0	0.8	1	0	1	1.00	0.00	1.00	30	22
	c. Air Blower				8.00	10.0	7.5	1	0	1	10.00	0.00	10.00	40	30
10	Fibre Disc Filter													50	37
12	Sludge Sump Mixer				4.00	5.0	3.7	1	0	1	5.00	0.00	5.00	125	90
13	Centrifuges	23			24.00	30.0	22.0	2	1	3	60.00	30.00	90.00	150	110
14	Centrifuge Feed Pumps	23	25	7.04	8.80	10.0	7.5	2	1	3	20.00	10.00	30.00	175	130
15	Dewatering Polymer Dosing System													215	160
	a. Agitators for Dosing Tanks				1.20	1.5	1.1	2	0	2	3.00	0.00	3.00	240	180
	b. Dosing Pumps	0.24			0.80	1.0	0.8	2	1	3	2.00	1.00	3.00	270	200
16	Service Water Pumps				4.00	5.0	3.7	1	1	2	5.00	5.00	10.00	335	250
17	Centrate Pump	45	15	5.51	6.89	7.5	5.5	1	1	2	7.50	7.50	15.00	422	315
18	Electrical Hoist with Travelling Trolley														
	a. 3 HP				2.40	3.0	2.2	4	0	4	12.00	0.00	12.00		
19	Plant Area Lighting				16.00	20.0	15.0	1	0	1	20.00	0.00	20.00		
	GRAND TOTAL							67	18	85	970	409	1379		


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GENERAL ABSTRACT

Puranik Brothers Consulting Engineers, Nagpur


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**GENERAL ABSTRACT**

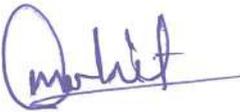
S.R No	PARTICULARS	Amount (Rs. In lacs)
PART A - SEWAGE TREATMENT PLANT		
1	CONSTRUCTION OF RCC DIVERSION WEIR ON SHANKAR NALA & PULGAON NALA	368.86
2	INLET, SCREEN & GRIT CHAMBERS	131.99
3	WET WELL WITH OVERHEAD PUMP HOUSE	628.46
4	CONSTRUCTION OF ELECTRIC SUB STATION AT STP SITE	218.23
	33/3.3 KV SUB STATION OF 2500 KVA & 1600 KVA TRANSFORMERS	
5	RAW SEWER PUMPING MACHINERY AT WET WELLS	678.72
6	PUMPING MAIN 800 MM DIA 100 M LENGTH & 600 MM DIA 200 M LENGTH DI-K 9	109.56
7	INTERCEPTOR RCC NP3 PIPE DIA. 1100MM PIPELINE LENGTH 850.7M.	365.14
8	SEWAGE TREATMENT PLANT 47 MLD FOR SHANKAR NALA AND 30 MLD FOR PULGAON NALA	7955.00
9	ALLIED CIVIL WORKS (COMPOUND WALL , QUARTERS & DEPOSITS TO CSPDCL ETC.)	896.03
10	ESTIMATE FOR 1.22 MWp SOLAR POWER PLANT (0.73 MWp For Shankar Nala and 0.49 Mwp For Pulgaon Nala)	640.50
	TOTAL (Part A) Rs. (in Lakh)	11992.49
PART B - OPERATION AND MAINTENANCE COSTS		
11	Annual Maintenance Cost for 15 years Consisting of Consumption of Chemicals, Establishment Charges & (Excluding Electrical charges)	6881.11
	TOTAL (Part B) Rs. (in Lakh)	6881.11
	Total Amount (Part A + Part B) Rs. In Lacs	18873.60
	Total Amount (Part A + Part B) Rs. In Cr	188.74

Cr.


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Municipal Corporation
Durg


Sub Engineer
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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**GENERAL ABSTRACT**

S.R No	PARTICULARS	Amount (Rs. In laacs)
(PART A) PACKAGE I - 47 MLD SEWAGE TREATMENT PLANT AT SHANKAR NALA		
1	CONSTRUCTION OF RCC DIVERSION WEIR ON SHANKAR NALA	128.23
2	INLET, SCREEN & GRIT CHAMBER AT SHANKAR NALA	80.98
3	WET WELL AND PUMP HOUSE ON SHANKAR NALA	322.31
4	CONSTRUCTION OF ELECTRIC SUB STATION AT STP SITE 33/3.3 KV SUB STATION OF 2 x 2500 KVA TRANSFORMER	114.34
5	RAW SEWER PUMPING MACHINERY AT WET WELL ON SHANKAR NALA 1) For Average flow, Q -270.12 lps, H- 19.77 m	436.32
6	PUMPING MAIN 800 MM DIA 100 M LENGTH DI-K9	49.65
TOTAL (Package-I) Rs. (in Lakh)		1131.83
PACKAGE II - 30 MLD SEWAGE TREATMENT PLANT AT PULGAON NALA		
7	CONSTRUCTION OF RCC DIVERSION WEIR ON PULGAON NALA	240.64
8	INLET, SCREEN & GRIT CHAMBER AT PULGAON NALA	51.01
9	INTERCEPTOR RCC NP3 PIPE DIA. 1100MM PIPELINE LENGTH 850.7M.	365.14
10	WET WELL AND PUMP HOUSE ON PULGAON NALA	306.15
11	CONSTRUCTION OF ELECTRIC SUB STATION AT STP SITE 33/3.3 KV SUB STATION OF 1 x 1600 KVA TRANSFORMER	103.89
12	RAW SEWER PUMPING MACHINERY FROM WET WELL ON PULGAON NALA 1) For Average flow, Q -171.99 lps, H- 15.86 m	242.40
13	PUMPING MAIN 600 MM DIA 200 M LENGTH DI-K9	59.90
TOTAL (Package-II) Rs. (in Lakh)		1369.13
14	SEWAGE TREATMENT PLANT 47 MLD FOR SHANKAR NALA AND 30 MLD FOR PULGAON NALA	7955.00
15	ALLIED CIVIL WORKS (COMPOUND WALL , QUARTERS & DEPOSITS TO CSPDCL ETC.)	896.03
TOTAL (Part A) Rs. (in Lakh)		11351.99

Puranik Brothers Consulting Engineers, Nagpur

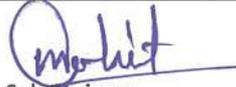

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S.R	PARTICULARS	Amount
PART B - SOLAR POWER GENERATION (ROOF TOP)		
17	ESTIMATE FOR 1.22 MWp SOLAR POWER PLANT (0.73 MWp For Shankar Nala and 0.49 Mwp For Pulgaon Nala)	640.50
	TOTAL (Part B) Rs. (in Lakh)	640.50
	Total Part A + Part B	11992.49
PART C - OPERATION AND MAINTENANCE COSTS		
18	Annual Maintenance Cost for 15 years (for 47 MLD STP) Consisting of Consumption of Chemicals, Establishment Charges & (Excluding Electrical charges)	4135.98
19	Annual Maintenance Cost for 15 years (for 30 MLD STP) Consisting of Consumption of Chemicals, Establishment Charges & (Excluding Electrical charges)	2530.93
20	Annual Maintenance Cost Of Solar for 15 years (for 47 MLD Shankar Nala STP)	107.10
21	Annual Maintenance Cost Of Solar for 15 years (for 30 MLD Pulgaon Nala STP)	107.10
	TOTAL (Part C) Rs. (in Lakh)	6881.11
	Total Amount (Part A + Part B + Part C) Rs. In Lacs	18873.60
	Total Amount (Part A + Part B + Part C) Rs. In Cr	188.74

Cr.



Sub Engineer
Municipal Corporation
Durg (C.G)



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Municipal Corporation
Durg (C.G)



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Municipal Corporation
Durg (C.G)



Commissioner
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Durg (C.G)

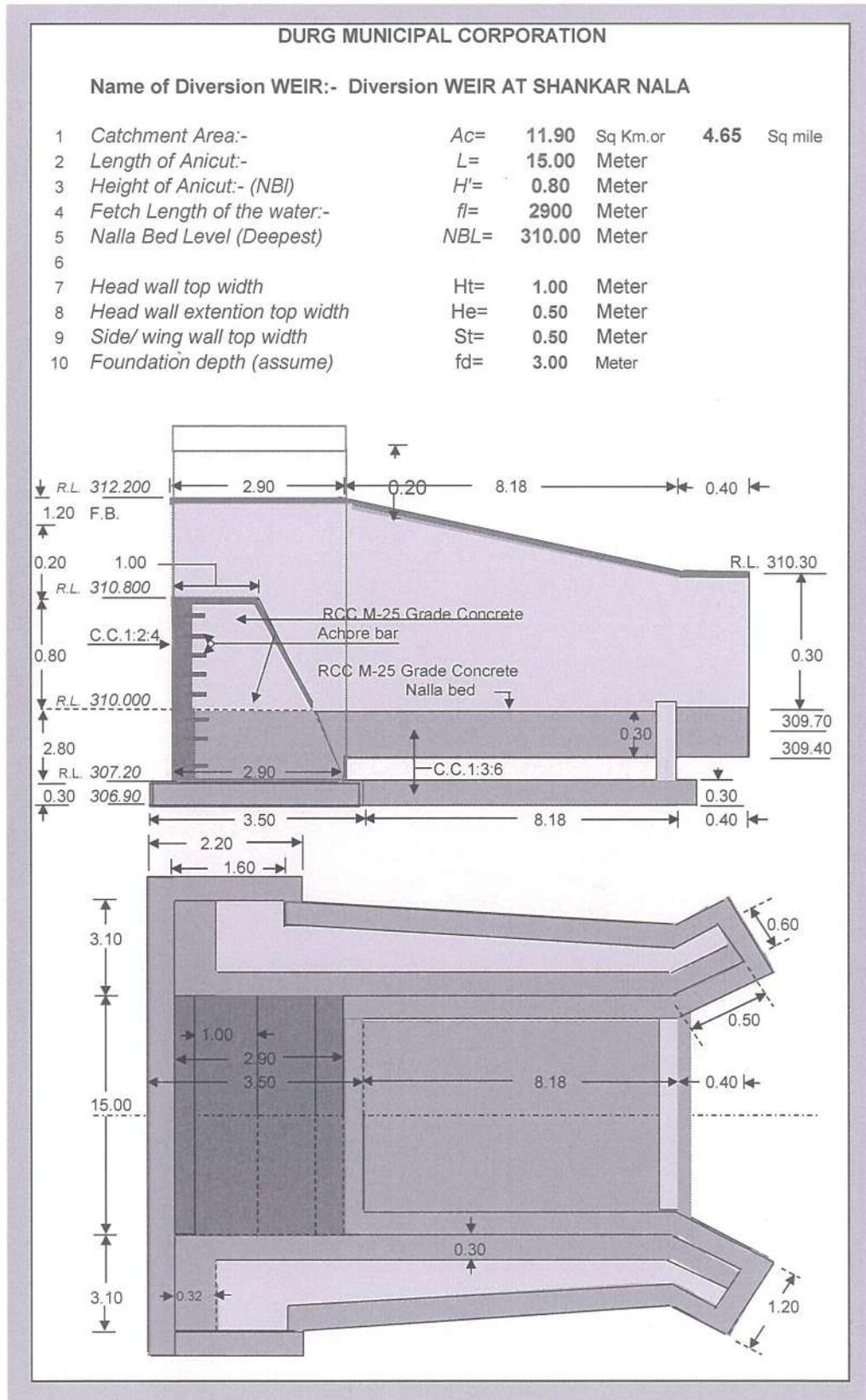
ESTIMATES PACKAGE-I

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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT SHANKAR NALA

Storm Water Runoff		C.I.A/360	
Where	C = Coefficient of Runoff	0.6	
	I = Intensity of Rainfall	38.14 mm/hr	highest at time in Sept
	A = Area in hectare for Nallah	11.90 Sq Km	
1 Catchment Area:-	Ac =	11.90 Sq Km.	4.65 Sq mile
2 Length of Anicut:-	L =	15.00 Meter	
3 Hight of Anicut:-	H' =	0.80 Meter	
4 Average Nallah bed level		310.00 Meter	

DESIGN :**(1) Flood discharge at Weir site**

Using above formula

$$Q = \dots = 0.75644 \text{ cumec} \quad \text{and substituting we have,}$$

$$\text{Max. observed flood discharge} = 1.98 \text{ cumec} \\ + \text{ DWF}$$

2 Hight of water on Anicut:- $h = (Q/1.7L)^{2/3}$

$$h = \left(\frac{1.98}{1.7 \times 30.60} \right)^{2/3} \\ = 0.20 \text{ meter}$$

3 Height of wave:- $hw = 0.014(Df)^{1/2}$

$$hw = 0.014 \times (2900)^{1/2} \\ = 0.80 \text{ meter}$$

4 Free Board :- $fb = 1.5hw$

$$fb = 1.50 \times 0.80 \\ = 1.20 \text{ meter}$$

5 Head wall top width :- $Ht = h/(p-1)^{1/2} > 0.4H$

$$Ht = \frac{0.20}{(2.3-1)^{1/2}} > 0.4H = 0.4 \times 0.80 \\ = 0.20 \text{ meter} \quad \text{Provided} = 0.32$$

$$\text{Required Ht} = 0.32 \text{ meter} \quad \text{Provided} = 1.00 \text{ Meter}$$

6 head wall base width :- $Hb = H + f + h/(p-1)^{1/2}$

$$Hb = \frac{0.80 + 1.20 + 0.20}{(2.3-1)^{1/2}} \\ = 1.90 \text{ meter} \quad \text{Provided} = 2.90 \text{ Meter}$$

7 Head wall Extension Height:- $Heh = H + h + f$

$$Heh = 0.80 + 0.20 + 1.20 \\ = 3.10 \text{ meter}$$

8 Head wall Extension length :- $He = Heh + 1$

$$He = 3.10 \text{ meter}$$

9 Head wall Extension Top width:- $Hetw = 0.4H, >= 0.6m$

$$Hetw = 0.4 \times 0.80 \\ = 0.32 \geq 0.30$$

$$\text{Provided Hetw} = 0.32 \text{ meter}$$

10 Head wall Extension Base Width :- $Heb = 0.5 \text{ head wall extension height}$

$$Heb = 0.5 \times 3.10 \\ = 1.60 \text{ meter}$$

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- 11 **Basin Length :-** $Bl = 0.75(H+h+f)+H$
 $= 0.75 \times 3.10 + 0.80$
 $= 8.38$ meter
- 12 **Basin Width :-** $L = \text{length of anicut}$
 $"L" = 15.00$ meter
- 13 **Basin Thickness :-** $Bt = 4/3x(h/1.3)$
 $Bt = \frac{4}{3} \times \frac{0.20}{1.3}$
 $= 0.30$ meter
- 14 **Side wall Length:-** $Sl = \text{Basin Length}$
 $Sl = 8.38$ meter
- 15 **Side wall top width** $St = 0.50$ meter (assume)
- 16 **Side wall Height (at head wall joint):-** $= \text{head wall extension height}$
 $= 3.10$ meter
- 17 **Side wall Height (at toe wall joint):-** $Sh = 1.5 h$
 $Sh = 1.5 \times 0.20$
 $= 0.30$ meter
- 18 **Side wall Base Width(at head wall joint) :-** $Sbh = 0.6+0.4x(H+h+f)$
 $Sbh = 0.50 + 0.4 \times 3.10$
 $= 1.70$ meter
- 19 **Side wall Base Width (at wing wall joint) :-** $Sbw = 0.6+0.6xh$
 $Sbw = 0.50 + 0.6 \times 0.20$
 $= 0.60$ meter
- 20 **Wing wall length:-** $Wl = 2.25xh$
 $Wl = 2.25 \times 0.20$
 $= 0.50$ meter
- 21 **Wing wall top width:-** $= 0.30$ meter (assume)
- 22 **Wing wall Base Width :-** $Wbw = \text{Side wall base width (at wing wall joint)}$
 $Wbw = 0.60$ meter
- 23 **Wing wall height:-** $wh = 1.5xh$
 $wh = 1.5 \times 0.20$
 $= 0.30$ meter
- 24 **Toe wall Length:-** $Tl = \text{Length of weir}$
 $= 15.00$ meter
- 25 **Toe Wall Top width :-** $= 0.30$ meter (assume)
- 26 **Max. Depth of Foundation in Earth or upto depth of D/R or H/R witch ever is less (from F.S.L.)**
 $D_{max} = 1.5 \times 0.47 (Q/0.7)^{1/3} = 1.5 \times 0.47 \times (1.98 / 0.7)^{1/3}$
 $= 1.00$ meter
 if $W = 4.75 \times Q^{1/2} > L$
 $= 4.75 \times (1.98)^{1/2}$
 $= 6.70$ meter > 15.00
 Than $d1 = d(w/l)^{0.6}$
 $= 1.00 \times (6.70 / 15.00)^{0.6}$
 $= 0.70$ meter
 Required. foundation depth = **-0.30** meter **from nalla bed**
 Provided Foundation depth = **3.00** meter


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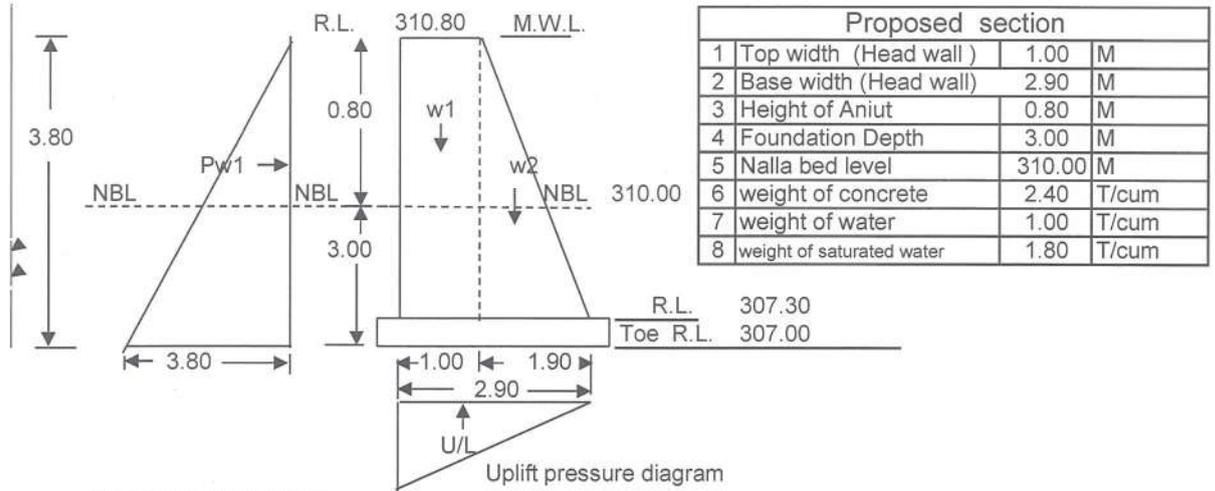
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**DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT SHANKAR NALA
STABILITY CHEKING OF HEAD WALL (main)**

Condition :- When water in U/S at M.W.L. and no tail water in d/s and considering full up lift



Taking moment at Toe

Sno.	Item	particulars	Force		L.A.	Moment	
			V	H		Mr	Mo
1	w1	1.00 x 3.80 x 2.40	= 9.12	-	2.40	21.89	-
2	w2	0.5 x 3.80 x 1.90 x 2.40	= 8.66	-	1.27	10.97	-
4	Pw1	0.5 x 3.80 x 3.80 x 1.00	= -	7.22	1.27	-	9.15
5	u/p lift	0.5 x 3.80 x 2.90 x 1.00	= -5.51	-	1.93	-	10.65
Total			= 12.27	7.22	-	32.86	19.80

$$\begin{aligned} \Sigma V &= 12.27 \text{ t/m} & \Sigma Mr &= 32.86 \text{ t/m} \\ \Sigma H &= 7.22 \text{ t/m} & \Sigma Mo &= 19.80 \text{ t/m} \\ \Sigma M &= 32.86 - 19.80 = 13.06 \text{ t/m} \\ \bar{X} &= \Sigma M / \Sigma V = 13.06 / 12.27 = 1.06 \text{ M} \\ b/3 &= 2.90 / 3 = 0.97 \text{ M} \\ 2b/3 &= (2 \times 2.90) / 3 = 1.93 \text{ M} \\ b/6 &= 2.90 / 6 = 0.48 \text{ M} \end{aligned}$$

$$\begin{aligned} 2b/3 &> \bar{X} > b/3 &= \text{than safe} \\ 1.93 &> 1.06 &= \text{O.K} \\ 1.06 &> 0.97 &= \text{O.K} \end{aligned}$$

$$1. \text{Eccentricity :- } e = b/2 - \bar{X} < b/6 \text{ than safe} \\ = 2.90 / 2 - 1.06 = 0.39 < 0.48$$

No tenson developed

$$\begin{aligned} 1. \text{ Check against Sliding :- } \Sigma V / \Sigma H &> 1 \text{ than safe} \\ \Sigma V / \Sigma H &= 12.27 / 7.22 = 1.70 > 1 \quad \text{O.K} \\ 2. \text{ Check Against Over turning :- } \Sigma Mr / \Sigma Mo &> 1.5 \text{ than safe} \\ &= 32.86 / 19.80 = 1.66 > 1.5 \quad \text{O.K} \end{aligned}$$

$$4. \text{ Maximum compressive / tensile at heel.} = \Sigma v / b(1-6e/b) < -1 \text{ t/m}^2 \text{ than safe} \\ = \frac{12.27}{2.90} \times (1.00 - \frac{6 \times 0.39}{2.90}) = 0.82 \text{ t/m}^2 \text{ Hence safe.}$$

$$3. \text{ Maximum compressive stress at toe.} = \Sigma v / b(1+6e/b) < 15 \text{ t/m}^2 \text{ than safe} \\ = \frac{12.27}{2.90} \times (1.00 + \frac{6 \times 0.39}{2.90}) = 7.65 \text{ t/m}^2 \text{ hence safe.}$$

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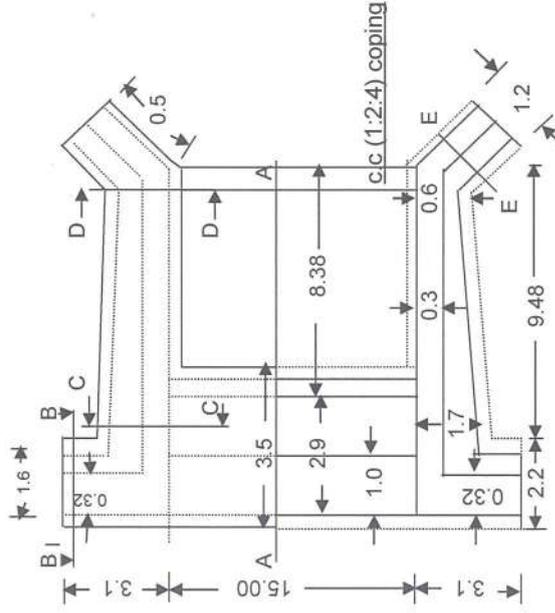
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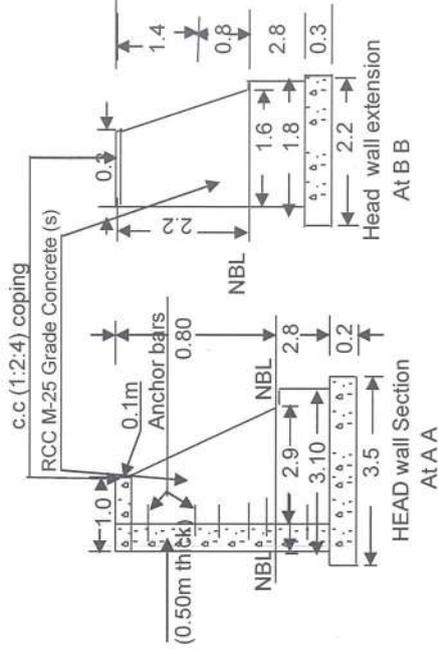
DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT SHANKAR NALA

- | | | | | | |
|---------------------------------|------|--------|----------|-------------|---------|
| 1 Catchmer. | Ac= | 11.90 | Sq Km.or | 4.65 | Sq mile |
| 2 Length of Anicut:- | L= | 15.00 | Meter | | |
| 3 Hight of Anicut:- (NBL) | H'= | 0.80 | Meter | | |
| 4 Fetch Length of the water:- | fl= | 2900 | Meter | | |
| 5 Nalla Bed Level (Deepest) | NBL= | 310.00 | Meter | | |
| 6 | | | | | |
| 7 Head wall top width | Ht= | 1.00 | Meter | | |
| 8 Head wall extension top width | He= | 0.30 | Meter | | |
| 9 Side/ wing wall top width | St= | 0.30 | Meter | | |
| 10 Foundation depth (assume) | fd= | 3.00 | Meter | | |

Foundation strata classification	
item	%
A. E/w in kanker boulder	25
B. E/w in D/R rock	25
C. H/R not required blasting	25
D. E/w in phylites & other rock	25



HALF TOP HALF BOTTOM PLAN



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.1****Abstract****DIVERSION WEIR AT SHANKAR NALLAH**

Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
1	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulders in wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surface excavated stuff within a radius of 0.5km as directed by Engineer - in-charge, etc. complete excluding refilling. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 For lift 0.0 to 1.5 m.	275.74	cum	201.00	55424.00
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51 For lift 0 to 1.5 m. For lift 1.5 to 3.0 m.			Basic Rate 266 Add Extra for every additional lift of 1.5m 67 266 333.00	36674.00 71469.00
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51) For lift 1.5 to 3.0 m. For lift 3.0 to 4.5 m. For lift 4.5 to 6.0 m.			Basic Rate 664 Add Extra for every additional lift of 1.5m 120 664 784.00 904.00	36049.00 37915.00 16479.00
4	For muddy area, extra rate for item No. 18.15 (extra 20% percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). (CGPHE SOR Amendment 7 I.No. 18.19 Page 51)	137.87	cum	40.20	5543.00
5	Pumping out water caused by springs tidal or river seepage, broken water main or drains and like Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.21, Pg. No.52	3600.00	KL	71	255600.00

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Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
6	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the materials as directed by the Engineer-in-charge. (PHE SOR AMENDMENT 7, I. No. 20.1 of P. No. 71)	210.00	cum	866	181860.00
7	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) 1:2:4 (M-15) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.40.1.4, Pg. No.53	26.98	cum	5910.00	159452.00
8	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in foundation/plinth (20mm graded metal) 1: 0.75 : 1.5 (M-30) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.42.3, Pg. No.54	348.47	cum	7982.00	2781453.00
9	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) 1: 0.75 : 1.5 (M-30) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.43.3, Pg. No.53	296.49	cum	8028.00	2380193.00
10	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56 & 57 Foundation / footing / column base / plinth beam of any shape and size up to plinth level Beam / Lintel / Cantilever / Walls	234.42 323.92	SQM SQM	231.00 378.00	54151.00 122442.00
11	Providing and laying Pitching Stone/Boulder on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications as per clause 2504. (CG SOR BRIDGE 2021 I.No.9.10 P.No.41)	18.71	cum	1639.00	30658.48

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Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
12	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.44, Pg. No.54 Sub structure 80 kg/cum Super structure 80 kg/cum	27877.25 23718.91	kg kg	70.00 70.00	1951408.00 1660324.00
13	Supply and fixing of moulded Fibre Needle gate for K.T. Weir of size of 2.15 meter x 0.5 meter x 65 mm made of composite material fiberglass reinforced plastic (F.R.P.) with both side gelcoat finish in eyepleasant blue color sandwiched with M.S. prefabricated structure made in 40 x 40 x square tube, 40x40x6 T Angle and total M.S. structure from all sides covered in FRP moulding, moulded and engraved gauge marking from 0 to 0.5 meter with one centimeter least count, project name covered in retro reflective for front portion of needle rubber pads etc. complete including transportation and all taxes . Analysis per No.				
	Market (Quotation Rate) Rs. 9300/- GST 18% Rs. 1675/- Transportation 05% Rs. 465/- 10% Incidental charges Rs. 930/- Fixing Charges 4 Labours for 1.5 days Rs. 1800/- 4*1.5@ 300/day Total Rs.14170/- AS per (15) /page 7 of CG SOR add 10.35 % Rs. 1467/- Rate for 1 No. of size 0.5*2.15 m size Rs.15637/- or per sqm rate Rs.14546/-	8.600	sqm	14546.0	125096.00
14	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.23, Pg. No.52	373.66	cum	62.00	23168.00
15	Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56	40.00	Rmt	1191.00	47640.00

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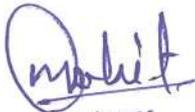

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Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
16	Design/Drawing, fabrication, supply and erection of structural steel Radial crest gate, as per IS: 4623 with skin plate stiffeners, guide, embedded parts, sill beam, fitted with stainless steel flat, guide roller, rubber seals wall plate fitted with stainless steel flats trunion& anchorage as required complete with hoist bridge etc. (Excluding cost & weight of hoist). CG WRD SOR 2010, ITEM NO. 2602(b), Pg.214	2.15	Tonne	155506.0 Total	334338.00 10367336.48
17	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architecural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.	5% of the estimated cost			518367.00

G-TOTAL 10885703.48

Excluding It. No.14 (F.R.P. Rate) GST 18% 1936909.35

Say Rs. 128.23 Lacs


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.1****Measurement****DIVERSION WEIR AT SHANKAR NALLAH**

Sno.	ITEM	No.	L	B	H	QTY
1	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulders in wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surface excavated stuff within a radius of 0.5km as directed by Engineer - in-charge, etc. complete excluding refilling. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 For lift 0.0 to 1.5 m.					
	(I) Head Wall	1	15.00	5.50	1.00	82.50
	(II)Head Wall Exetention	2	3.10	7.20	1.00	44.64
	(III)Side Wall	2	9.48	3.75	1.00	71.10
		2	9.48	3.75	1.00	71.10
	(IV)Wing Wall	4	0.50	3.20	1.00	6.40
					Total	275.74 cum
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51 For lift 0 to 1.5 m.					
	(I) Head Wall	1	15.00	5.50	0.50	41.25
	(II)Head Wall Exetention	2	3.10	7.20	0.50	22.32
	(III)Side Wall	2	9.48	3.75	0.50	35.55
		2	9.48	3.75	0.50	35.55
	(IV)Wing Wall	4	0.50	3.20	0.50	3.20
						137.87 Cum
	For lift 1.5 to 3.0 m.					
	(I) Head Wall	1	15	4.50	1	67.50
	(II)Head Wall Exetention	2	3.1	6.20	1	38.44
	(III)Side Wall	2	9.48	2.75	1	52.14
		2	9.48	2.75	1	52.14
	(IV)Wing Wall	4	0.5	2.20	1.00	4.40
					Total	214.62 Cum

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Sno.	ITEM	No.	L	B	H	QTY
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51) For lift 1.5 to 3.0 m. (I) Head Wall (II)Head Wall Exetention (III)Side Wall (IV)Wing Wall	1 2 2 2 4	15.00 3.1 9.48 9.48 0.5	4.5 6.2 2.75 2.75 2.2	0.50 0.50 0.00 0.00 0.30	33.75 19.22 0.00 0.00 1.32 54.29 Cum
	For lift 3.0 to 4.5 m. (I) Head Wall (II)Head Wall Exetention (III)Side Wall (IV)Wing Wall	1 2 2 2 4	15 3.1 9.48 9.48 0.5	3.50 5.20 2.75 2.75 2.20	0 1.5 0 0 0.00	0.00 48.36 0.00 0.00 0.00 Total 48.36 Cum
	For lift 4.5 to 6.0 m. (I) Head Wall (II)Head Wall Exetention (III)Side Wall (IV)Wing Wall	1 2 2 2 4	15 3.1 9.48 9.48 0.5	2.50 4.20 2.75 2.75 2.2	0 0.7 0 0 0	0.00 18.23 0.00 0.00 0.00 Total 18.23 Cum
4	For muddy area, extra rate for item No. 18.15 (extra 20% percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). 50 % of excavation item No.1 (CGPHE SOR Amendment 7 I.No. 18.19 Page 51)	50	%	Quantity taken for		137.87
5	Pumping out water caused by springs tidal or river seepage, broken water main or drains and like 1 nos. Pumps of 15 KL/hr discharge run for 8 hr for 30 days Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.21, Pg. No.52	30	8	15	1	3600

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Sno.	ITEM	No.	L	B	H	QTY	
6	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the materials as directed by the Engineer-in-charge. (PHE SOR AMENDMENT 7, I. No. 20.1 of P. No. 71)	1	40.00	3.5	1.5	210.00	
7	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) In Plinth & foundation 1:2:4 (M-15) (I) Head Wall (II)Head Wall Exetantion (III)Side Wall (IV)Wing Wall Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.40.1.4, Pg. No.53	1 2 2 2 4	15.00 3.10 9.48 9.48 0.50	3.50 2.20 1.75 1.75 1.20	0.20 0.20 0.20 0.20 0.20	10.50 2.73 6.64 6.64 0.48	total 26.98
8	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in foundation/plinth (20mm graded metal) 1: 0.75 : 1.5 (M-30) (I) Head Wall (II)Head Wall Extention (III)Side Wall (IV)Wing Wall Head wall qty in pier portion Wing wall qty in pier portion Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.42.3, Pg. No.54	1 2 2 2 4 3 2	15.00 3.10 9.48 9.48 0.50 3.50 3.50	3.10 1.80 1.35 1.35 0.80 0.80 0.80	2.80 2.80 2.80 2.80 2.80 2.80 2.80	130.20 31.25 71.67 71.67 4.48 23.52 15.68	Total 348.47 cum
9	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) RCC M-25 (1:1:2)						

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Sno.	ITEM	No.	L	B	H	QTY
	Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.43.2, Pg. No.54					
	(I) Head Wall	1	15.00	1.95	0.80	23.40
	(II)Head Wall Extention	2	3.10	0.96	2.20	13.09
	(III)Side Wall	2	9.48	1.46	1.25	34.48
		2	9.48	1.46	1.25	34.48
	(V)Wing Wall	2	0.50	0.45	0.30	0.14
	Head wall qty in pier portion	3	3.50	0.80	0.50	4.20
	Wing wall qty in pier portion	2	3.50	0.80	0.60	3.36
	VI) Pier	3	3.50	1.95	0.80	16.38
	(V) Middle wall over crest to support Gate	3	2.15	1.00	1.40	9.00
	(VI) Walkway Slab over for Operating platform	1	15.00	3.50	0.30	15.75
	(VII) D/s bedding above nala bed	1	15.00	9.48	0.50	71.10
	(VIII) U/s bedding above nala bed	1	15.00	9.48	0.50	71.10
					ToTal	296.49
10	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56 & 57 Foundation / footing / column base / plinth beam of any shape and size up to plinth level					
	Head Wall	2	15.00		2.8	84.00
	Head Wall Extension	1	6.20		2.8	17.36
	Wing Wall	2x2	11.88		2.8	133.06
						234.42
						SQM
	Beam / Lintel / Cantilever / Walls					
	Head Wall	1	15.00		0.80	12.00
	Slope	1	15.00		3.54	53.10
	Head Wall Extension	1	6.20		2.20	13.64
		1	6.20		8.92	55.30
	Wing Wall	2x2	11.88		0.30	14.26
	Pier	2x2x7	3.50		0.80	78.40
	Middle wall	2x2	3.15		1.40	17.64
	Slab	1	15.00		0.30	4.50
	4 sides	2x2	18.50		0.30	22.20
		2x2	3.50		2.80	39.20
		2x2	1.00		0.80	3.20
	Sides	2x2x1/2	1.90		0.80	3.04
		2	1.20		3.10	7.44
						323.92
						SQM

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Sno.	ITEM	No.	L	B	H	QTY
11	Providing and laying Pitching Stone/Boulder on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications as per clause 2504. (CG SOR BRIDGE 2021 I.No.9.10 P.No.41) Head Wall Extension Side Wall	2 2 2	3.10 9.48 9.48	1.80 1.35 1.35	0.30 0.30 0.30	3.35 7.68 7.68 18.71 cum
12	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.44, Pg. No.54 Sub structure 80 kg/cum Super structure 80 kg/cum	27877 23719				27877.25 23718.91 kg
13	Supply and fixing of moulded Fibre Needle gate for K.T. Weir of size of 2.15 meter x 0.5 meter x 65 mm made of composite material fiberglass reinforced plastic (F.R.P.) with both side gelcoat finish in eyepleasant blue color sandwiched with M.S. prefabricated structure made in 40 x 40 x square tube, 40x40x6 T Angle and total M.S. structure from all sides covered in FRP moulding, moulded and engraved gauge marking from 0 to 0.5 meter with one centimeter least count, project name covered in retro reflective for front portion of needle rubber pads etc. complete including transportation and all taxes . 1 Row of 2.15 m x 0.5 m 4 No. in a Row 2 No. of opening	4 x 2	2.15	0.50		8.6 sqm
14	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.23, Pg. No.52 Deduct for PCC Deduct for RCC					as per item no 1 as per item no 7 as per item no 8 749.11 -26.98 -348.47 Net Qty. 373.66 cum

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Sno.	ITEM	No.	L	B	H	QTY
15	Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56	2	20		Rmt.	40
16	Design / Drawing, fabrication, supply and erection of automatic openable vertical Axis swing gate with water tight rubber seals, skin plate stiffeners, sill beam, hinge brackets rotating gate leafs of size up to 8 sqm. with structural steel frame, bushing of aluminum bronze, trunnion hubs, friction dampers with stainless steel guide etc. complete including hydraulic jack for closure of gate. CG WRD SOR 2010, ITEM NO. 2602(d), Pg.215 As per Note 6 (M) The weight of Vertical Axis swing gate is 0.50 MT per sqm	1 @0.50 mt /SQM	2.15		2	4.3 2.15 Ton
17	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architecural/ Structural drawing having following items :-					5% of the estimated cost

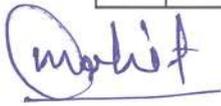
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Sno.	ITEM	No.	L	B	H	QTY
	<p>(a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.</p> <p>(b) Preparation of estimate on prevailing schedule of rates, architectural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets. (CGPHE SOR I.No. 24.18 page 271-72</p>					



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0

TOOL FOR DESIGN OF INLET CHAMBER, SCREEN CHAMBER, GRIT CHAMBER		
Capacity Average Flow	47.00	MLD
Guidance: Yellow cells are the input information to be suitably filled. Green cells are to be reviewed and modified/updated if need be. Red letters to be suitably corrected.		
Ground level at STP Site at Inlet chamber		313 Mtr
Average Flow		47 MLD
Average Flow		0.54 M ³ /sec
Peak Flow : Peak Factor	2.25	105.75 MLD
Peak Flow :		1.22 M ³ /sec
Minimum Flow Factor	0.5	52.875 MLD
Minimum Flow		0.61 M ³ /sec
DESIGN OF INLET CHAMBER		
Peak Flow		105.75 MLD
Peak Flow		1.22 M ³ /sec
Detention time		10 Sec
Volume required		12.24 cum
Liquid depth taken		0.6 Mtr
Area		20.40 M ²
Width taken		4.60 Mtr
Length		4.50 Mtr
Depth of the Inlet Chamber		4 Mtr
Size-4.6 (L) x 4.6 (W) x 1 (D)		
DESIGN OF COARSE SCREEN		
Peak Flow		1.22 M ³ /sec
Coarse Screen Opening		50 mm
Depth of water in screen		0.6 Mtr.
velocity through screen		0.7 M/sec
Area of screen		2.04 M ²
Angle of inclination with the horizontal		45 degree
Sin (Angle of Inclination)		0.71
Free Board		0.40 m
Length of screen		1.41
Width of opening		1.44 mtr
No of opening		29 nos
Number of bars		28 nos
Let width of each bar be		10 mmx75 mm
Total width of channel		1722 mm
Let width of each side be		1350 mm
Total width of channel: Provide		4500 mm
Openings		75
No of bars		74

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Size of Coarse Screen-Width	4.50	m
Size of Coarse Screen-Length	4.00	m
Velocity in Channal u/s of Screen	0.45	
Velocity through Screen	0.54	
Head Loss No Clogging	0.005	m
Velocity when 50% clogging	1.09	m/sec
Head Loss when 50% clogging	0.050	m
Depth of the Coarse Screen	4	Mtr
Size-4 (L) x 4.6 (W) x 1 (D)		
DESIGN OF FINE SCREEN		
Peak Flow	1.22	M3/sec
Nos of screen(Each for handling peak flow)	2	Nos
Velocity(taking) through screen, Assume	0.7	M/sec
Area	1.75	M ²
Depth of flow taken	0.6	Mtr.
Hence width of opening	2.91	Mtr.
No of Openings	194	
No of Bars	193	
Width of Channal	2423	
Angle of inclination with the horizontal	45	degree
Clear opening between adjacent bars of screen	15	mm
Bars thickness of screen	10	mm x50mm
Taking width of screen	4500	mm
Nos of opening will be	180	Nos
Nos of bars(10 mm thickness)	179	Nos
Free Board	0.4	m
Sin (Angle of Inclination with horizontal)	0.707	
Inclined length of Screen	1.41	m
Length of chamber before screen	1.5	m
Total Length of chamber	3.00	
Total width of channel	4.5	Mtr.
Velocity in Channal u/s of Screen	0.45	m/sec
Velocity through Screen	0.75	m/sec
Head Loss through screen	0.018	m
Velocity through screen when 50% clogged	1.508	
Head Loss when 50% clogging	0.105	
Depth of the Coarse Screen	4	Mtr
Size-3 (L) x 4.6 (W) x 1 (D)		
DESIGN OF GRIT CHAMBER		
GRIT REMOVAL SYSTEM		
Two grit removal tank (1 w +1 S) each capable of handling peak flow, will be provided. They are designed		
$Q/A=V_c \times n/(1-\eta)^{n-1}$		
Where- η -Desired efficiency of removal of grit particle		
V_s -settling velocity of minimum size of grit particle to be removed		
Q/A--Design surface overflow rate applicable for grit chamber to be designed		
n-an index which a measure of the basin performance		

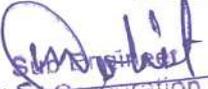
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Here η value taken	75	%
Say	0.75	
Here V_s value taken	1225	$m^3/m^2/day$
Here n value taken-1/8(for very good performance)	0.13	
Hence surface over flow	806.42	$m^3/m^2/day$
Say	810	$m^3/m^2/day$
This Q/A value has to be reduced to allow for deposition of	10.00%	%
Then design overflow rate	729	$m^3/m^2/day$
Peak flow(m^3/day)	105750	(m^3/day)
Hence area required for peak flow	145.06	m^2
Each side of square grit chamber	12.04	mtr.
Hence provide tank length	13.00	mtr.
Hence provide tank Width	13.00	mtr.
Detention time taken is	1	minute
Depth of tank will be	0.17	mtr.
However in order to provide adequate depth for the grit	0.15	mtr.
This gives detention time is	0.38	minute
the detention time of 0.35 (slightly higher) minute is immaterial for mechanically cleaned grit removal		
Hence size of grit removal chamber is		
Size-13 (L) x 13 (W) x 2 (D)		
Pipe from Diversion to Intercepting Chamber		
Peak Flow	1.22	cum/sec
Pipe dia	0.80	m
velocity of flow	2.44	m/sec
Length of pipe	10.00	m
head loss $fLQ^2/10*d^5$	0.046	m
entry/exit loss	0.454	m
say	0.1	in 1000


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**ESTIMATE FOR INLET CHAMBER, SCREEN CHAMBER & GRIT CHAMBER FOR STP.****Sub-Work No.2****ABSTRACT**

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 1 :- Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Basic Rate 201 Add Extra for every additional lift of 1.5m 67				
	For lift 0.0 to 1.5 m.	964.35	201.00	Cum	193834.00
	For lift 1.5 to 3.0 m.	810.00	268.00	Cum	217080.00
	For lift 3.0 to 4.5 m.	669.15	335.00	Cum	224165.00
	For lift 4.5 to 6.0 m. (CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.15)	191.98	402.00	Cum	77174.00
	Item No. 2 (A) :- Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. (CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.16) Basic Rate 266.00 Add Extra for every additional lift of 1.5m 67.00				
	For lift 4.5 to 6.0 m.	304.86	467.00	Cum	142367.00
	For lift 6.0 to 7.5 m.	121.56	534.00	Cum	64910.00
	Item No. 2 (C) :- For muddy area, extra rate for item No. 18.15 (extra percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). 20 % of excavation item (CGPHE AMEND 07 I.No. 18.18.1 Page 51)	527.10	40.20	Cum	21190.00
	Item No. 3 :- Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) (CGPHE Ammendment 7 SOR P No.51/ I.No. 18.40.1.3) M-150 Grade	58.05	5910.00	Cum	343076.00
	Item No. 4 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) RCC M-30 for Raft foundation	82.80	7982.00	Cum	660910.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) Sub structure For R.C.C. Vertical wall M-300 grade</p>	131.29	7982.00	Cum	1047917.00
	<p>Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHE Ammendment SOR P No. 54 / I.No. 18.43.3) For R.C.C. Vertical wall M-300 grade Super structure</p>	19.89	8028.00	Cum	159677.00
	<p>Item No. 7 :- Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHE Ammendment SOR P No. 54 / I.No. 18.44) @80kg/cum</p>	18718	70	kg	1310260.00
	<p>Item No. 8 :- Providing and fixing in position M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (CGPHE Ammendment SOR P No. 121 / I.No. 26.50)</p>	3.75	4087.00	Rmt	15326.00
	<p>Item No. 9 :- Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-in-charge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code: (CG PHE Ammendment SOR P No. 123 / I.No. 26.14.1) For two Coat</p>	1100.16	798.00	sqm	877927.68
	<p>Item No. 10 :- Providing and fixing M.S. sluice gates in position as per detailed drawing and specification including cost of all materials, labour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc. complete as directed by Engineer-in charge. (CG PHE Ammendment 7 SOR P No. 73/ I.No.20.13)</p>	2400.00	132.00	Kg	316800.00

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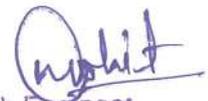

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S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 11 :- Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like. (CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.21)	3600	71.00	KL	255600.00
	Item No. 12 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE Ammendment 7SOR. P.No.52/lt.No18.22)	2315.16	82.00	cum	189842.71
	Item No. 13 :- Steel work in welded built-up section/ framed work, including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. Coarse Screen Fine Screen (CGPHE Ammendment 7SOR. P.No.54/lt.No18.47.2)	1028.50 1759.44	112.00 112.00	Kg Kg	115192.00 197057.28
	Item No. 14 :- Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Beam / Lintel / Cantilever / Walls Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57 Foundation , footing, bases of columns ,etc for mass concrete	20.21	231.00	sqm	4667.36
	Wall (any thickness)	251.55	402.00	sqm	101123.10
				Total	6536096.13
	Item No. 15 :- Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- 5% of the estimated cost				326805.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.				
	(ii) Architecural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c detailes of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.				

Total Rs. 6862901.13
 18% GST 1235322.20
Say Rs. 8098223.33
Total in lakhs 80.98



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0							
ESTIMATE FOR INLET CHAMBER, SCREEN CHAMBER & GRIT CHAMBER FOR STP.							
Sub-Work No.2							
<u>Measurments</u>							
Items	Nos.	Length	Breadth	Height	Qty.	Unit	
Item No. 1 :-							
Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.							
(CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.15)							
For lift 0.0 to 1.5 m.							
Inlet Chamber & Screen Chamber	1	18.70	11.70	1.5	328.19	cum	
For lift 1.5 to 3.0 m.							
Inlet Chamber & Screen Chamber	1	17.20	10.20	1.5	263.16	cum	
For lift 3.0 to 4.5 m.							
Inlet Chamber & Screen Chamber	1	15.70	8.70	1.5	204.89	cum	
For lift 4.5 to 6.0 m.							
Inlet Chamber & Screen Chamber	1	15.20	8.20	0.5	45.90	cum	
For lift 0.0 to 1.5 m.							
Grit Chamber & Grit Outlet Chamber	1	21.10	20.10	1.50	636.17	cum	
For lift 1.5 to 3.0 m.							
Grit Chamber & Grit Outlet Chamber	1	19.60	18.60	1.50	546.84	cum	
For lift 3.0 to 4.5 m.							
Grit Chamber & Grit Outlet Chamber	1	18.10	17.10	1.50	464.27	cum	
For lift 4.5 to 6.0 m.							
Grit Chamber & Grit Outlet Chamber	1	17.60	16.60	0.50	146.08	cum	
					lift 0.0 to 1.5 m.	964.35	Cum
					lift 1.5 to 3.0 m.	810.00	Cum
					lift 3.0 to 4.5 m.	669.15	Cum
					lift 4.5 to 6.0 m.	191.98	Cum
Item No. 2 (A) :-							
Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.							
(CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.16)							
For lift 4.5 to 6.0 m.							
Inlet Chamber & Screen Chamber	1	13.70	6.70	0.5	45.90	cum	
For lift 4.5 to 6.0 m.							

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Grit Chamber & Grit Outlet Chamber	1	16.60	15.60	1	258.96	cum
For lift 6.0 to 7.5 m. Grit Chamber & Grit Outlet Chamber	1	16.10	15.10	0.5	121.56	cum
				lift 4.5 to 6.0 m. lift 6.0 to 7.5 m.	304.86 121.56	Cum cum
Item No. 2 (B) :- Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3)						
For lift 4.5 to 6.0 m. 0	0	0	0.00	1	0.00	cum
				lift 3.5 to 4.5 m.	0.00	Cum
Item No. 2 (C) :- For muddy area, extra rate for item No. 18.15 (extra percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions).						
			Considering 20% As muddy Soil		527.10	cum
Item No. 3 :- Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) (CGPHE Ammendment 7 SOR P No.51/ I.No. 18.40.1.3) M-150 Grade Inlet Chamber & Screen Chamber Grit Chamber & Grit Outlet Chamber	1 1	12.95 15.35	5.70 14.10	0.2 0.2	14.76 43.29	cum cum
				Total	58.05	cum
Item No. 4 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) RCC M-30 for Raft foundation Inlet Chamber & Screen Chamber Grit Chamber & Grit Outlet Chamber	1 1	12.65 15.05	5.40 13.80	0.3 0.3	20.49 62.31	cum cum
					82.80	cum
Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) For R.C.C. Vertical wall M-300 grade						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Inlet Chamber						
Long Wall	2	4.60	0.25	5	11.50	Cum
Short Wall	2	5.10	0.25	5	12.75	Cum
Screen Chamber						
A) Coarse Screen						
Long Wall	2	4.00	0.25	5	10.00	Cum
Partation wall	1	4.00	0.15	2.5	1.50	Cum
Screen Maintenance Platform	1	4.60	0.75	0.15	0.52	Cum
B) Fine Screen						
Long Wall	2	3.00	0.25	5	7.50	Cum
Partation wall	1	3.00	0.15	2.5	1.13	Cum
Screen Maintenance Platform	1	4.60	0.75	0.15	0.52	Cum
Grit Chamber						
Long Wall	2	13.00	0.25	6	39.00	Cum
Short Wall	1	13.50	0.25	6	20.25	Cum
Common wall of Screen & Grit Chamber	1	13.50	0.25	1	3.38	Cum
Grit Outlet Chamber						
Long Wall	2	1.00	0.25	6	3.00	Cum
Short Wall	1	13.50	0.25	6	20.25	Cum
					Total Quantity	131.29
Item No. 6 :-						
Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal)						
(CGPHEAmmendment SOR P No. 54 / I.No. 18.43.3)						
For R.C.C. Vertical wall M-300 grade Above Ground Level						
Inlet Chamber						
Long Wall	2	4.60	0.25	0.9	2.07	Cum
Short Wall	2	5.10	0.25	0.9	2.30	Cum
Screen Chamber						
A) Coarse Screen						
Long Wall	2	4.00	0.25	0.9	1.80	Cum
B) Fine Screen						
Long Wall	2	3.00	0.25	0.9	1.35	Cum
Grit Chamber						
Long Wall	2	13.00	0.25	0.9	5.85	Cum
Short Wall	1	13.50	0.25	0.9	3.04	Cum
Grit Outlet Chamber						
Long Wall	2	1.00	0.25	0.9	0.45	Cum
Short Wall	1	13.50	0.25	0.9	3.04	Cum
					Total Quantity	19.89


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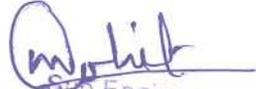

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Items	Nos.	Length	Breadth	Height	Qty.	Unit	
Item No. 7 :-							
Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage.							
(CGPHEAmendment SOR P No. 54 / I.No. 18.44)							
Sub structure	214.09	@80kg/cum			17127	kg	
Super structure	19.89	@80kg/cum			1591	kg	
Item No. 8 :-							
Providing and fixing in position M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge.							
(CGPHEAmendment SOR P No. 121 / I.No. 26.50)							
	1.0	3.75			3.75	Rmt	
Item No. 9 :-							
Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-incharge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code:							
(CG PHE Amendment SOR P No. 123 / I.No. 26.14.1)							
For two Coat							
Inner Wall							
Inlet Chamber Screen Chamber							
Long Wall	2.00	11.60		5.00	116.00	Sqm	
Short Wall	6.00	4.60		5.00	138.00	Sqm	
Grit Chamber Grit Outlet Chamber							
Long Wall	2.00	14.00		6.00	168.00	Sqm	
Short Wall	4.00	13.00		6.00	312.00	Sqm	
Base Slab							
Inlet Chamber Screen Chamber	1.00	11.60		4.60	53.36	Sqm	
Grit Chamber Grit Outlet Chamber	1.00	14.00		13.00	182.00	Sqm	
Outer wall							
Inlet Chamber Screen Chamber							
Long Wall	2.00	11.60		1.00	23.20	Sqm	
Short Wall	6.00	4.60		1.00	27.60	Sqm	
Grit Chamber Grit Outlet Chamber							
Long Wall	2.00	14.00		1.00	28.00	Sqm	
Short Wall	4.00	13.00		1.00	52.00	Sqm	
for new surface					Total Quantity	1100.16	Sqm

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>Item No. 10 :- Providing and fixing M.S. sluice gates in position as per detailed drawing and specification including cost of all materials, labour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc. complete as directed by Engineer-in charge. (CG PHE Ammendment 7 SOR P No. 73/ I.No.20.13)</p>	4	Assume gate of 600 kg		600	2400.00	Kg
<p>Item No. 11 :- Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like. (CGPHE SOR. Ammendment 7 P.No.51/It.No.18.21)</p>	30	8	15	1	3600	kl
<p>Item No. 12 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE Ammendment 7SOR. P.No.52/It.No18.22)</p>					Total Excavation 2940.33 Deduct PCC -58.05 Foundation -82.80 -131.29 Volume of the Structures (Inlet & Screen chamber) -80.04 Volume of the Structures (Grit & Grit outlet chamber) -273.00 2315.16	cum
<p>Item No. 13 :- Steel work in welded built-up section/ framed work, including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.</p> <p>Analysis Coarse Screen 100X100X6 mm Equal Angle frame for Screen @ 9.20 kg/rmt For Frame 2 x 4.6 9.2 Rmt 2 x 2 4 Rmt Total 13.2 Rmt @ 9.20 kg/rmt 121.44 Kg</p> <p>75 mm x 10 mm MS Flat placed 50 mm apart = 4600 mm / 60 mm = 77 Nos of L-2 m 77 2 154 Rmt Total 154 Rmt @ 5.89 kg/rmt 907.06 Kg</p> <p>Total of Coarse Screen 1028.50 kg</p> <p>Analysis Fine Screen 100X100X6 mm Equal Angle frame for Screen @ 9.20 kg/rmt For Frame 2 x 4.6 9.2 Rmt 2 x 2 4 Rmt Total 13.2 Rmt @ 9.20 kg/rmt 121.44 Kg</p>						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
(a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.						
(b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.						


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**WET WELL AND PUMP HOUSE****Sub-Work No.3****ABSTRACT**

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 1 :- Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. (CGPHE AMEND 07 I.No. 18.15 Page 51)				
		Basic Rate	201		
		Add Extra for every additional lift of 1.5m	67		
	For lift 0.0 to 1.5 m.	1486.50	201.00	Cum	298787.00
	For lift 1.5 m to 3.0 m	1265.40	268.00	Cum	339127.00
	For lift 3.0 m to 4.5 m	1086.08	335.00	Cum	363835.00
	For lift 4.5 m to 6.0 m	343.10	402.00	Cum	137926.00
	Item No. 2 :- Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51				
		Basic Rate	266.00		
		Add Extra for every additional lift of 1.5m	67.00		
	For lift 4.5 m to 6.0 m	613.50	467.00	Cum	286505.00
	For lift 6.0 m to 7.5 m	289.33	534.00	Cum	154500.00
	Item No. 3 :- Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51)				
	Soft rock with or without blasting or bituminous pavement / cement concrete road.	Basic Rate	465.00		
		Add Extra for every additional lift of 1.5m	120.00		
	Lift 6.0 to 7.5 m	511.95	945.00	Cum	483793.00
	Lift 7.5 to 9.0 m	561.20	1065.00	Cum	597676.00
	Lift 9.0 to 10.5 m	364.80	1185.00	Cum	432288.00

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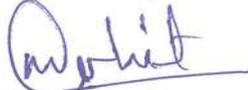

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S.No.	Items	Qty.	Rate	Unit	Amount
	Hard rock requiring chiseling / where blasting is prohibited	Basic Rate	664.00		
	Add Extra for every additional lift of 1.5m		120.00		
	Lift 6.0 to 7.5 m	345.69	1144.00	Cum	395469.00
	Lift 7.5 to 9.0 m	437.76	1264.00	Cum	553329.00
	Lift 12 to 13.5 m (For Suction pit)	94.24	1384.00	Cum	130428.00
	Item No. 4 :- Cement Concrete 1:3:6 well mixed and laid in position complete including all leads of all construction materials including curing and finishing well graded broken stone aggregate of maximum size upto 40mm (CGPHE AMEND 07 I.No. 18.40.1.3 Page 53) M-100 Grade	72.58	5029	Cum	365015.00
	Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE AMEND 07 I.No. 18.42.3 Page 54) RCC M-30 for foundation	610.91	7982.00	Cum	4876308.00
	Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHE AMEND 07 I.No. 18.43.3 Page 54) For R.C.C. Vertical wall M-300 grade RCC Grade M30	360.92	8028.00	Cum	2897490.00
	Item No. 7 :- Providing and placing in position cold twisted or uncoated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHE AMEND 07 I.No. 18.44 Page 54) Sub structure & Super structure	77747	70	kg	5442290.00
	Item No. 8 :- Providing and fixing in position C.I./M.S. steps or 22 mm dia. MS bar steps with proper anchorage, etc. and providing and applying 3 coats of anti-corrosive paint, etc complete as directed by Engineer-in-charge.				

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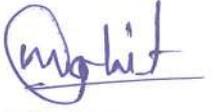

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S.No.	Items	Qty.	Rate	Unit	Amount
	(CG PHED USOR Amendment No.07, Item No.20.12, Pg.No.73)	50.00	566.00	No.	28300.00
	<p>Item No. 9 :- Painting with synthetic enamel paint (cow dung) of approved brand and manufacture to give an even shade : (two or more coats) on New work .</p> <p>(CG PHED USOR Amed. No.07, Item No.18.77, Pg.No. 58)</p> <p>Inside Pump House For two Coat</p>	50.45	86.00	sqm	4338.70
	<p>Item No. 11 :- Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-incharge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code:</p> <p>(CG PHED USOR Amed No.7; Item No.20.20.1Pg.No.75)</p> <p>For Inlet, Screen & Wet well</p>	1356.49	798.00	Sqm	1082479.02
	<p>Item No. 12 :- Providing, hoisting and fixing in position inverted "J" type 100 mm dia. C.I. Cowl type ventilators with mosquito proof aluminium mesh at top including applying 2 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge, weighing not less than 35 Kg.</p> <p>(CG PHED USOR Amendment No.07/2022-23; Item No.26.1 dated 23.12.22)</p>	10.00	1648.00	No.	16480.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 13 :- Design/Drawing, fabrication, supply and erection of structural steel Automatic Outflow Regulating Gate as per standard specification with gate leaf with end girders, cast steel track plates, rubber seals with SS clamping nut bolts etc., concrete counter weight in bottom compartments of gate leaf, embedded parts consisting of trunion girders, anchor frames, U/s & D/s stoppers, still beams, SS axles, SS seals etc., fulcrum assemblies with links, SS axles, bronze bushes, sail hard curved track plate etc, lever system consisting of actuating lever, lever link, gate bracket, hoisting bracket, SS axles, bronze bushes etc. complete with hoist bridge and portal frame if required (excluding cost & weight of hoist)</p> <p>(CGWRD P No. 214 / I.No. 2602) 1500X1200 mm.</p>	10.80	155506.00	No.	1679464.80
	<p>Item No. 14 :- Cement concrete flooring with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm) finished with a floating coat of neat cement (CG PWD SOR. P.No.111/I.No.12.3) 40 mm thick</p>	192.00	222.00	sqm	42624.00
	<p>Item No. 15 :- Providing and fixing double glazed hermetically sealed glazing in aluminium windows, ventilators and partition etc. with 6 mm thick clear float glass both side having 12 mm air gap including providing EPDM gasket, perforated aluminium spacers, desiccants, sealant (Both primary and secondary sealant) etc. complete.</p> <p>(PWD CSR 15-16 P.NO.86 ,It.no.9.53 Powdered coated</p>	21	3159	Sqm	66339.00


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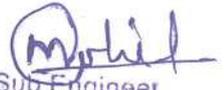

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 16 :- Supplying and fixing rolling shutter of approved makes made of M.S. laths interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and out side locking with push and pull arrangement complete but excluding the cost of top cover and spring.</p> <p>80x1.25mm M.S. Laths (PWD CSR 15-16 P.NO.83 ,It.no.9.27</p>	40	1691	Sqm	67640.00
	<p>Item No. 17 :- Providing and fixing 1mm thick M.S. sheet door shutters with frame and diagonal braces of 40x40x6 mm angle iron, 3mm M.S. gusset plates at the junctions and corners i/c all necessary fittings complete including applying a priming coat of approved steel primer. with diagonal braces and central cross pieces of M.S. angle / flats as required. (CGPHE SOR.Amendment 7 P.No.54/It.No.18.48) Door</p>	9.45	3668.00	Sqm	34662.60
	<p>Item No. 18 :- Providing and fixing inposition M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (CGPHE SOR.Amendment 7 P.No.121/It.No.26.5)</p>	40	4087.00	m	163480.00
	<p>Item No. 19 :- Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56</p>	29.80	Rmt	1191.00	35492.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 20 :- Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070.</p> <p>(CGPHE SOR.Amendment 7 P.No.120/It.No.20.19) For wet well at pumping station for 10 m</p>	1	14031	No.	14031.00
	<p>Item No. 21 :- Pumping out water caused by springs tidal or river seepage, broken water main or drains and like (CGPHE AMEND 07 I.No. 18.21 Page 52)</p>	12000	71.00	kl	852000.00
	<p>Item No. 22 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE AMEND 07 I.No. 18.22 Page 52)</p>	4600.11	62.00	cum	285207.01
	<p>Item No. 23 :- Structural steel work riveted, bolted or welded in builtup section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat of approved steel primer all complete. ISBM 250 X 125 X 6.9 MM</p> <p>Over the Inlet Chamber</p> <p>Over the Screen Chamber</p> <p>In stringers treads landings etc. of stair cases including use of chequered plate wherever required all complete.</p> <p>Over the Inlet Chamber</p> <p>Over the Screen Chamber</p> <p>(CGPHE AMEND 07 I.No. 18.46 Page 54)</p>	1521.840 1372.640 1104.00 1987.20	96 96 100 100	kg kg kg kg	146096.64 131773.44 110400.00 198720.00

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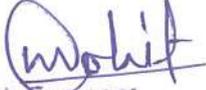
S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 26: - Providing & Installation of PLC SCADA At Wet Well. As per Rate Analysis attached				2036061.10

Total Rs. 27314802.45

27314802.45

GST 18% 4916664.44

Say Rs. 32231467.00
322.31



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Assistant Engineer
Municipal Corporation
Durg(C.G)



Executive Engineer
Municipal Corporation
Durg (C.G)

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0						
WET WELL AND PUMP HOUSE						
Sub-Work No.3						
<u>Measurments</u>						
Items	Nos.	Length	Breadth	Height	Qty.	Unit
<u>Item No. 1 :-</u>						
Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.						
(CGPHE AMEND 07 I.No. 18.15 Page 51)						
Inlet Chamber						
Lift 0 to 1.5 m	1	6.30	14.50	1.5	137.03	cum
Lift 1.5 to 3.0 m	1	5.00	13.00	1.5	97.50	cum
Lift 3.0 to 4.5 m	1	5.00	11.50	1.5	86.25	cum
Lift 4.5 to 6.0 m	1	5.00	11.00	0.5	27.50	cum
Screen Chamber						
Lift 0 to 1.5 m	1	17.90	16.40	1.5	440.34	cum
Lift 1.5 to 3.0 m	1	16.40	14.90	1.5	366.54	cum
Lift 3.0 to 4.5 m	1	14.90	13.40	1.5	299.49	cum
Lift 4.5 to 6.0 m	1	14.40	12.90	0.5	92.88	cum
Wet Well						
Lift 0 to 1.5 m	1	26.70	22.70	1.5	909.14	cum
Lift 1.5 to 3.0 m	1	25.20	21.20	1.5	801.36	cum
Lift 3.0 to 4.5 m	1	23.70	19.70	1.5	700.34	cum
Lift 4.5 to 6.0 m	1	23.20	19.20	0.5	222.72	cum
Abstract	Lift 0 to 1.5 m				1486.50	cum
	Lift 1.5 to 3.0 m				1265.40	cum
	Lift 3.0 to 4.5 m				1086.08	cum
	Lift 4.5 to 6.0 m				343.10	cum
Total					4181.08	Cum
<u>Item No. 2 :-</u>						
Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.						
Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Inlet Chamber						
Lift 4.5 to 6.0 m	1	5.00	10.00	1	50.00	cum
Lift 6.0 to 7.5 m	1	5.00	9.50	0.5	23.75	cum
Screen Chamber						
Lift 4.5 to 6.0 m	1	13.40	11.90	1	159.46	cum
Lift 6.0 to 7.5 m	1	12.90	11.40	0.5	73.53	cum
Wet Well						
Lift 4.5 to 6.0 m	1	22.20	18.20	1	404.04	cum
Lift 6.0 to 7.5 m	1	21.70	17.70	0.5	192.05	cum
Abstract			Lift 4.5 to 6.0 m		613.50	cum
			Lift 6.0 to 7.5 m		289.33	cum
			Total		902.83	Cum
Item No. 3 :-						
Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.						
(Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51)						
Soft Rock						
Inlet Chamber						
Lift 6.0 to 7.5 m	1	5.00	8.50	1	42.50	cum
Lift 7.5 to 9.0 m	1	5.00	7.00	0.75	26.25	cum
Screen Chamber						
Lift 6.0 to 7.5 m	1	11.90	10.40	1	123.76	cum
Lift 7.5 to 9.0 m	1	10.40	8.90	1.05	97.19	cum
Wet Well						
Lift 6.0 to 7.5 m	1	20.70	16.70	1	345.69	cum
Lift 7.5 to 9.0 m	1	19.20	15.20	1.5	437.76	cum
Lift 9.0 to 10.5 m	1	19.20	15.20	1.25	364.80	cum
Hard Rock						
Lift 9.0 to 10.5 m	1	19.20	15.20	0.25	72.96	cum
Lift 10.5 to 12 m	1	19.20	15.20	1.5	437.76	cum
Lift 12 to 13.5 m (For Suction pit)	1	15.20	6.2	1	94.24	cum

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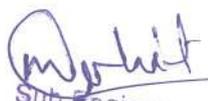

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Abstract				Lift 6.0 to 7.5 m	511.95	cum
				Lift 7.5 to 9.0 m	561.20	cum
				Lift 9.0 to 10.5 m	437.76	cum
				Lift 10.5 to 12 m	802.56	cum
				Lift 12 to 13.5 m (For Suction pit)	94.24	cum
				Total	2407.71	Cum
Item No. 4 :-						
Cement Concrete 1:3:6 well mixed and laid in position complete including all leads of all construction materials including curing and finishing well graded broken stone aggregate of maximum size upto 40mm						
(CGPHE AMEND 07 I.No. 18.40.1.3 Page 53)						
M-150 Grade PCC						
Inlet Chamber	1	5.30	5.70	0.20	6.04	Cum
Screen Chamber	1	9.40	7.90	0.20	14.85	Cum
For Wet Well	1	18.20	14.20	0.20	51.69	Cum
					72.58	cum
Item No. 5 :-						
Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal)						
(CGPHE AMEND 07 I.No. 18.42.3 Page 54)						
RCC M-30 for foundation						
Foundation bedding						
Inlet Chamber	1	5.00	5.40	0.30	8.10	Cum
Screen Chamber	1	9.10	7.60	0.30	20.75	Cum
For Wet Well	1	17.90	13.90	0.30	74.64	Cum
Inlet Chamber						
Long Wall	2	5.40	0.40	7.75	33.48	Cum
Short Wall	1	4.60	0.40	7.75	14.26	Cum
Screen Chamber						
Long Wall	2	8.80	0.40	8.05	56.67	Cum
Short Wall	1	6.50	0.40	8.05	20.93	Cum
Short Wall	2	0.50	0.40	8.05	3.22	Cum

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Wet Well						
Long Wall	2	17.00	0.5	11.5	195.50	Cum
Short Wall	2	12.00	0.5	11.5	138.00	Cum
For RCC Column Wet Well	3	0.60	0.60	14	15.12	Cum
	9	0.40	0.60	14	30.24	Cum
				Total (A)	610.91	cum
Item No. 6 :-						
Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal)						
(CGPHE AMEND 07 I.No. 18.43.3 Page 54)						
For R.C.C. Vertical wall M-300 grade RCC Grade M30						
Inlet Chamber						
Long Wall	2	5.4	0.4	0.9	3.89	Cum
Short Wall	1	4.6	0.4	0.9	1.66	Cum
Screen Chamber						
Long Wall	2	8.8	0.4	0.9	6.34	Cum
Short Wall	1	6.5	0.4	0.9	2.34	Cum
Short Wall	2	0.5	0.4	0.9	0.36	Cum
Wet Well						
Long Wall	2	17.00	0.50	2.5	42.50	Cum
Short Wall	2	12.00	0.50	2.5	30.00	Cum
Pump House Wall						
Long Wall	2	17.60	0.3	6	63.36	Cum
Short Wall	2	12.00	0.3	6	43.20	Cum
Deduct Door	3	1.5	2.1	0.3	-2.84	Cum
Deduct Window	10	1.5	1	0.3	-4.50	Cum
Deduct Ventilator	10	1	0.6	0.3	-1.80	Cum
Deduct Rolling Shutter	1	5	4	0.3	-6.00	Cum
For RCC Slab						
For Wet Well						
For R.C.C. Top Slab M-300 grade	1	17.00	13.00	0.3	66.30	Cum
Roof Slab	1	17.20	13.20	0.2	45.41	Cum

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
For RCC Column Pump House	12	0.40	0.60	6	17.28	Cum
For RCC Brace Beam Wet well	2	16.00	0.4	0.75	9.60	Cum
	2	12.00	0.4	0.75	7.20	Cum
For RCC Brace Beam Pump House	2	16.40	0.4	0.75	9.84	Cum
	2	12.40	0.4	0.75	7.44	Cum
For RCC Roof Slab Beam	2	16.40	0.4	0.75	9.84	Cum
	2	12.40	0.4	0.75	7.44	Cum
For RCC Chajja						
Deduct Door	3	1.5	0.6	0.1	0.27	Cum
Deduct Window	10	1.5	0.6	0.1	0.90	Cum
Deduct Ventilator	10	1	0.6	0.1	0.60	Cum
Deduct Rolling Shutter	1	5	0.6	0.1	0.30	Cum
					Total (B)	360.92
					Total (A+B)	971.84
Item No. 7 :- Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHE AMEND 07 I.No. 18.44 Page 54) Sub structure & Super structure	971.8	@80kg/cum			77747	kg
Item No. 8 :- Providing and fixing in position C.I./M.S. steps or 22 mm dia. MS bar steps with proper anchorage, etc. and providing and applying 3 coats of ant-corrosive paint, etc complete as directed by Engineer-in-charge. (CG PHED USOR Amendment No.07, Item No.20.12, Pg.No.73) For wet well	50.0				50.00	No.
					Total	50.00
Item No. 9 :- Painting with synthetic enamel paint (cow dung) of approved brand and manufacture to give an even shade : (two or more coats) on New work (CG PHED USOR Amendment No.07/2022-23; Item No.14.49.1 dated 23.12.22)						

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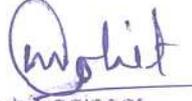

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Inside Pump House						
For two Coat						
Door	3	1.5		2.1	9.5	Sqm
Window	10	1.5		1	15.0	Sqm
Ventilator	10	1		0.6	6.0	Sqm
Rolling Shutter	1	5		4	20.0	Sqm
					50.45	Sqm
Item No. 11 :-						
Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-in-charge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code:						
(CG PHED USOR Amed No.7; Item No.20.20.1Pg.No.75)						
For Inlet Chamber						
Long Walls	2	4.60		7.75	71.30	Sqm
Short Walls	2	5.40		7.75	83.70	Sqm
Floor	1	4.60	4.60		21.16	Sqm
					176.16	Sqm
For Screen Chamber						
Long Walls	2	8.00		8.05	128.80	Sqm
Short Walls	2	7.30		8.05	117.53	Sqm
Floor	1	8.00	6.50		52.00	Sqm
					298.33	Sqm
For Wet Well						
Long Walls	2	17.00		11.5	391.00	Sqm
Short Walls	2	13.00		11.5	299.00	Sqm
Floor	1	16.00	12.00		192.00	Sqm
					882.00	Sqm
					Grand Total	1356.49
						Sqm
Item No. 12 :-						
Providing, hoisting and fixing in position inverted "J" type 100 mm dia. C.I. Cowl type ventilators with mosquito proof aluminium mesh at top including applying 2 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge, weighing not less than 35 Kg.						
(CG PHED USOR Amendment No.07/2022-23; Item No.26.1 dated 23.12.22)						
					10.00	No

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>Item No. 13 :- Design/Drawing, fabrication, supply and erection of structural steel Automatic Outflow Regulating Gate as per standard specification with gate leaf with end girders, cast steel track plates, rubber seals with SS clamping nut bolts etc., concrete counter weight in bottom compartments of gate leaf, embedded parts consisting of trunion girders, anchor frames, U/s & D/s stoppers, still beams, SS axles, SS seals etc., fulcrum assemblies with links, SS axles, bronze bushes, sail hard curved track plate etc, lever system consisting of actuating lever, lever link, gate bracket, hoisting bracket, SS axles, bronze bushes etc. complete with hoist bridge and portal frame if required (excluding cost & weight of hoist) (CGWRD P No. 214 / I.No. 2602) Area of Each Gate As per Note 6 (C) page 210 For 5 gates</p>	1 5	1.5		1.2	1.80 2.16 10.80	sqm Tonnes Tonnes
<p>Item No. 14 :- Cement concrete flooring with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm) finished with a floating coat of neat cement (CG PWD SOR. P.No.111/It.No.12.3) 40 mm thick With Iron filings and flakes in flooring</p>	1	16	12		192	Sqm
<p>Item No. 15 :- Providing and fixing double glazed hermetically sealed glazing in aluminium windows, ventilators and partition etc. with 6 mm thick clear float glass both side having 12 mm air gap including providing EPDM gasket, perforated aluminium spacers, desiccants, sealant (Both primary and secondary sealant) etc. complete. (PWD CSR 15-16 P.NO.86 ,It.no.9.53)</p>	10.0 10.0	1.5 1.0		1.0 0.6	15.0 6.0	Sqm Sqm
				Total	21.0	Sqm

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>Item No. 16 :- Supplying and fixing rolling shutter of approved makes made of M.S. laths interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and out side locking with push and pull arrangement complete but excluding the cost of top cover and spring.</p> <p>(PWD CSR 15-16 P.NO.86 ,It.no.9.53 Rolling Shutter</p>	2.0	5.0		4.0	40.0	Sqm
<p>Item No. 17 :- Providing and fixing 1mm thick M.S. sheet door shutters with frame and diagonal braces of 40x40x6 mm angle iron, 3mm M.S. gusset plates at the junctions and corners i/c all necessary fittings complete including applying a priming coat of approved steel primer. with diagonal braces and central cross pieces of M.S. angle / flats as required.</p> <p>Door</p>	3	1.5		2.1	9.5	Sqm
<p>Item No. 18 :- Providing and fixing inposition M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge.</p> <p>(CGPHE SOR.Amendment 7 P.No.121/It.No.26.5) For Pump House</p>	4.0	10			40.00	RM
				Total	40.00	Rmt


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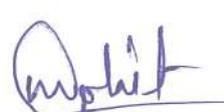

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 19: - Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56						
Inlet Chamber	1.0	13.8			13.80	RM
Screen Chamber	1.0	16			16.00	RM
					Total	29.80 RM
Item No. 20 :- Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070. (CGPHE SOR.Amendment 7 P.No.120/It.No.20.19) For wet well at pumping station 1 for 10 m						10 m
Item No. 21 :- Pumping out water caused by springs tidal or river seepage, broken water main or drains and like (CGPHE AMEND 07 I.No. 18.21 Page 52) For wet well at pumping station	100	8	15	1	12000	kl

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 22 :-						
Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils (CGPHE AMEND 07 I.No. 18.22 Page 52)						
For wet well at pumping station 1						
Total Excavation					7491.61	
Deduct					-72.58	
PCC					-610.91	
Footing					-2208	
Vol of Well	1	16	12	11.5	4600.11	cum
Item No. 23 :-						
Structural steel work riveted, bolted or welded in builtup section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat of approved steel primer all complete. ISBM 250 X 125 X 6.9 MM						
@ 37.30 kg /Rmt						
Over the Inlet Chamber	6	6.8	37.30		1521.840	kg
Over the Screen Chamber	4	9.2	37.30		1372.640	kg
In stringers treads landings etc. of stair cases including use of chequered plate wherever required all complete. (CGPHE AMEND 07 I.No. 18.46 Page 54)						
@ 48 kg /Sqm (Plate 6mm thick)						
Over the Inlet Chamber	1	4.6	5	23	1104.000	kg
Over the Screen Chamber	1	6	6.9	41.4	1987.200	kg
Item No. 24:-						
Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57						
For PCC Inlet Chamber	2	(5.3+5.7)		0.20	4.4	sqm
For PCC Screen Chamber	2	(9.4+7.9)		0.30	10.38	sqm
Foundation Inlet Chamber	2	(9.1+7.6)		0.30	10.02	sqm
For Inlet Chamber						
LW	2	4.60		7.75	71.3	sqm
	2	5.40		7.75	83.7	sqm
SW	2	4.60		7.75	71.3	sqm
	2	5.40		7.75	83.7	sqm

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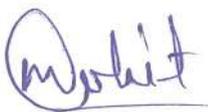

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
For Screen Chamber						
LW	2	8.00		8.05	128.8	sqm
	2	8.80		8.05	141.68	sqm
SW	2	6.50		8.05	104.65	sqm
	2	7.30		8.05	117.53	sqm
For PCC Wet Well	2	(18.2+14.2)		0.20	12.96	sqm
Foundation Wet Well	2	(17.9+13.9)		0.30	19.08	sqm
For Collection Chamber/ Wet Well						
LW	2	16.00		11.5	368	sqm
	2	17.00		11.5	391	sqm
SW	2	12.00		11.5	276	sqm
	2	13.00		11.5	299	sqm
Pump House Wall LW	2	16.60		6	199.2	sqm
	2	17.20		6	206.4	sqm
SW	2	12.00		6	144	sqm
	2	12.60		6	151.2	sqm
Slab WetWell	1	17	13		221	sqm
Roof slab	1	17.2	13.2		227.04	sqm
Chujja	3	1.5	0.6		2.7	sqm
	10	1.5	0.6		9	sqm
	1	(1.5+0.6+0.6)		0.1	0.27	sqm
	3	(1.5+0.6+0.6)		0.1	0.81	sqm
Foundation , footing, bases of columns ,etc for mass concrete					56.84	sqm
Wall (any thickness)					2837.46	sqm
Slab					460.82	sqm
Item No. 25 : -						
Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:-						
(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>(ii) Architecural/ Structural drawing having following items :-</p> <p>(a) Layout plan. Elevation, cross-section i/c detailes of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.</p> <p>(b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.</p>						
<p>Item No. 26: - Providing & Installation of PLC SCADA At Wet Well. As per Rate Analysis attached</p>						


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0											
INSTRUMENTATION BILL OF QUANTITY FOR SHANKAR NALLAH-PUMP HOUSE											
Sub Work No:- 3											
Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
1	Supplying, Installing of Ultrasonic Radar type level transmitter CE marked with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range- 0 to 20 mtrs, Accuracy - +/- 0.25% of Full Scale or better Enclosure- IP 67	Each	1	90,000.00	4,746.00	As per Market Rate	94,746.00	94,746.00	-	-	94,746.00
2	Supplying, Installing of pressure transmitter CE marked with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including mounting arrangement. Output 4-20 mA, Display - 4" LED, Pressure Range - 0-1, 0-2, 04 PN, Accuracy - +/- 0.1 % of full scale or better, Enclosure- IP 67	Each	4	60,000.00	2,215.00	As per Market Rate	62,215.00	2,48,860.00	-	-	2,48,860.00
3	Supplying, Installing of Glycerine Filled Pressure gauge Bourdon's type as IS 3624:1987, mounting - direct bottom, stainless steel body, toughened glass window Pressure gauge 150 mm dia	Each	5	3,000.00	67.00	As per Market Rate	3,067.00	15,335.00	-	-	15,335.00
4	Supplying, Installing of Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/-0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrester, cable GI duct if suitable size, including the pipe cutting, levelling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc. complete with necessary accessories, as may be required at site & based on technical specifications.	Each	1	6,20,000.00	13,015.00	As per Market Rate	6,33,015.00	6,33,015.00	-	-	6,33,015.00
	Nominal Diameter Flowmeter 500 mm	Each	1	6,20,000.00	13,015.00		6,33,015.00	6,33,015.00	-	-	6,33,015.00



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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
5	Valve Actuator Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power to motor and with 10 watt single phase space heater and continuous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirrel cage induction motor working on 440 Volts +/- 10%, 3 phase, 50Hz AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30% over load margin. The torque rating of reduction gear box shall be at least 1.5 times max. torque required for opening and closing of valve with integral starter for ON					As per Market Rate					
5.1	350mm dia	Each	2	1,19,600.00	3,479.00		1,23,079.00	2,46,158.00		-	2,46,158.00
5.2	250mm dia	Each	2	1,01,600.00	3,479.00		1,05,079.00	2,10,158.00		-	2,10,158.00
6	PLC/SCADA system Design, supply, installing, commissioning & testing of master PLC control monitoring and communication panel as per IEC 61131 at raw water sump suitable for monitoring and control of water pumps, pressure transmitter, level transmitter, flow meter, actuators etc. (MJP Electrical & Mechanical Works SOR 2020-21, Code No. 2.7)					As per MJP SOR	59,733.00	59,733.00	18%	10751.94	70,484.94


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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
7	Design, supply, installing, commissioning & testing of PLC based control monitoring and communication software as per IEC 61131 at raw water sump suitable for monitoring and control of water pumps, pressure transmitter, level transmitter, flow meter, actuators etc. (MJP Electrical & Mechanical Works SOR 2022-23, Item No. 1.5; page no.- 48)	Each	1			As per MJP SOR	55,582.00	55,582.00	18%	10004.76	65,586.76
8	Supply, Installation, Testing, Trials, Programming, Integration, Commissioning, Handing Over of Dual GSM/GPRS modem.	Set	1			As per market rate	18,000.00	18,000.00		-	18,000.00
9	Supplying, installation, testing and commissioning following rating single phase 230 volts sine wave inverter (without battery) including connection as per specification. 1.5kVA (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 11.3.3)	Each	1			As per CG PWD SOR	5,504.00	5,504.00		-	5,504.00
10	Supplying, installation, testing and commissioning following rating (sealed maintenance free) lead acid battery including connection as per specification. 150AH (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 11.4.5)	Each	1			As per CG PWD SOR	14,252.00	14,252.00		-	14,252.00
11	Supplying, installation, testing and commissioning of Analogue type bullet AHD 2MP camera VF of 1080P real time high resolution, CMOS progressive scan, true day/night capability minimum illumination: 0 lux (IR ON), TDN (Ir-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: up to 40 meters, Power:230V AC, vandal resistance, dual output AHD & CVBS as per specification. (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 27.3)	Each	4			As per CG PWD SOR	5,723.00	22,892.00		-	22,892.00


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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
12	Supplying, installation, testing and commissioning of 16 channel AHD 1080P DVR high resolution recording, H.264 high profile compression, playback 4/8/16 channels simultaneously, multiple recording option: Manual, schedule, motion detection, pentaplex operation: live view, record, playback, back up and remotely access, HDMI & VGA output simultaneously up to 1080P resolution, 1 SATA HDD, DHCP, DDNS, IE browser and CMS supported, mobile app for android and ios as per specification (CG PWD Electrical &Mechanical Works SOR 2020, Code No. 27.9)	Each	1			As per CG PWD SOR	21,466.00	21,466.00		-	21,466.00
13	Supplying, installation, testing and commissioning of 32 inch LED monitor, table/wall mount with in build speaker minimum 5W x 2 with minimum 1 ni of HDMI and USB port including remote control, connecting cable, batteries, and all accessories, connection etc. complete as per specification (CG PWD Electrical &Mechanical Works SOR 2020, Code No. 27.49.1)	Each	1			As per CG PWD SOR	21,896.00	21,896.00		-	21,896.00
14	Supplying, Installing with Terminating & Interfacing of 2 Pair x 1 sq.mm as per IS 694 copper Shielded twisted, multistranded armoured cable on wall in GI tray or on ground. (As per 2021 cable price list)	Mtr	800	149.10	28.96		178.06	1,42,448.00		-	1,42,448.00
15	Supplying and fixing cat-6 UTP armoured cable suitable for LAN / WAN as per specification complete. (As per 2021 polycab price list)	Mtr	90	77.70	28.96		106.66	9,599.40		-	9,599.40


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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
16	Supplying & fixing of approved make hi wall split inverter type Air conditioner unit with cooling unit (copper coil) and condensing unit (copper coil) including 5 year compressor warranty and standard length of upto 5 meter of copper piping with insulation etc. complete as per specification. 2 Ton split type inverter AC (5 star) (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 24.20.9)	Each	2	55,830.00	2,000.00	As per CG PWD SOR	57,830.00	1,15,660.00		-	1,15,660.00
17	Operational & Mandatory Spare	Set	1	60,000.00	-		60,000.00	60,000.00		-	60,000.00
18	Tools & Tackles	Set	1	20,000.00	-		20,000.00	20,000.00		-	20,000.00
	Note - Excavation & foundation work for electrical & instrumentation equipments are considered in civil estimation.										
						TOTAL		20,15,304.40			20,36,061.10



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No. 4**

Construction of Electric Sub Station at STP SITE					
S.NO.	PARTICULARS	QUANTITY	Estimated Cost Rs. 114.34 Lacs		
			RATE in Lacs	PER	AMOUNT
1	33/3.3 KV Sub station (i) Providing & installation of 2500 KVA transformer With off circuit tap changer. (CG PWD SOR 2020 I.No. 21.2 Page 178)	2	2884118	No.	57.68
2	Pannel Board (i) Relay control panel for 33 KV breakers	2	600000	Set	12.00
3	33/3.3 KVA sub station equipments / <i>Accessories</i> (i) 33 KV isolator 400/800 amps (ii) 33 KV VCB 800 amps (iii) Outdoor current transformer (iv) Potential transformer (v) Lightning arrestor (vi) ACSR conductor as required (vii) 33 KV drop out fuse (viii) Necessary 2 pole & 6 pole structure (ix) Misc. accessories such as termination kit, connectors, lugs etc. as required. (x) Sub Station earthing as per IE Rules (x) Lighting of sub station	2 2 2 2 3 1 2 1 1 1 1	80000 105000 100000 240000 30000 120000 18000 650000 120000 700000 200000	Each Each Each Each Each Job Each Job Job Job Each	1.60 2.10 2.00 4.80 0.90 1.20 0.36 6.50 1.20 7.00 2.00
4	Civil Works (i) Construction of control room, construction of foundations for sub station - equipments, cable trenches, transformer foundations & Structural steel and other misc. works.	1	1500000	Each Job	15.00

Total 114.34
Say 114.34
Lacs



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0										
Sub Work No.6										
Raw Water Pipeline										
					Dia.	800	mm	L =	100	m
Estimated Cost Rs. :-								49.65 Lakh		
S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)	
Total Excavation Quantity										
	800 mm Dia.	1	75.00	1.40	1.95	204.75				
	800 mm Dia.	1	25.00	1.40	1.95	68.25			273.00	
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.									
	70% Total Excavation Qty	1				191.1	Cum	201.00	38411.10	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.15/P 51)									
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.									
	20% Total Excavation Qty	1				54.6	Cum	266.00	14523.60	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.16/P 51)									
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.									
	Soft rock with or without blasting or bituminous pavement / cement concrete road.									
	5% Total Excavation Qty	1				13.65	Cum	465.00	6347.25	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.19.1/P 51)									
4	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.									
	Hard rock requiring chiseling / where blasting is prohibited.									
	5% Total Excavation Qty	1				13.65	Cum	664.00	9063.60	
	(CGPHE SOR 2020, amendment 07/2022-23 I.N.18.19.3/P-52)									

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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
5	Supply & Filling moorum/river sand for pipe bedding or over the pipe (including supply)								
	800 mm Dia.	1	100.00	1.40	0.15	21			
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.24/P 52)					21	Cum	864.00	18144.00
6	Providing, laying and jointing including testing following socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) conforming to IS 8329 /2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/2018								
	800 mm					100.00	Mtr	19653.00	1965300.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.3/P 3)								
7	Providing and Laying including testing Ductile Iron Double Socket 90° Bends conforming to IS:9523/2000 having dimension as per table 15 of IS:9523/2000 in the following nominal diaMtr/sizes with external bitumen coating and internal cement mortar lining.								
	800 mm					2	Each	84864.00	169728.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.13/P 7)								
8	Providing and Laying including testing Ductile Iron Double Socket 45° Bends conforming to IS:9523/2000 having dimension as per table 16 of IS: 9523 /2000 in the following nominal diaMtr/sizes with external bitumen coating and internal cement mortar lining.								
	800 mm					1	Each	79399.00	79399.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.15/P 8)								
9	Providing and Laying including testing Ductile Iron Double Socket 22.5° Bends conforming to IS:9523/2000 having dimension as per table 17 of IS:9523/2000 in the following nominal diaMtr /sizes with external bitumen coating and internal cement mortar lining.								
	800 mm					1	Each	50865.00	50865.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.17/P 8)								


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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
10	Providing and Laying including testing Ductile Iron Double Socket 11.25° bends conforming to IS:9523/2000 having dimension as per table 18 of IS:9523/2000 in the following nominal diameter/ sizes with external bitumen coating and internal cement mortar lining.								
	800 mm					1	Each	50038.00	50038.00
	(CGPHE SOR 2020 amendment 07/2022-23 4.19/9)								
11	Providing & fixing following ductile iron single chamber triple function temperproof air valves, small orifice with screwed end as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991								
	150 mm dia					1	Each	14928.00	14928.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.50/P 21)								
12	Providing & fixing following ductile iron double flanged check valve without damper (non- return valve) including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 5312 (Part II)								
	600 mm					1	Each	399716.00	399716.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.44/P 19)								
13	Providing & fixing of following Ductile iron double flanged sluice valves as per I.S.:14846-2000 fitted with cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete.								
	500 mm					1	Each	256125.00	256125.00
	80 mm diameter - PN-16 for Air valve					1	Each	8622.00	8622.00
	100 mm diameter - PN-16 for Scour valve					1	Each	11585.00	11585.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.41/P 18)								
14	Providing and Laying including testing Ductile Iron Double Socket branch flange Tee conforming to IS:9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.								
	(CGPHE SOR 2020 amendment 07/2022-23 4.23/11)								



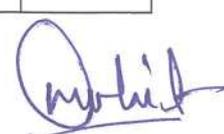
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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
	100 mm diameter - PN-16 for Scour valve								
	600 x 200					1	Each	30553.00	30553.00
15	Providing and Laying including testing Ductile iron Mechanical joint collar with follower glands conforming to IS: 9523/2000 having dimension as per table 24 of IS: 9523/2000 in the following nominal diaMtr/sizes with external bitumen and internal cement mortar lining. (CGPHE SOR 2020, amendment 07/2022-23 4.11/6)								
	800 mm					8	Each	70441.00	563528.00
16	Providing and Laying including testing ductile PN 16 type iron flanged spigot conforming to IS:9523/2000 having dimension as per table 24 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000. (CGPHE SOR 2020 amendment 07/2022-23 4.9/5)								
	Flanged Spigot								
	800 mm					2	Each	53768.00	107536.00
17	Providing and Laying including testing ductile iron PN 16 type flanged sockets conforming to IS: 9523/2000 having dimension as per table 23 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000. (CGPHE SOR 2020, amendment 07/2022-23 4.7/4)								
	Flange Socket Tail piece								
	800 mm					2	Each	47914.00	95828.00
18	Labour only for cutting following Ductile Iron pipes of any type and class.								
	800 mm					8	Per Cut	662.00	5296.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.4/P 60)								
19	Chamfering of CI/DI pipes of all types and classes to make suitable for tyton joints.								
	300mm					8	Each	3700.00	29600.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.6/P 61)								

S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
20	Construction of RCC valve chamber with 15 cm thick wall base course 10 cm thick in M-10. complete.								
	800 mm					2	Nos	44809.00	89618.00
	Detail in sub-estimate								
	100 mm dia - SOR AMENDMENT 07/2022-23, CGPHE 2020 Item No. 18.79 P/58					2	Nos	7886.00	15772.00
21	RCC thrust block								
	800 mm					5	Nos	13942.00	69710.00
	Detail in sub-estimate								
22	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of Each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils								
						273.0	Cum		
	Deduction Pipe volume								
	800 mm	1	100.00	0.80	0.785	-50.24	Cum		
						201.8	Cum	82.00	16544.32
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.22/P 52)								
23	Carriage of Material by Mechanical transport including loading unloading & stacking etc.								
	Surplus Earth & Moorum & dismantled CC&BT								
	Distance 5 km					71.24	Cum	222.00	15815.28
		(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.10.2/P 62)							


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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
24	Providing and laying cement concrete for plain concrete/reinforced concrete i/c form work shuttering complete in as per drawings and specifications (for other / village roads)								
	PCC M-10(250 mm)	1	50.00	1.40	0.15	10.50	Cum	2789.00	29,285
	Providing and laying Un-reinforced Cement Concrete without Dowel bars including formwork and expansion, contraction & Longitudinal Joints as per design and as per IRC-62-2014, over a prepared base as per approved mix design and finishing to lines and grade as per Drawing for Pavement thickness less than 200mm in Low Volume Roads.								
	PCC Grade M30 with minimum: Cement Content @ 375kg/cum								
	PCC M-30(250mm)	1	50.00	1.40	0.15	10.50	Cum	4391.00	46,106
(CG PWD ROAD SOR 2015, ITEM NO. 6.6/27) & Amendment No. 01/2015									
Sub Total Rs. :-									4207986.15
Grand Total Rs. :-									4207986.2
Add 18% GST									757437.51
Grand Total									4965423.66
IN LACS									49.65



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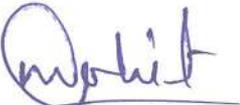


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ESTIMATES PACKAGE-II


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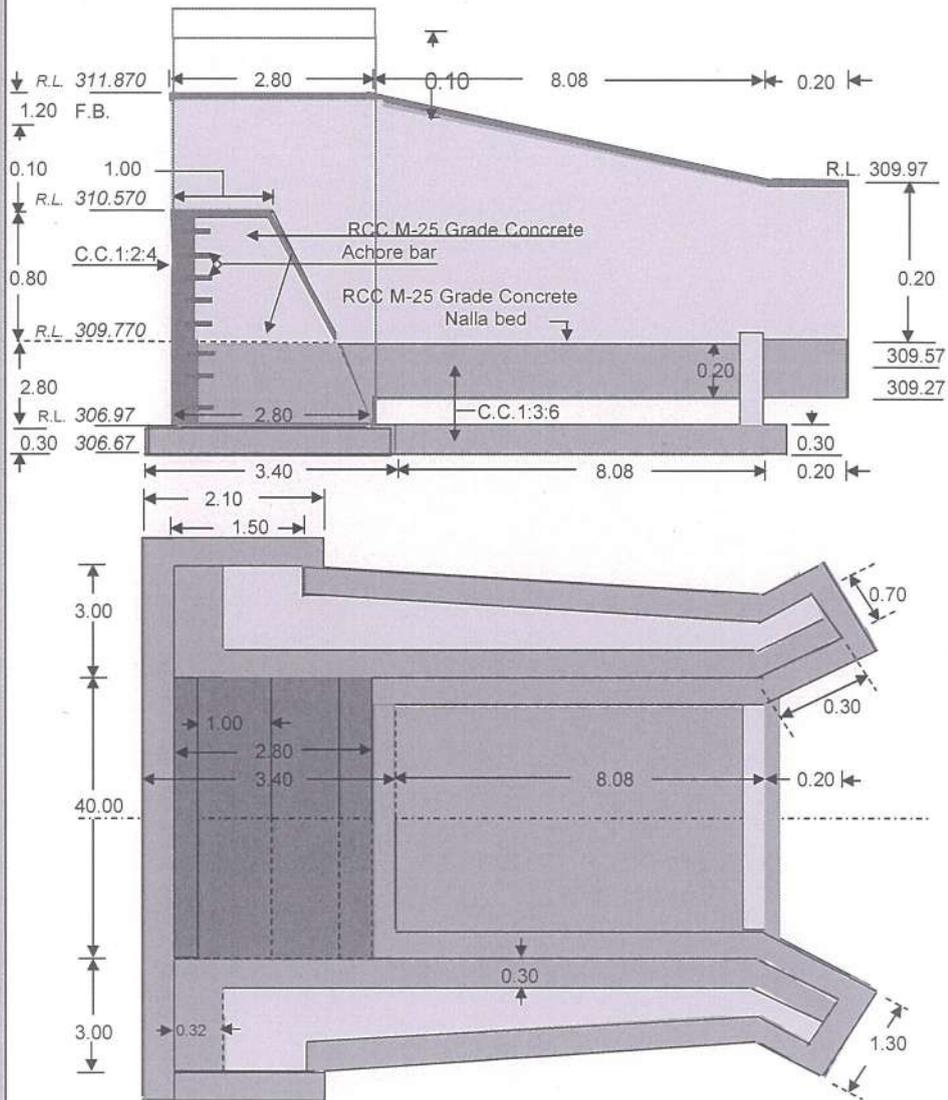

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DURG MUNICIPAL CORPORATION

Name of Diversion WEIR:- Diversion WEIR AT PULGAON NALA

1	Catchment Area:-	Ac=	12.50	Sq Km.or	4.89	Sq mile
2	Length of Anicut:-	L=	40.00	Meter		
3	Height of Anicut:- (NBI)	H'=	0.80	Meter		
4	Fetch Length of the water:-	f=	2900	Meter		
5	Nalla Bed Level (Deepest)	NBL=	309.77	Meter		
6						
7	Head wall top width	Ht=	1.00	Meter		
8	Head wall extension top width	He=	0.60	Meter		
9	Side/ wing wall top width	St=	0.60	Meter		
10	Foundation depth (assume)	fd=	3.00	Meter		



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT PULGAON NALA

Storm Water Runoff		C.I.A/360	
Where	C = Coefficient of Runoff	0.6	
	I = Intensity of Rainfall	38.12 mm/hr	highest at time in July
	A = Area in hectare for Nallah	12.50 Sq Km	
1 Catchment Area:-	Ac=	= 12.50 Sq Km.	4.89 Sq mile
2 Length of Anicut:-	L=	= 40.00 Meter	
3 Hight of Anicut:-	H'=	= 0.80 Meter	
4 Average Nallah bed level		= 309.77 Meter	

DESIGN :**(1) Flood discharge at Weir site**

Using above formula

$$Q = \quad = \quad = 0.79417 \text{ cumec} \quad \text{and substituting we have,}$$

$$\text{Max. observed flood discharge} = \mathbf{1.58} \text{ cumec}$$

$$+ \text{ DWF}$$

2 Hight of water on Anicut:- $h=(Q/1.7L)^{2/3}$

$$h = \left(\frac{1.58}{1.7 \times 30.60} \right)^{2/3}$$

$$= \mathbf{0.10} \text{ meter}$$

3 Height of wave:- $hw=0.014(Df)^{1/2}$

$$hw = 0.014 \times (2900)^{1/2}$$

$$= \mathbf{0.80} \text{ meter}$$

4 Free Board :- $fb=1.5hw$

$$fb = 1.50 \times 0.80$$

$$= \mathbf{1.20} \text{ meter}$$

5 Head wall top width :- $Ht=h/(p-1)^{1/2} > 0.4H$

$$Ht = \frac{0.10}{(2.3-1)^{1/2}} > 0.4H = 0.4 \times 0.80$$

$$= \mathbf{0.10} \text{ meter} \quad = \mathbf{0.32}$$

$$\text{Required Ht} = \mathbf{0.32} \text{ meter} \quad \text{Provided} = \mathbf{1.00} \text{ Meter}$$

6 head wall base width :- $Hb=H+f+h/(p-1)^{1/2}$

$$Hb = \frac{0.80 + 1.20 + 0.10}{(2.3-1)^{1/2}}$$

$$= \mathbf{1.80} \text{ meter} \quad \text{Provided} = \mathbf{2.80} \text{ Meter}$$

7 Head wall Extension Height:- $Heh=H+h+f$

$$Heh = 0.80 + 0.10 + 1.20$$

$$= \mathbf{3.00} \text{ meter}$$

8 Head wall Extension length :- $He=Heh+1$

$$He = \mathbf{3.00} \text{ meter}$$

9 Head wall Extension Top width:- $Hetw=0.4H.>= 0.6m$

$$Hetw = 0.4 \times 0.80$$

$$= \mathbf{0.32} \quad \geq \mathbf{0.30}$$

$$\text{Provided Hetw} = \mathbf{0.32} \text{ meter}$$

10 Head wall Extension Base Width :- $Heb= 0.5 \text{ head wall extension height}$

$$Heb = 0.5 \times 3.00$$

$$= \mathbf{1.50} \text{ meter}$$

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- 11 **Basin Length :-** $Bl = 0.75(H+h+f)+H$
 $= 0.75 \times 3.00 + 0.80$
 $= 8.28$ meter
- 12 **Basin Width :-** $L = \text{length of anicut}$
 $"L" = 40.00$ meter
- 13 **Basin Thickness :-** $Bt = 4/3 \times (h/1.3)$
 $Bt = \frac{4}{3} \times \frac{0.10}{1.3}$
 $= 0.20$ meter
- 14 **Side wall Length:-** $Sl = \text{Basin Length}$
 $Sl = 8.28$ meter
- 15 **Side wall top width** $St = 0.60$ meter (assume)
- 16 **Side wall Height (at head wall joint):-** $= \text{head wall extension height}$
 $= 3.00$ meter
- 17 **Side wall Height (at toe wall joint):-** $Sh = 1.5 h$
 $Sh = 1.5 \times 0.10$
 $= 0.20$ meter
- 18 **Side wall Base Width(at head wall joint) :-** $Sbh = 0.6+0.4 \times (H+h+f)$
 $Sbh = 0.60 + 0.4 \times 3.00$
 $= 1.80$ meter
- 19 **Side wall Base Width (at wing wall joint) :-** $Sbw = 0.6+0.6 \times h$
 $Sbw = 0.60 + 0.6 \times 0.10$
 $= 0.70$ meter
- 20 **Wing wall length:-** $Wl = 2.25 \times h$
 $Wl = 2.25 \times 0.10$
 $= 0.30$ meter
- 21 **Wing wall top width:-** $= 0.30$ meter (assume)
- 22 **Wing wall Base Width :-** $Wbw = \text{Side wall base width (at wing wall joint)}$
 $Wbw = 0.70$ meter
- 23 **Wing wall height:-** $wh = 1.5 \times h$
 $wh = 1.5 \times 0.10$
 $= 0.20$ meter
- 24 **Toe wall Length:-** $Tl = \text{Length of weir}$
 $= 40.00$ meter
- 25 **Toe Wall Top width :-** $= 0.30$ meter (assume)
- 26 **Max. Depth of Foundation in Earth or upto depth of D/R or H/R witch ever is less (from F.S.L.)**
 $D_{max} = 1.5 \times 0.47 \times (Q/0.7)^{1/3} = 1.5 \times 0.47 \times (1.58 / 0.7)^{1/3}$
 $= 1.00$ meter
 if $W = 4.75 \times Q^{1/2} > L$
 $= 4.75 \times (1.58)^{1/2}$
 $= 6.00$ meter > 40.00
 Than $d1 = d(w/l)^{0.6}$
 $= 1.00 \times (6.00 / 40.00)^{0.6}$
 $= 0.40$ meter
 Required foundation depth = **-0.50** meter from nalla bed
 Provided Foundation depth = **3.00** meter

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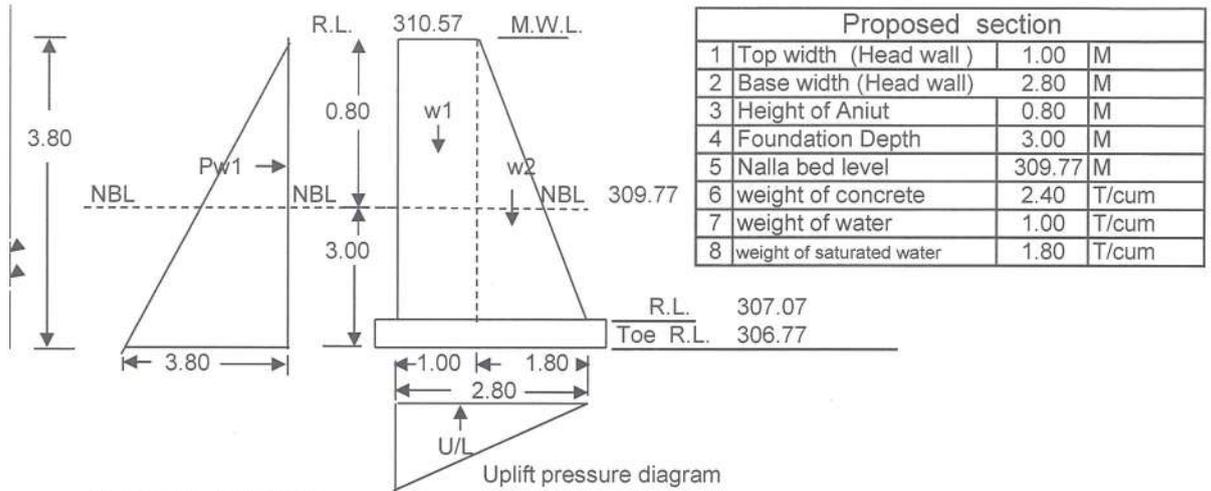
Executive Engineer
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**DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT PULGAON NALA
STABILITY CHEKING OF HEAD WALL (main)**

Condition :- When water in U/S at M.W.L. and no tail water in d/s and considering full up lift



Taking moment at Toe

Sno.	Item	particulars	Force		L.A.	Moment	
			V	H		Mr	Mo
1	w1	1.00 x 3.80 x 2.40	= 9.12	-	2.30	20.98	-
2	w2	0.5 x 3.80 x 1.80 x 2.40	= 8.21	-	1.20	9.85	-
4	Pw1	0.5 x 3.80 x 3.80 x 1.00	= -	7.22	1.27	-	9.15
5	u/p lift	0.5 x 3.80 x 2.80 x 1.00	= -5.32	-	1.87	-	9.93
Total			= 12.01	7.22	-	30.83	19.08

$$\begin{aligned} \Sigma V &= 12.01 \text{ t/m} & \Sigma Mr &= 30.83 \text{ t/m} \\ \Sigma H &= 7.22 \text{ t/m} & \Sigma Mo &= 19.08 \text{ t/m} \\ \Sigma M &= 30.83 - 19.08 = 11.75 \text{ t/m} \\ \bar{X} &= \Sigma M / \Sigma V = 11.75 / 12.01 = 0.98 \text{ M} \\ b/3 &= 2.80 / 3 = 0.93 \text{ M} \\ 2b/3 &= (2 \times 2.80) / 3 = 1.87 \text{ M} \\ b/6 &= 2.80 / 6 = 0.47 \text{ M} \end{aligned}$$

$$1. \text{Eccentricity :- } e = b/2 - \bar{X} < b/6 \text{ than safe} \\ = 2.80 / 2 - 0.98 = 0.42 < 0.47$$

No tension developed

$$1. \text{ Check against Sliding :- } \Sigma V / \Sigma H > 1 \text{ than safe} \\ \Sigma V / \Sigma H = 12.01 / 7.22 = 1.66 > 1 \text{ O.K}$$

$$2. \text{ Check Against Over turning :- } \Sigma Mr / \Sigma mo > 1.5 \text{ than safe} \\ = 30.83 / 19.08 = 1.62 > 1.5 \text{ O.K}$$

$$4. \text{ Maximum compressive / tensile at heel.} = \Sigma v / b(1-6e/b) < -1 \text{ t/m}^2 \text{ than safe} \\ = \frac{12.01}{2.80} \times (1.00 - \frac{6 \times 0.42}{2.80}) = 0.43 \text{ t/m}^2 \\ \text{Hence safe.}$$

$$3. \text{ Maximum compressive stress at toe.} = \Sigma v / b(1+6e/b) < 15 \text{ t/m}^2 \text{ than safe} \\ = \frac{12.01}{2.80} \times (1.00 + \frac{6 \times 0.42}{2.80}) = 8.15 \text{ t/m}^2 \\ \text{hence safe.}$$

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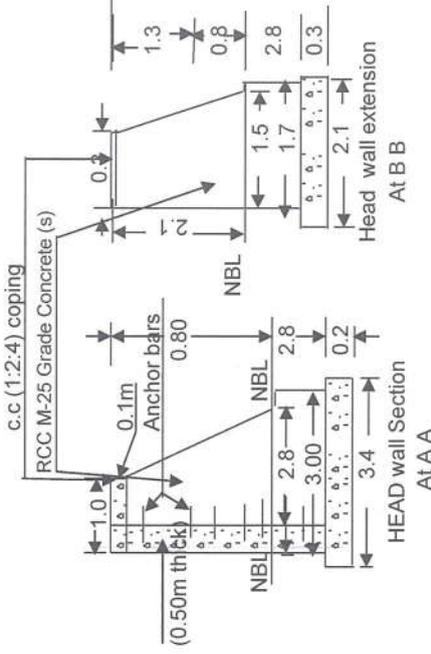
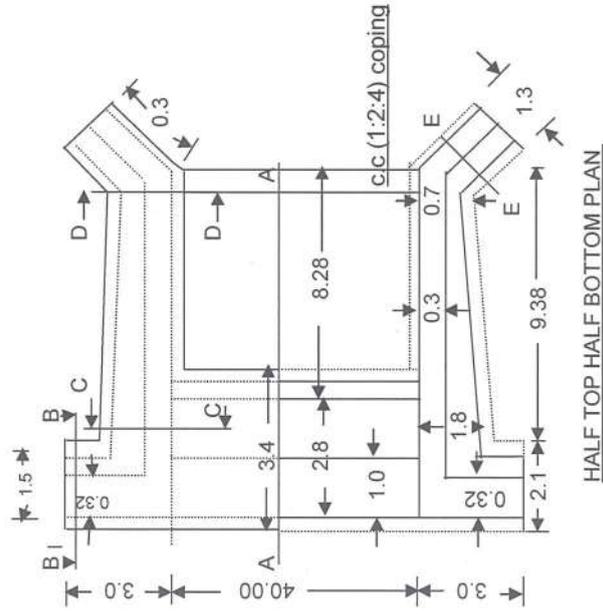
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Sub Engineer
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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
DIVERSION WIER AT PULGAON NALA

1 Catchmer.	Ac=	12.50	Sq Km.or	4.89	Sq mile
2 Length of Anicut:-	L=	40.00	Meter		
3 Height of Anicut:- (NBI)	H'	0.80	Meter		
4 Fetch Length of the water:-	fl=	2900	Meter		
5 Nalla Bed Level (Deepest)	NBL=	309.77	Meter		
6					
7 Head wall top width	Ht=	1.00	Meter		
8 Head wall extension top width	He=	0.30	Meter		
9 Side/ wing wall top width	St=	0.30	Meter		
10 Foundation depth (assume)	fd=	3.00	Meter		

Foundation strata classification	item	%
A. E/w in kanker boulder		25
B. E/w in D/R rock		25
C. H/R not required blasting		25
D. E/w in phylites & other rock		25

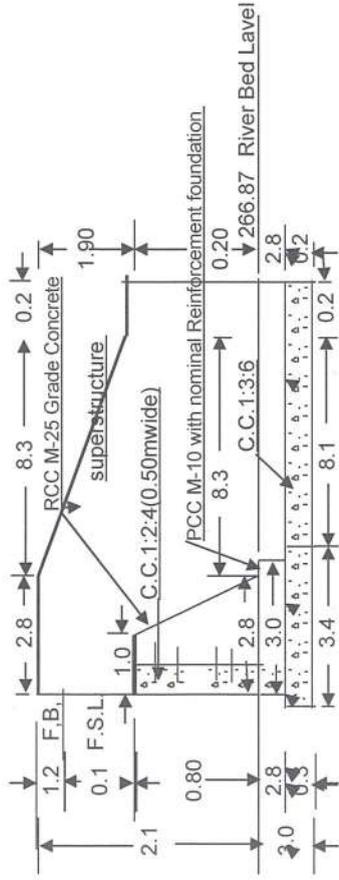
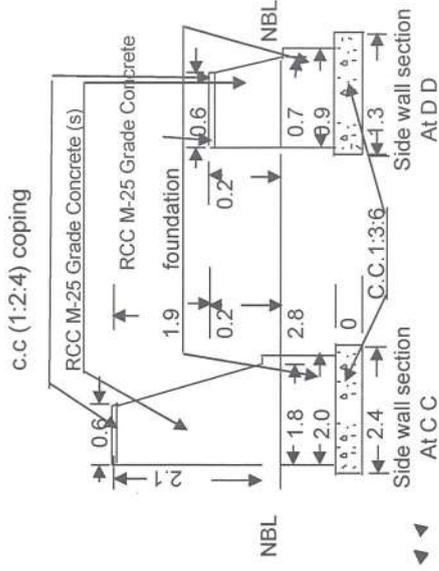


HALF TOP HALF BOTTOM PLAN

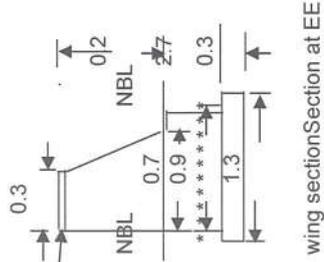
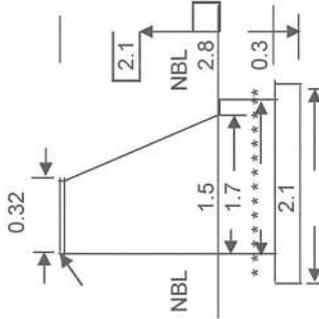
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SECTION ELEVATION at A A



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.7****Abstract****DIVERSION WEIR AT PULGAON NALLAH**

Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
1	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulders in wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surface excavated stuff within a radius of 0.5km as directed by Engineer - in-charge, etc. complete excluding refilling. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 For lift 0.0 to 1.5 m.	478.84	cum	201.00	96247.00
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51 For lift 0.0 to 1.5 m. For lift 1.5 to 3.0 m.	119.71 356.51	cum cum	266.00 67 266.00 333.00	31843.00 118718.00
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unservicveable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51) (Soft rock with or without blasting or bituminous pavement/ cement concrete road) For lift 1.5 to 3.0 m. For lift 3.0 to 4.5 m. For lift 4.5 to 6.0 m.	62.12 36.90 13.02	cum cum cum	465 120 585.00 705.00 825.00	36340.00 26015.00 10742.00
4	For muddy area, extra rate for item No. 18.15 (extra 20% percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). (CGPHE SOR Amendment 7 I.No. 18.19 Page 51)	239.42	cum	40.20	9625.00

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Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
5	Pumping out water caused by springs tidal or river seepage, broken water main or drains and like Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.21, Pg. No.52	3600.00	KL	71	255600.00
6	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the materials as directed by the Engineer-in-charge. (PHE SOR AMENDMENT 7, I. No. 20.1 of P. No. 71)	262.50	cum	866	227325.00
7	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) 1:2:4 (M-15) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.40.1.4, Pg. No.53	43.76	cum	5910.00	258613.00
8	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) 1: 0.75 : 1.5 (M-30) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.42.3, Pg. No.54	594.56	cum	7982.00	4745804.00
9	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) 1: 0.75 : 1.5 (M-30) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.43.3, Pg. No.53	626.84	cum	8028.00	5032247.00
10	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56 & 57 Foundation / footing / column base / plinth beam of any shape and size up to plinth level Beam / Lintel / Cantilever / Walls	369.38 450.30	SQM SQM	231.00 378.00	85326.00 170215.00

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Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
11	Providing and laying Pitching Stone/Boulder on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications as per clause 2504. (CG SOR BRIDGE 2021 I.No.9.10 P.No.41)	19.38	cum	1639.00	31765.79
12	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.44, Pg. No.54 Sub structure 80 kg/cum Super structure 80 kg/cum	47565.06 50146.96	kg kg	70.00 70.00	3329554.00 3510287.00
13	Supply and fixing of moulded Fibre Needle gate for K.T. Weir of size of 2.15 meter x 0.5 meter x 65 mm made of composite material fiberglass reinforced plastic (F.R.P.) with both side gelcoat finish in eyepleasant blue color sandwiched with M.S. prefabricated structure made in 40 x 40 x square tube, 40x40x6 T Angle and total M.S. structure from all sides covered in FRP moulding, moulded and engraved gauge marking from 0 to 0.5 meter with one centimeter least count, project name covered in retro reflective for front portion of needle rubber pads etc. complete including transportation and all taxes . Analysis per No.				
	Market (Quotation Rate) Rs. 9300/- GST 18% Rs. 1675/- Transportation 05% Rs. 465/- 10% Incidental charges Rs. 930/- Fixing Charges 4 Labours for 1.5 days Rs. 1800/- 4*1.5@ 300/day Total Rs.14170/- AS per (15) /page 7 of CG SOR add 10.35 % Rs. 1467/- Rate for 1 No. of size 0.5*2.15 m size Rs.15637/- or per sqm rate Rs.14546/-	25.800	sqm	14546.0	375287.00
14	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.23, Pg. No.52	428.77	cum	62.00	26584.00

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Municipal Corporation Durg


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Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
15	Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56	80.00	Rmt	1191.00	95280.00
16	Design/Drawing, fabrication, supply and erection of structural steel Radial crest gate, as per IS: 4623 with skin plate stiffeners, guide, embedded parts, sill beam, fitted with stainless steel flat, guide roller, rubber seals wall plate fitted with stainless steel flats trunion & anchorage as required complete with hoist bridge etc. (Excluding cost & weight of hoist). CG WRD SOR 2010, ITEM NO. 2602(b), Pg.214	6.45	Tonne	155506.0	1003014.00
				Total	19476431.79
17	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architectural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on preveling schedule of rates, architectural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6			5% of the estimated cost	973822.00

G-TOTAL 20450253.79

Excluding It. No.14 (F.R.P. Rate) GST 18% 3613494.02

Say Rs. 240.64 Lacs



Sub Engineer
Municipal Corporation Durg



Assistant Engineer
Municipal Corporation
Durg(C.G)



Executive Engineer
Municipal Corporation
Durg (C.G)

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.7****Measurement****DIVERSION WEIR AT PULGAON NALLAH**

Sno.	ITEM	No.	L	B	H	QTY
1	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulders in wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surface excavated stuff within a radius of 0.5km as directed by Engineer - in-charge, etc. complete excluding refilling. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 For lift 0.0 to 1.5 m.					
	(I) Head Wall	1	40.00	5.40	1.20	259.20
	(II)Head Wall Exetention	2	3.00	6.10	1.20	43.92
	(III)Side Wall	2	9.38	3.85	1.20	86.67
		2	9.38	3.85	1.20	86.67
	(IV)Wing Wall	2	0.30	3.30	1.20	2.38
					Total	478.84 cum
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51 For lift 0.0 to 1.5 m.					
	(I) Head Wall	1	40	5.4	0.3	64.80
	(II)Head Wall Exetention	2	3	6.1	0.3	10.98
	(III)Side Wall	2	9.38	3.85	0.3	21.67
		2	9.38	3.85	0.3	21.67
	(IV)Wing Wall	2	0.3	3.3	0.3	0.59
					Total	119.71 Cum
	For lift 1.5 to 3.0 m.					
	(I) Head Wall	1	40	4.40	1.2	211.20
	(II)Head Wall Exetention	2	3	5.10	1.2	36.72
	(III)Side Wall	2	9.38	2.85	1	53.47
		2	9.38	2.85	1	53.47
	(IV)Wing Wall	2	0.3	2.30	1.2	1.66
					Total	356.51 Cum

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Municipal Corporation
Durg


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Sno.	ITEM	No.	L	B	H	QTY
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51) For lift 1.5 to 3.0 m.					
	(I) Head Wall	1	40	4.4	0.3	52.80
	(II)Head Wall Exetention	2	3	5.1	0.3	9.18
	(III)Side Wall	2	9.38	2.85	0	0.00
		2	9.38	2.85	0	0.00
	(IV)Wing Wall	2	0.3	2.3	0.1	0.14
					Total	62.12
						Cum
	For lift 3.0 to 4.5 m.					
	(I) Head Wall	1	40	3.40	0	0.00
	(II)Head Wall Exetention	2	3	4.10	1.5	36.90
	(III)Side Wall	2	9.38	2.85	0	0.00
		2	9.38	2.85	0	0.00
	(IV)Wing Wall	2	0.3	2.30	0.00	0.00
				Total	36.90	
					Cum	
For lift 4.5 to 6.0 m.						
(I) Head Wall	1	40	3.4	0	0.00	
(II)Head Wall Exetention	2	3	3.10	0.7	13.02	
(III)Side Wall	2	9.38	2.85	0	0.00	
	2	9.38	2.85	0	0.00	
(IV)Wing Wall	2	0.3	2.3	0	0.00	
				Total	13.02	
					Cum	
4	For muddy area, extra rate for item No. 18.15 (extra 20% percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). 50 % of excavation item No.1 (CGPHE SOR Amendment 7 I.No. 18.19 Page 51)	50	% Quantity taken for			239.42
5	Pumping out water caused by springs tidal or river seepage, broken water main or drains and like 1 nos. Pumps of 15 KL/hr discharge run for 8 hr for 30 days Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.21, Pg. No.52	30	8	15	1	3600

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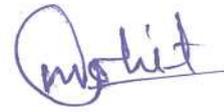

Sub Engineer
Municipal Corporation Durg

Sno.	ITEM	No.	L	B	H	QTY	
6	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the materials as directed by the Engineer-in-charge. (PHE SOR AMENDMENT 7, I. No. 20.1 of P. No. 71)	1	50.00	3.5	1.5	262.50	
7	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) In Plinth & foundation 1:2:4 (M-15) (I) Head Wall (II)Head Wall Exetantion (III)Side Wall (IV)Wing Wall Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.40.1.4, Pg. No.53	1 2 2 2 2	40.00 3.00 9.38 9.38 0.30	3.40 2.10 1.85 1.85 1.30	0.20 0.20 0.20 0.20 0.20	27.20 2.52 6.94 6.94 0.16	 total 43.76
8	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in foundation/plinth (20mm graded metal) 1: 0.75 : 1.5 (M-30) (I) Head Wall (II)Head Wall Extention (III)Side Wall (IV)Wing Wall Head wall qty in pier portion Wing wall qty in pier portion Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.42.3, Pg. No.54	1 2 2 2 2 8 2	40.00 3.00 9.38 9.38 0.30 3.40 3.40	3.00 1.70 1.45 1.45 0.90 0.80 0.80	2.80 2.80 2.80 2.80 2.80 2.80 2.80	336.00 28.56 76.17 76.17 1.51 60.93 15.23	 Total 594.56 cum
9	Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) RCC M-25 (1:1:2) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.43.2, Pg. No.54 (I) Head Wall (II)Head Wall Extention (III)Side Wall	1 2 2 2	40.00 3.00 9.38 9.38	1.90 0.91 1.41 1.41	0.80 2.10 1.15 1.15	60.80 11.47 30.31 30.31	

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Sno.	ITEM	No.	L	B	H	QTY
	(V)Wing Wall	2	0.30	0.50	0.20	0.06
	Head wall qty in pier portion	8	3.40	0.80	0.50	10.88
	Wing wall qty in pier portion	2	3.40	0.80	0.60	3.26
	VI) Pier	8	3.40	1.90	0.80	41.34
	(V) Middle wall over crest to support Gate	8	2.15	1.00	1.30	22.40
	(VI) Walkway Slab over for Operating platform	1	40.00	3.40	0.30	40.80
	(VII) D/s bedding above nala bed	1	40.00	9.38	0.50	187.60
	(VIII) U/s bedding above nala bed	1	40.00	9.38	0.50	187.60
					ToTal	626.84
10	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56 & 57 Foundation / footing / column base / plinth beam of any shape and size up to plinth level					
	Head Wall	2	40.00		2.8	224.00
	Head Wall Extension	1	6.00		2.8	16.80
	Wing Wall	2x2	11.48		2.8	128.58
						369.38
						SQM
	Beam / Lintel / Cantilever / Walls					
	Head Wall	1	40.00		0.80	32.00
	Slope	1	40.00		3.44	137.60
	Head Wall Extension	1	6.00		2.10	12.60
		1	6.00		8.39	50.34
	Wing Wall	2x2	11.48		0.20	9.18
	Pier	2x2x7	3.40		0.80	76.16
	Middle wall	2x2	3.15		1.30	16.38
	Slab	1	40.00		0.30	12.00
	4 sides	2x2	43.40		0.30	52.08
	Deduct	2x2	3.40		2.80	38.08
		2x2	1.00		0.80	3.20
	Sides	2x2x1/2	1.80		0.80	2.88
		2	1.30		3.00	7.80
						450.30
						SQM
11	Providing and laying Pitching Stone/Boulder on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications as per clause 2504. (CG SOR BRIDGE 2021 I.No.9.10 P.No.41)					
	Head Wall Extension	2	3.00	1.70	0.30	3.06
	Side Wall	2	9.38	1.45	0.30	8.16
		2	9.38	1.45	0.30	8.16
						19.38
						cum

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Sno.	ITEM	No.	L	B	H	QTY
12	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.44, Pg. No.54 Sub structure 80 kg/cum Super structure 80 kg/cum	47565 50147				47565.06 50146.96 kg
13	Supply and fixing of moulded Fibre Needle gate for K.T. Weir of size of 2.15 meter x 0.5 meter x 65 mm made of composite material fiberglass reinforced plastic (F.R.P.) with both side gelcoat finish in eyepleasant blue color sandwiched with M.S. prefabricated structure made in 40 x 40 x square tube, 40x40x6 T Angle and total M.S. structure from all sides covered in FRP moulding, moulded and engraved gauge marking from 0 to 0.5 meter with one centimeter least count, project name covered in retro reflective for front portion of needle rubber pads etc. complete including transportation and all taxes . 1 Row of 2.15 m x 0.5 m 4 No. in a Row 6 No. of opening	4 x 6	2.15	0.50		25.8 sqm
14	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.23, Pg. No.52 Deduct for PCC Deduct for RCC					as per item no 1 as per item no 7 as per item no 8 Net Qty. 428.77 cum
15	Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56	2	40		Rmt.	80

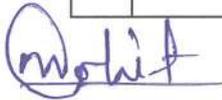
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Sno.	ITEM	No.	L	B	H	QTY	
16	Design / Drawing, fabrication, supply and erection of automatic openable vertical Axis swing gate with water tight rubber seals, skin plate stiffeners, sill beam, hinge brackets rotating gate leafs of size up to 8 sqm. with structural steel frame, bushing of aluminum bronze, trunnion hubs, friction dampers with stainless steel guide etc. complete including hydraulic jack for closure of gate. CG WRD SOR 2010, ITEM NO. 2602(d), Pg.215 As per Note 6 (M) The weight of Vertical Axis swing gate is 0.50 MT per sqm	3 @0.50 mt /SQM	2.15			2 12.9 6.45 Ton	
17	Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architecural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c detailes of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets. (CGPHE SOR I.No. 24.18 page 271-72	5% of the estimated cost					



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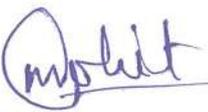
DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0

TOOL FOR DESIGN OF INLET CHAMBER, SCREEN CHAMBER, GRIT CHAMBER FOR PULGAON NALA		
Capacity Average Flow	30.00	MLD
Guidance: Yellow cells are the input information to be suitably filled. Green cells are to be reviewed and modified/updated if need be. Red letters to be suitably corrected.		
Ground level at Inlet chamber site		311.90 Mtr
Average Flow		30 MLD
Average Flow		0.35 M ³ /sec
Peak Flow : Peak Factor	2.25	67.5 MLD
Peak Flow :		0.78 M ³ /sec
Minimum Flow Factor	0.5	33.75 MLD
Minimum Flow		0.39 M ³ /sec
DESIGN OF INLET CHAMBER		
Peak Flow		67.5 MLD
Peak Flow		0.78 M ³ /sec
Detention time		10 Sec
Volume required		7.81 cum
Liquid depth taken		0.6 Mtr
Area		13.02 M ²
Width taken		3.70 Mtr
Length		3.60 Mtr
Depth of the Inlet Chamber		4 Mtr
Size-3.7 (L) x 3.7 (W) x 1 (D)		
DESIGN OF COARSE SCREEN		
Peak Flow		0.78 M ³ /sec
Coarse Screen Opening		50 mm
Depth of water in screen		0.6 Mtr.
velocity through screen		0.7 M/sec
Area of screen		1.30 M ²
Angle of inclination with the horizontal		45 degree
Sin (Angle of Inclination)		0.71
Free Board		0.40 m
Length of screen		1.41
Width of opening		0.92 mtr
No of opening		18 nos
Number of bars		17 nos
Let width of each bar be		10 mmx75 mm
Total width of channel		1095 mm
Let width of each side be		1300 mm
Total width of channel: Provide		3700 mm
Openings		62
No of bars		61
Size of Coarse Screen-Width		3.70 m

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Size of Coarse Screen-Length	3.60	m
Velocity in Channal u/s of Screen	0.35	
Velocity through Screen	0.42	
Head Loss No Clogging	0.003	m
Velocity when 50% clogging	0.84	m/sec
Head Loss when 50% clogging	0.030	m
Depth of the Coarse Screen chamber	4	Mtr
Size - 3.7 (L) x 3.7 (W) x 1 (D)		
DESIGN OF FINE SCREEN		
Peak Flow	0.78	M3/sec
Nos of screen(Each for handling peak flow)	2	Nos
Velocity(taking) through screen, Assume	0.7	M/sec
Area	1.12	M ²
Depth of flow taken	0.6	Mtr.
Hence width of opening	1.86	Mtr.
No of Openings	124	
No of Bars	123	
Width of Channal	1545	
Angle of inclination with the horizontal	45	degree
Clear opening between adjacent bars of screen	15	mm
Bars thickness of screen	10	mm x50mm
Taking width of screen	3700	mm
Nos of opening will be	148	Nos
Nos of bars(10 mm thickness)	147	Nos
Free Board	0.4	m
Sin (Angle of Inclination with horizontal)	0.707	
Inclined length of Screen	1.41	m
Length of chamber before screen	1.5	m
Total Length of chamber	3.00	
Total width of channel	3.7	Mtr.
Velocity in Channal u/s of Screen	0.35	m/sec
Velocity through Screen	0.58	m/sec
Head Loss through screen	0.011	m
Velocity through screen when 50% clogged	1.170	
Head Loss when 50% clogging	0.063	
Depth of the Fine Screen chamber	4	Mtr
Size-3 (L) x 3.7 (W) x 1 (D)		
DESIGN OF GRIT CHAMBER		
GRIT REMOVAL SYSTEM		
Two grit removal tank (1 W +1 S) each capable of handling peak flow, will be provided. They are		
$Q/A=V_s \times n/(1-\eta)^{n-1}$		
Where- η -Desired efficiency of removal of grit particle		
V_s -settling velocity of minimum size of grit particle to be removed		
Q/A --Design surface overflow rate applicable for grit chamber to be designed		
n-an index which a measure of the basin performance		

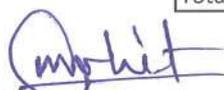
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Here η value taken	75	%
Say	0.75	
Here V_s value taken	1225	$m^3/m^2/day$
Here n value taken-1/8(for very good performance)	0.13	
Hence surface over flow	806.42	$m^3/m^2/day$
Say	810	$m^3/m^2/day$
This Q/A value has to be reduced to allow for deposition of	10.00	%
Then design overflow rate	729	$m^3/m^2/day$
Peak flow(m^3/day)	67500	(m^3/day)
Hence area required for peak flow	92.59	m^2
Each side of square grit chamber	9.62	mtr.
Hence provide tank length	10.00	mtr.
Hence provide tank Width	10.00	mtr.
Detention time taken is	1	minute
Depth of tank will be	0.11	mtr.
However in order to provide adequate depth for the grit settlement mechanism, increase to	0.15	mtr.
This gives detention time is	0.23	minute
the detention time of 0.35 (slightly higher) minute is immaterial for mechanically cleaned grit removal tank		
Hence size of grit removal chamber is		
Size-10 (L) x 10 (W) x 2 (D)		
Flow height above, H weir, $Q=(2/3)*Cd*L*H^{1.5}*((2g)^{.5}), Cd=.6, L=9$	0.12	m
Pipe from Diversion to Intercepting Chamber		
Peak Flow	0.78	cum/sec
Pipe dia	0.80	m
velocity of flow	1.56	m/sec
Length of pipe	10.00	m
head loss $flq^2/10*d^5$	0.019	m
entry/exit loss	0.185	m
Total Losses	0.203	m


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**ESTIMATE FOR INLET CHAMBER, SCREEN CHAMBER & GRIT CHAMBER FOR STP.****Sub-Work No.8****ABSTRACT**

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 1 :- Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Basic Rate 201.00 Add Extra for every additional lift of 1.5m 67.00 For lift 0.0 to 1.5 m. 642.67 201.00 Cum 129177.00 For lift 1.5 to 3.0 m. 517.41 268.00 Cum 138667.00 lift 3.0 to 4.5 m. 96.44 335.00 Cum 32306.00 (CGPHE SOR. Ammendment 7 P.No.51/I.No.18.15)				
	Item No. 2 (A) :- Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. (CGPHE SOR. Ammendment 7 P.No.51/I.No.18.16) Basic Rate 266.00 Add Extra for every additional lift of 1.5m 67.00 lift 3.0 to 4.5 m. 241.41 400.00 Cum 96563.00 lift 4.5 to 6.0 m. 20.61 467.00 Cum 9623.00				
	Item No. 2 (C) :- For muddy area, extra rate for item No. 18.15 (extra percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions). 20 % of excavation item 251.30 40.20 Cum 10103.00 (CGPHE AMEND 07 I.No. 18.18.1 Page 51)				
	Item No. 3 :- Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) (CGPHE Ammendment 7 SOR P No.51/ I.No. 18.40.1.3) M-150 Grade 38.70 5910.00 Cum 228699.00				
	Item No. 4 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) RCC M-30 for Raft foundation 54.50 7982.00 Cum 435015.00				

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammdement 7 SOR P No.54/ I.No. 18.42.3) Sub structure For R.C.C. Vertical wall M-300 grade</p>	72.28	7982.00	Cum	576914.00
	<p>Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering& shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHEAmmdement SOR P No. 54 / I.No. 18.43.3) For R.C.C. Vertical wall M-300 grade Super structure</p>	16.25	8028.00	Cum	130415.00
	<p>Item No. 7 :- Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/ccost of binding wire and wastage. (CGPHEAmmdement SOR P No. 54 / I.No. 18.44) @80kg/cum</p>	11442	70	kg	800940.00
	<p>Item No. 8 :- Providing and fixing in position M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (CGPHEAmmdement SOR P No. 121 / I.No. 26.50)</p>	3.75	4087.00	Rmt	15326.00
	<p>Item No. 9 :- Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-incharge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code: (CG PHE Ammdement SOR P No. 123 / I.No. 26.14.1) For two Coat</p>	633.63	798.00	sqm	505636.74
	<p>Item No. 10 :- Providing and fixing M.S. sluice gates in position as per detailed drawing and specification including cost of all materials, about, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc.complete as directed by Engineer-in charge. (CG PHE Ammdement 7 SOR P No. 73/ I.No.20.13)</p>	2400.00	132.00	Kg	316800.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 11 :- Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like. (CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.21)	3600	71.00	KL	255600.00
	Item No. 12 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE Ammendment 7SOR. P.No.52/lt.No18.22)	1130.34	82.00	cum	92688.28
	Item No. 13 :- Steel work in welded built-up section/ framed work, including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. Coarse Screen Fine Screen	835.24 1423.08	112.00 112.00	Kg Kg	93546.88 159384.96
	Item No. 14 :- Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Beam / Lintel / Cantilever / Walls Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57 Foundation , footing, bases of columns ,etc for mass concrete	17.66	231.00	sqm	4078.31
	Wall (any thickness)	211.95	402.00	sqm	85203.90
				Total	4116687.06
	Item No. 15 :- Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:-				
				5% of the estimated cost	205834.00
	(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.				

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S.No.	Items	Qty.	Rate	Unit	Amount
	(ii) Architectural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on prevailing schedule of rates, architectural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.				

Total Rs. 4322521.06

18% GST 778053.79

Say Rs. 5100574.86

Total in lakhs 51.01



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0							
ESTIMATE FOR INLET CHAMBER, SCREEN CHAMBER & GRIT CHAMBER FOR STP.							
Sub-Work No.8							
<u>Measurments</u>							
Items	Nos.	Length	Breadth	Height	Qty.	Unit	
Item No. 1 :-							
Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.							
(CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.15)							
For lift 0.0 to 1.5 m.							
Inlet Chamber & Screen Chamber	1	15.78	9.43	1.5	223.21	cum	
For lift 1.5 to 3.0 m.							
Inlet Chamber & Screen Chamber	1	14.28	7.93	1.5	169.86	cum	
For lift 3.0 to 4.5 m.							
Inlet Chamber & Screen Chamber	1	13.95	7.60	0.33	23.26	cum	
For lift 0.0 to 1.5 m.							
Grit Chamber & Grit Outlet Chamber	1	17.23	16.23	1.50	419.46	cum	
For lift 1.5 to 3.0 m.							
Grit Chamber & Grit Outlet Chamber	1	15.73	14.73	1.50	347.55	cum	
For lift 3.0 to 4.5 m.							
Grit Chamber & Grit Outlet Chamber	1	15.40	14.40	0.33	73.18	cum	
					lift 0.0 to 1.5 m.	642.67	Cum
					lift 1.5 to 3.0 m.	517.41	Cum
					lift 3.0 to 4.5 m.	96.44	Cum
Item No. 2 (A) :-							
Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.							
(CGPHE SOR. Ammendment 7 P.No.51/lt.No.18.16)							
For lift 3.0 to 4.5 m.							
Inlet Chamber & Screen Chamber	1	12.15	5.80	0.3	21.14	cum	
For lift 3.0 to 4.5 m.							
Grit Chamber & Grit Outlet Chamber	1	14.23	13.23	1.17	220.27	cum	
For lift 4.5 to 6.0 m.							
Grit Chamber & Grit Outlet Chamber	1	13.10	12.10	0.13	20.61	cum	
					lift 3.0 to 4.5 m.	241.41	Cum
					lift 4.5 to 6.0 m.	20.61	cum

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 2 (C) :- For muddy area, extra rate for item No. 18.15 (extra percentage rate is applicable in respect of each item but limited to quantities of work executed in these difficult conditions).						
					251.30	cum
	Considering 20% As muddy Soil					
Item No. 3 :- Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) (CGPHE Ammendment 7 SOR P No.51/ I.No. 18.40.1.3) M-150 Grade Inlet Chamber & Screen Chamber	1	11.75	4.80	0.2	11.28	cum
Grit Chamber & Grit Outlet Chamber	1	12.35	11.10	0.2	27.42	cum
				Total	38.70	cum
Item No. 4 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) RCC M-30 for Raft foundation Inlet Chamber & Screen Chamber	1	11.45	4.50	0.3	15.46	cum
Grit Chamber & Grit Outlet Chamber	1	12.05	10.80	0.3	39.04	cum
					54.50	cum
Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE Ammendment 7 SOR P No.54/ I.No. 18.42.3) For R.C.C. Vertical wall M-300 grade Inlet Chamber Long Wall Short Wall Screen Chamber A) Coarse Screen Long Wall Partation wall Screen Maintenance Platform B) Fine Screen Long Wall Partation wall Screen Maintenance Platform Grit Chamber Long Wall Short Wall Common wall of Screen & Grit Chamber	2 2 2 1 1 2 1 1 2 1 1	3.70 4.20 3.70 3.70 3.70 3.00 3.00 3.70	0.25 0.25 0.25 0.15 0.75 0.25 0.15 0.75	3.13 3.13 3.13 1.565 0.15 3.13 1.565 0.15	5.79 6.57 5.79 0.87 0.42 4.70 0.70 0.42	Cum Cum Cum Cum Cum Cum Cum Cum

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Grit Outlet Chamber						
Long Wall	2	1.00	0.25	4.13	2.07	Cum
Short Wall	1	10.50	0.25	4.13	10.84	Cum
			Total Quantity		72.28	Cum
Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHEAmendment SOR P No. 54 / I.No. 18.43.3)						
For R.C.C. Vertical wall M-300 grade Above Ground Level						
Inlet Chamber						
Long Wall	2	3.70	0.25	0.9	1.67	Cum
Short Wall	2	4.20	0.25	0.9	1.89	Cum
Screen Chamber						
A) Coarse Screen						
Long Wall	2	3.70	0.25	0.9	1.67	Cum
B) Fine Screen						
Long Wall	2	3.00	0.25	0.9	1.35	Cum
Grit Chamber						
Long Wall	2	10.00	0.25	0.9	4.50	Cum
Short Wall	1	10.50	0.25	0.9	2.36	Cum
Grit Outlet Chamber						
Long Wall	2	1.00	0.25	0.9	0.45	Cum
Short Wall	1	10.50	0.25	0.9	2.36	Cum
			Total Quantity		16.25	Cum
Item No. 7 :- Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHEAmendment SOR P No. 54 / I.No. 18.44)						
Sub structure	126.78	@80kg/cum			10142	kg
Super structure	16.25	@80kg/cum			1300	kg
Item No. 8 :- Providing and fixing in position M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (CGPHEAmendment SOR P No. 121 / I.No. 26.50)						
	1.0	3.75			3.75	Rmt

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Items	Nos.	Length	Breadth	Height	Qty.	Unit				
Item No. 9 :-										
Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-in-charge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code:										
(CG PHE Ammendment SOR P No. 123 / I.No. 26.14.1)										
For two Coat										
Inner Wall										
Inlet Chamber Screen Chamber										
Long Wall	2.00	10.40		3.13	65.10	Sqm				
Short Wall	6.00	3.70		3.13	69.49	Sqm				
Grit Chamber Grit Outlet Chamber										
Long Wall	2.00	11.00		4.13	90.86	Sqm				
Short Wall	4.00	10.00		4.13	165.20	Sqm				
Base Slab										
Inlet Chamber Screen Chamber	1.00	10.40		3.70	38.48	Sqm				
Grit Chamber Grit Outlet Chamber	1.00	11.00		10.00	110.00	Sqm				
Outer wall										
Inlet Chamber Screen Chamber										
Long Wall	2.00	10.40		0.90	18.72	Sqm				
Short Wall	6.00	3.70		0.90	19.98	Sqm				
Grit Chamber Grit Outlet Chamber										
Long Wall	2.00	11.00		0.90	19.80	Sqm				
Short Wall	4.00	10.00		0.90	36.00	Sqm				
					Total Quantity	633.63	Sqm			
Item No. 10 :-										
Providing and fixing M.S. sluice gates in position as per detailed drawing and specification including cost of all materials, labour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint, etc.complete as directed by Engineer-in charge.										
(CG PHE Ammendment 7 SOR P No. 73/ I.No.20.13										
					4 Assume gate of 600 kg	600	2400.00	Kg		
Item No. 11 :-										
Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like.										
(CGPHE SOR. Ammendment 7 P.No.51/It.No.18.21)										
					30	8	15	1	3600	kl

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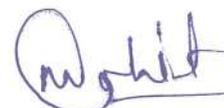
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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>Item No. 12 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE Ammendment 7SOR. P.No.52/lt.No18.22)</p>						
				Total Excavation	1518.54	
				Deduct		
				PCC	-38.70	
				Foundation	-54.50	
					-72.28	
				Volume of the Structures (Inlet & Screen chamber)	-57.72	
				Volume of the Structures (Grit & Grit outlet chamber)	-165.00	
					1130.34	cum
<p>Item No. 13 :- Steel work in welded built-up section/ framed work, including cutting hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.</p> <p>Analysis Coarse Screen 100X100X6 mm Equal Angle frame for Screen @ 9.20 kg/rmt For Frame</p> <p>75 mm x 10 mm MS Flat placed 50 mm apart = 3700 mm / 60 mm = 62 Nos of L-2 m</p> <p>Analysis Fine Screen 100X100X6 mm Equal Angle frame for Screen @ 9.20 kg/rmt For Frame</p> <p>50 mm x 10 mm MS Flat placed 12 mm apart = 3700 mm / 22 mm = 169 Nos of L-2 m</p>						
	2 x	3.7	7.4	Rmt		
	2 x	2	4	Rmt		
		Total	11.4	Rmt		
				@ 9.20 kg/rmt	104.88	Kg
	62	2	124	Rmt		
		Total	124	Rmt		
				@ 5.89 kg/rmt	730.36	Kg
				Total of Coarse Screen	835.24	kg
	2 x	3.7	7.4	Rmt		
	2 x	2	4	Rmt		
		Total	11.4	Rmt		
				@ 9.20 kg/rmt	104.88	Kg
	169	2	338	Rmt		
		Total	338	Rmt		
				@ 3.90 kg/rmt	1318.2	Kg
				Total of Fine Screen	1423.08	kg
<p>Item No. 14: - Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57</p>						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
For PCC	2	11.75		0.20	4.7	sqm
	1	12.35		0.20	2.47	sqm
Foundation	2	11.45		0.30	6.87	sqm
	1	12.05		0.30	3.615	sqm
Inlet, Screen & Grit Chamber						
Long Wall	4	21.40		5.50	117.70	sqm
Short Wall	6	7.50		4.50	33.75	sqm
	6	11.00		5.50	60.50	sqm
Foundation , footing, bases of columns ,etc for mass concrete					17.66	sqm
Wall (any thickness)					211.95	sqm
				Total	229.61	sqm
Item No. 15 :-						
Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:-						
	5% of the estimated cost					
(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.						
(ii) Architecural/ Structural drawing having following items :-						
(a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.						
(b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.						

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Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Invert (Start) (m)	Elevation Ground (Start) (m)	Invert (Stop) (m)	Elevation Ground (Stop) (m)	Velocity (m/s)	Depth/Rise (%)	Slope (Calculate) (1/1.5)	Size	Conduit Type	Set Invert to Start?	Set Invert to Stop?	Manning's n	Depth (Middle) (m)	Capacity (Full Flow) (MLD)	Flow / Capacity (Design) (%)	Flow (MLD)	Catalog Class	Material	Cover (Start) (m)	Cover (Stop) (m)	Cover (Average) (m)	Design Conduit?
CO-1	MH-2	MH-1	1,100.00	28.6	296.22	300.14	296.25	300.26	1.12	78.6	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.82	2.91	2.87	TRUE
CO-2	MH-2	MH-3	1,100.00	31.8	296.22	300.14	296.19	300.23	1.12	78.5	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.82	2.94	2.88	TRUE
CO-3	MH-3	MH-4	1,100.00	24.4	296.19	300.23	296.17	300.28	1.12	78.4	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.94	3.01	2.98	TRUE
CO-4	MH-4	MH-5	1,100.00	24.4	296.17	300.28	296.15	300.24	1.12	78.3	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	3.01	2.99	3	TRUE
CO-5	MH-5	MH-6	1,100.00	24.4	296.15	300.24	296.12	300.32	1.12	78.2	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.99	2.9	2.94	TRUE
CO-6	MH-6	MH-7	1,100.00	26.9	296.12	300.32	296.1	300.19	1.12	78	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.9	2.99	2.94	TRUE
CO-7	MH-7	MH-8	1,100.00	26.9	296.1	300.19	296.08	300.2	1.12	77.9	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.9	2.99	2.94	TRUE
CO-8	MH-8	MH-9	1,100.00	26.9	296.08	300.2	296.05	300.17	1.12	77.7	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.86	80.53	100	78.74	RCC	RCC	2.99	3.03	3.01	TRUE
CO-9	MH-9	MH-10	1,100.00	26.9	296.05	300.17	296.03	300.09	1.12	77.6	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.85	80.53	100	78.74	RCC	RCC	3.03	3.01	3.02	TRUE
CO-10	MH-10	MH-11	1,100.00	23.5	296.03	300.09	296.01	300.16	1.12	77.4	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.85	80.53	100	78.74	RCC	RCC	3.01	2.96	2.99	TRUE
CO-11	MH-11	MH-12	1,100.00	23.5	296.01	300.16	295.98	300.21	1.12	77.2	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.85	80.53	100	78.74	RCC	RCC	2.96	3.06	3.01	TRUE
CO-12	MH-12	MH-13	1,100.00	23.5	295.98	300.21	295.96	300.32	1.12	77.1	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.85	80.53	100	78.74	RCC	RCC	3.06	3.13	3.09	TRUE
CO-13	MH-13	MH-14	1,100.00	23.5	295.96	300.32	295.94	300.44	1.12	76.9	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.85	80.53	100	78.74	RCC	RCC	3.13	3.26	3.2	TRUE
CO-14	MH-14	MH-15	1,100.00	23.5	295.94	300.44	295.92	300.57	1.12	76.7	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.84	80.53	100	78.74	RCC	RCC	3.26	3.4	3.33	TRUE
CO-15	MH-15	MH-16	1,100.00	35.6	295.92	300.57	295.89	300.78	1.12	76.4	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.84	80.53	100	78.74	RCC	RCC	3.4	3.55	3.48	TRUE
CO-16	MH-16	MH-17	1,100.00	27.1	295.89	300.78	295.86	300.86	1.12	76	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.84	80.53	100	78.74	RCC	RCC	3.55	3.79	3.67	TRUE
CO-17	MH-17	MH-18	1,100.00	27.1	295.86	300.86	295.84	300.92	1.12	75.7	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.83	80.53	100	78.74	RCC	RCC	3.79	3.9	3.85	TRUE
CO-18	MH-18	MH-19	1,100.00	27.1	295.84	300.92	295.81	300.98	1.12	75.3	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.83	80.53	100	78.74	RCC	RCC	3.9	3.99	3.94	TRUE
CO-19	MH-19	MH-20	1,100.00	27.1	295.81	300.98	295.79	300.97	1.12	74.9	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.82	80.53	100	78.74	RCC	RCC	3.99	4.06	4.02	TRUE
CO-20	MH-20	MH-21	1,100.00	27.1	295.79	300.97	295.76	300.94	1.12	74.5	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.82	80.53	100	78.74	RCC	RCC	4.06	4.08	4.07	TRUE
CO-21	MH-21	MH-22	1,100.00	31.8	295.76	300.94	295.74	300.74	1.12	74	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.81	80.53	100	78.74	RCC	RCC	4.08	4.08	4.08	TRUE
CO-22	MH-22	MH-23	1,100.00	31.8	295.74	300.74	295.71	300.57	1.12	73.3	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.81	80.53	100	78.74	RCC	RCC	4.08	3.91	3.99	TRUE
CO-23	MH-23	MH-24	1,100.00	31.8	295.71	300.57	295.68	300.39	1.12	72.6	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.8	80.53	100	78.74	RCC	RCC	3.91	3.76	3.83	TRUE
CO-24	MH-24	MH-25	1,100.00	27.8	295.68	300.39	295.65	300.92	1.12	71.8	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.79	80.53	100	78.74	RCC	RCC	3.76	3.61	3.68	TRUE
CO-25	MH-25	MH-26	1,100.00	27.8	295.65	300.92	295.63	301.51	1.12	70.9	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.78	80.53	100	78.74	RCC	RCC	3.61	4.17	3.89	TRUE
CO-26	MH-26	MH-27	1,100.00	27.8	295.63	301.51	295.6	302.1	1.12	69.8	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.77	80.53	100	78.74	RCC	RCC	4.17	4.78	4.48	TRUE
CO-27	MH-27	MH-28	1,100.00	27.8	295.6	302.1	295.58	302.71	1.12	68.6	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.75	80.53	100	78.74	RCC	RCC	4.78	5.4	5.09	TRUE
CO-28	MH-28	MH-29	1,100.00	27.8	295.58	302.71	295.55	301.81	1.12	67	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.74	80.53	100	78.74	RCC	RCC	5.4	6.03	5.71	TRUE
CO-29	MH-29	MH-30	1,100.00	27.8	295.55	301.81	295.53	300.95	1.12	65.1	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.72	80.53	100	78.74	RCC	RCC	6.03	5.16	5.59	TRUE
CO-30	MH-30	MH-31	1,100.00	27.8	295.53	300.95	295.5	302.36	1.12	62.3	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.69	80.53	100	78.74	RCC	RCC	5.16	4.33	4.74	TRUE
CO-31	MH-31	O-2	1,100.00	30.9	295.5	302.36	295.47	303.63	1.12	54.4	1,100	1100	Catalog Conduit	FALSE	FALSE	0.013	0.6	80.53	100	78.74	RCC	RCC	4.33	5.75	5.04	TRUE

Row Labels	Sum of Length (Scaled) (m)
1,100.00	850.7
Grand Total	850.7

Moghit
Sub Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation Durg

Executive Engineer
Municipal Corporation Durg

Label	Elevation (Ground) (m)	Elevation (Invert) (m)	Depth (Structure) (m)	Flow (Total In) (MLD)	Flow (Total Out) (MLD)	Depth (Out) (m)	Hydraulic Grade Line (Out) (m)	Hydraulic Grade Line (In) (m)
MH-1	300.26	296.25	4.01	0	78.74	0.87	297.11	297.11
MH-2	300.14	296.22	3.92	78.74	78.74	0.86	297.08	297.08
MH-3	300.23	296.19	4.04	78.74	78.74	0.86	297.05	297.05
MH-4	300.28	296.17	4.11	78.74	78.74	0.86	297.03	297.03
MH-5	300.24	296.15	4.09	78.74	78.74	0.86	297.01	297.01
MH-6	300.12	296.12	4	78.74	78.74	0.86	296.98	296.98
MH-7	300.19	296.1	4.09	78.74	78.74	0.86	296.96	296.96
MH-8	300.2	296.08	4.13	78.74	78.74	0.86	296.93	296.93
MH-9	300.17	296.05	4.11	78.74	78.74	0.85	296.91	296.91
MH-10	300.09	296.03	4.06	78.74	78.74	0.85	296.88	296.88
MH-11	300.16	296.01	4.16	78.74	78.74	0.85	296.86	296.86
MH-12	300.21	295.98	4.23	78.74	78.74	0.85	296.83	296.83
MH-13	300.32	295.96	4.36	78.74	78.74	0.85	296.81	296.81
MH-14	300.44	295.94	4.5	78.74	78.74	0.84	296.79	296.79
MH-15	300.57	295.92	4.65	78.74	78.74	0.84	296.76	296.76
MH-16	300.78	295.89	4.89	78.74	78.74	0.84	296.73	296.73
MH-17	300.86	295.86	5	78.74	78.74	0.83	296.7	296.7
MH-18	300.92	295.84	5.09	78.74	78.74	0.83	296.67	296.67
MH-19	300.98	295.81	5.16	78.74	78.74	0.83	296.64	296.64
MH-20	300.97	295.79	5.18	78.74	78.74	0.82	296.61	296.61
MH-21	300.94	295.76	5.18	78.74	78.74	0.82	296.58	296.58
MH-22	300.74	295.74	5.01	78.74	78.74	0.81	296.55	296.55
MH-23	300.57	295.71	4.86	78.74	78.74	0.8	296.51	296.51
MH-24	300.39	295.68	4.71	78.74	78.74	0.79	296.47	296.47
MH-25	300.92	295.65	5.27	78.74	78.74	0.78	296.44	296.44
MH-26	301.51	295.63	5.88	78.74	78.74	0.77	296.4	296.4
MH-27	302.1	295.6	6.5	78.74	78.74	0.76	296.36	296.36
MH-28	302.71	295.58	7.13	78.74	78.74	0.75	296.32	296.32
MH-29	301.81	295.55	6.26	78.74	78.74	0.73	296.28	296.28
MH-30	300.95	295.53	5.43	78.74	78.74	0.7	296.23	296.23
MH-31	302.36	295.5	6.85	78.74	78.74	0.67	296.17	296.17


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Municipal Corporation
Durg


Sub Engineer
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BLOCK:DURG

DURG SEWAGE MASTER PLAN

DISTRICT: DURG

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STATEMENT FOR BEDDING AND ENCASING

Label	Length (m)	Dia.		Avg. Exc. Depth (m)	Trench Width (m)	Strength of Pipe	Load on Pipe	Load Factor	Class of Bedding	Depth of Bedding Below Pipe (m)	Deduct Area of Half pipe for B Type (m ²)	Deduct Area of Pipe From Autocad for C Type (m ²)	Quantity of Bedding cum
		Internal (mm)	External (mm)										
CO-1	43.4	1,100.00	1330	1.92	1.93	5861.32	6567.13	1.12	B	0.9975	0.6943		53.43
CO-2	42.1	1,100.00	1330	1.87	1.93	5861.32	8115.46	1.38	B	0.9975	0.6943		51.83
CO-3	48.4	1,100.00	1330	1.85	1.93	5861.32	8218.76	1.40	B	0.9975	0.6943		59.58
CO-4	42.2	1,100.00	1330	1.85	1.93	5861.32	7964.31	1.36	B	0.9975	0.6943		51.95
CO-5	19.3	1,100.00	1330	1.84	1.93	5861.32	7362.78	1.26	B	0.9975	0.6943		23.76
CO-6	28.3	1,100.00	1330	1.83	1.93	5861.32	6957.67	1.19	B	0.9975	0.6943		34.84
CO-7	28.3	1,100.00	1330	1.96	1.93	5861.32	6981.56	1.19	B	0.9975	0.6943		34.84
CO-8	28.3	1,100.00	1330	2.39	1.93	5861.32	6879.39	1.17	B	0.9975	0.6943		34.84
CO-9	28.3	1,100.00	1330	2.65	1.93	5861.32	7189.59	1.23	B	0.9975	0.6943		34.84
CO-10	23.7	1,100.00	1330	2.65	1.93	5861.32	7362.27	1.26	B	0.9975	0.6943		29.18
CO-11	32.8	1,100.00	1330	2.6	1.93	5861.32	6799.79	1.16	B	0.9975	0.6943		40.38
CO-12	28.2	1,100.00	1330	2.11	1.93	5861.32	6708.04	1.14	B	0.9975	0.6943		34.72
CO-13	34.7	1,100.00	1330	1.4	1.93	5861.32	6849.66	1.17	B	0.9975	0.6943		42.72
CO-14	24.1	1,100.00	1330	1	1.93	5861.32	7215.22	1.23	B	0.9975	0.6943		29.67
CO-15	27.1	1,100.00	1330	0.86	1.93	5861.32	8032.17	1.37	B	0.9975	0.6943		33.36
CO-16	31.3	1,100.00	1330	1.15	1.93	5861.32	8189.2	1.40	B	0.9975	0.6943		38.53
CO-17	22.2	1,100.00	1330	2.19	1.93	5861.32	8022.83	1.37	B	0.9975	0.6943		27.33
CO-18	20.8	1,100.00	1330	3.51	1.93	5861.32	8081.26	1.38	Ab	0.9975	0.6943		25.61
CO-19	38.6	1,100.00	1330	4.7	1.93	5861.32	7875.85	1.34	Ab	0.9975	0.6943		47.52
CO-20	28.2	1,100.00	1330	5.44	1.93	5861.32	7065.56	1.21	Ab	0.9975	0.6943		34.72
CO-21	28.3	1,100.00	1330	5.92	1.93	5861.32	7465.08	1.27	Ab	0.9975	0.6943		34.84
CO-22	29.7	1,100.00	1330	6.07	1.93	5861.32	8500.23	1.45	Ab	0.9975	0.6943		36.56
CO-23	22.6	1,100.00	1330	5.17	1.93	5861.32	8512.81	1.45	Ab	0.9975	0.6943		27.82
CO-24	28.4	1,100.00	1330	3.65	1.93	5861.32	8268.19	1.41	Ab	0.9975	0.6943		34.96
CO-25	36.1	1,100.00	1330	4.44	1.93	5861.32	8279.04	1.41	Ab	0.9975	0.6943		44.44
CO-26	24.2	1,100.00	1330	6.29	1.93	5861.32	9779.78	1.67	Ab	0.9975	0.6943		29.79

B type bedding	Qty. 655.80	Unit Cum	Type B
Ab type bedding	316.26	Cum	Ab


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DURG SEWAGE MASTER PLAN

BLOCK:DURG

DISTRICT : DURG

SUB ESTIMATE NO 9 -: INTERCEPTING SEWER LINE FROM NALA TO WET WELL

S.N.	PARTICULARS				QUANTITY	RATE	PER	AMOUNT	
Lift	Qty of Excavation	Soft Soil (40%)	Soft Murum+ Hard murum with boulder (10%)	Hard Murum (20%)	Soft Rock (10%)	Hard Rock (15%)	Slushy soil (5%)	Sheet Piling for depth above 6 m (SQM)	Open Timbering Ex. >4.5 m 6 m (SQM)
0-1.5	6124.56	2449.82	612.46	1224.91	612.46	918.68	306.23		
1.5-3	4848.51	1939.40	484.85	969.70	484.85	727.28	242.43		
3-4.5	3444.65	1377.86	344.47	688.93	344.47	516.70	172.23		
4.5-6	1151.27	460.51	115.13	230.25	115.13	172.69	57.56		
6-7.5	279.60	111.84	27.96	55.92	27.96	41.94	13.98		
7.5-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
TOTAL	15848.59	6339.44	1584.86	3169.72	1584.86	2377.29	792.43	316.41	1382.11
		BT Road Cutting	Stone masonry						
	Assumed		100						
			100						
1	Excavation: Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 Lift 0.0 to 1.5 m Lift 1.5 to 3.0 m Lift 3.0 to 4.5 m Lift 4.5 to 6.0 m Lift 6.0 to 7.5 m Lift 7.5 to 9.0 m				2449.82	201	cum	4,92,415.00	
					1939.40	268	cum	5,19,760.0	
					1377.86	335	cum	4,61,583.00	
					460.51	402	cum	1,85,124.00	
					111.84	469	cum	52,453.00	
					0.00	536	cum	-	
					6339.44				
2	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unservice able material up to lead up to 50m and lift up to 1.5m. Hard rock (requiring blasting) Amendment No. 07 /2022-23; Item No.18.19.2; Pg.No.52 Lift 0.0 to 1.5 m Lift 1.5 to 3.0 m Lift 3.0 to 4.5 m Lift 4.5 to 6.0 m Lift 6.0 to 7.5 m Lift 7.5 to 9.0 m				612.46	571	cum	3,49,712.00	
					484.85	641	cum	3,10,789.0	
					344.47	711	cum	2,44,915.00	
					115.13	781	cum	89,914.00	
					27.96	851	cum	23,794.00	
					0.00	921	cum	-	
					1584.86				

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S.N.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. Chhattisgarh PHED USOR Amendment No.07 /2022-23; Item No.18.19.1 & 18.19.7; Pg. No.51 & 52 Soft rock with or without blasting or bituminous pavement / cement concrete road. Lift 0.0 to 1.5 m Lift 1.5 to 3.0 m Lift 3.0 to 4.5 m Lift 4.5 to 6.0 m Lift 6.0 to 7.5 m Lift 7.5 to 9.0 m	1837.37 1454.55 1033.40 345.38 83.88 0.00 4754.58	465.00 535.00 605.00 675.00 745.00 815.00	Cum Cum Cum Cum Cum Cum	8,54,376.00 7,78,186.00 6,25,204.00 2,33,132.00 62,490.00 -
4	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. Hard rock requiring chiselling / where blasting is prohibited Chhattisgarh PHED USOR Amendment No.07 /2022-23; Item No.18.19.3 & 18.19.7; Pg. No.52 Lift 0.0 to 1.5 m Lift 1.5 to 3.0 m Lift 3.0 to 4.5 m Lift 4.5 to 6.0 m Lift 6.0 to 7.5 m Lift 7.5 to 9.0 m	918.68 727.28 516.70 172.69 41.94 0.00 2377.29	664.00 734.00 804.00 874.00 944.00 1014.00	Cum Cum Cum Cum Cum Cum	6,10,006.00 5,33,821.00 4,15,425.00 1,50,931.00 39,591.00 -
5	For muddy area extra rate for Item of quantity extra percentage rate is applicable in respect of each item but limited to quantities of works executed in these difficult conditions of soft soil. (CG PHED SOR, Amendment No.07 /2022-23 18.18, Pg No.-51; +20% Extra) Lift 0.0 to 1.5 m Lift 1.5 to 3.0 m Lift 3.0 to 4.5 m Lift 4.5 to 6.0 m Lift 6.0 to 7.5 m Lift 7.5 to 9.0 m	306.23 242.43 172.23 57.56 13.98 0.00 792.43	241.20 321.60 402.00 482.40 562.80 643.20	Cum Cum Cum Cum Cum Cum	73,862.00 77,964.00 69,238.00 27,769.00 7,868.00 -


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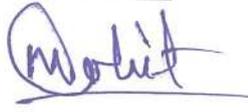

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S.N.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
6	Dismantling/Demolishing of ancillary works Demolishing stone rubble masonry manually/mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50 meter lead as per direction of engineer-in-charge.(In lime mortar). (CG PHED SOR, Amendment No.07 /2022-23; Item N. 18.27, Pg No.-52)	100	449.00	cum	44,900.00
	Extra for carriage by mechanical means upto 5 Kms PHE SOR 2013, Item	100	40.00	cum	4,000.00
8	Pumping out water caused by springs, tides or river seepage, broken water mains or drains. 15 KL for 12 hrs a day for 30 days (CG PHED SOR AMEND 7 P.52 It.No. 18.21)	5400	71.00	KL	3,83,400.00
9.(A)	Supply & Filling crusher stone dust for pipe bedding or over the pipe (including supply of crusher stone dust.) (Amendment 7/2022 / I.N. 18.25) Granular Murum for bedding Bedding below pipe As per SEWER Statement for Bedding	For A type			
		For B type 655.80			
		655.80	1119	cum	7,33,840.20
9.(B)	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregates) (Amendment 7/2022 / I.N. 18.40.1.4) Ab Type bedding M-15	316.26	5910	Cum	18,69,096.60
	For pipe Encasing Volume of pipe 1.1+0.115 *2 = 1.33 1.39 dia Pipe 200 1.8 1.7 encasing Total Encasing	277.72 612.00 334.28	5910	Cum	19,75,610.76
10	Providing and Laying non-pressure (NP3) RCC socket & spigot pipes with rubber gasket joint including testing of joints. Conforming to IS ; 458-1988, ISI marked laying as per IS 783:1985) (CG PHE SOR 2020 I.No. 13.3 page No. 174) Diameter (mm) Length (m) 1100 mm dia 850.7	850.70	7623.00	Mtr	6484886.1
	Labour only for laying and Jointing non-pressure (NP3) RCC Socket and spigot pipe with rubber gasket joint including testing of joint (CG PHE SOR 2020 I.No. 13.3 page No. 174) Diameter (mm) Length (m) 1100 mm dia 850.7	850.70	1116.00	Mtr	9,49,381.20

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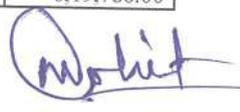

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S.N.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
11	Supplying of and application of Polymer based protective Elastomeric coating with zero V.O.C. for complete inside surface of RCC sewers, with minimum dry film thickness of 1mm, Acid resistant, Abrasive resistant, Adhesive to concrete surface, Durable and pinhole /break free, with smooth surface and after application, complete, as per applicable Technical specification clause, including all labour, HOM of equipment, lead, lifts, taxes etc., complete, spray coating applied by approved and controlled mechanical spray method, for RCC sewers prior to delivery of sewers t site or applied at site, as approved by BWSSB, including all surface preparation, testing, Rate shall be inclusive of all materials, tools and plants, testing and inspection etc., complete. (BWSSB CSR I.No. 5 page No. 74) Diameter (mm) Length (m) 1100 mm dia 850.7 3.14*(DIA/1000)*LENGTH	2938.318 2938.318	1,280.00	sqm	37,61,047.0
12	Construction of RCC Machinehole chambers of 1:1.5:3 proportion or approved type Castinsitu / Pre-cast RCC Machinehole chambers, constructed using form vibrators of standard type, with barricading, danger lighting and using of sight rails and boning rods wherever necessary, shoring and strutting wherever required using Ordinary Port Land Cement, using 1:1.5:3 proportion RCC with 20 mm and down graded jelly, well graded sand and steel of approved quality, 200 mm thick top concrete slab, having wall thickness and raft thickness as in approved drawings and with an offset in raft around the chamber as in approved drawing, benching concrete with 1:6 slope towards the central drain finished smooth, including fixing and grouting of pipes, including conveying to work spot supply and fixing SFRC Machinehole cover and frame (Heavy duty) conforming to IS:12592 with latest amendments, on a bed of CC 1:2:4 supplying and fixing of minimum 3 mm thick encapsulated plastic footsteps (as per IS 10910) on 12 mm dia. Grade Fe-500 steel bar (as per IS 1786) staggered at 300 mm apart as detailed in Technical specifications, including stone grit bedding wherever required, watering, curing, engraving Machinehole number with flow direction on the inner cylindrical surface etc., complete including (BWSSB CSR I.No. 17 SOR Code T330 page No. 169-				
	1.2 m Manhole				
	2 m	0.00	Each	63577	-
	3 m	0.00	Each	81546	-
	1.5 m Manhole				
	4m	0.00	Each	118602	-
	5m	16.00	Each	145414	23,26,624.00
	6m	10.00	Each	166459	16,64,590.00
	7m	3.00	Each	187886	5,63,658.00
	1.8 m Manhole				
	8m	2.00	Each	309893	6,19,786.00

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S.N.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
13	Providing and installing sheet piling for both sides of the trenches for following depths with mild steel sheets of not less than 6.5mm thick, stronger knife edge, recessed spreader sockets, 3 inch single or double wall shields, to be designed by the contractor to withstand all types of soils, maximum depth as per the approved design drawings, including labour charges for installing and removing the sheet piling at various reaches of sewer line constructions, including loading, unloading, transporting to the suitable location etc. complete with all lead and lifts. (Measurement shall be taken for one side only even though it is provided for both sides). (BWSSB CSR I.No. 29 page No. 173)				
		Upto 3m 0.00	512	Sqm	0.00
		From 3m-6m 0.00	768	Sqm	0.00
		Beyond 6m 316.41	1024	Sqm	324005.03
14	Open timbering in trenches of depth more than 1.5 M for shoring and strutting including use of and waste of all necessary timber works including walling, struts, open polling boards / horizontal sheeting, runners, etc. as may be necessary and fixing and removal complete. (Measurements to be taken of the face area timbered) (N.B.O. Item No. 4-15, P.No. 59) (MJP CSR It.No. 20 b /Page 41) Lift 4.5 to 6.0 m	1382.11	404.00	sqm	558371.00
15	Providing and fixing 150mm dia. Cast Iron pipe for ventilating shaft 5 M high with specials and cowl and with suitable grips in CC 1:2:4 pillar using 10mm to 20mm graded hard granite, with 15 cms. thick cement concrete 1:2:4 around upto 1.22 M above the GLR and with a foundation base of 90 x 90 x 90 cms. plastered with 12mm thick CM 1:3 to all exposed faces and linking the shaft to the manholes by means of 150mm dia. GSW pipes and specials, jointing with tar dipped hemp 1:1.5 CM caulking, curing. The cost include all lead and lifts for all materials, earth work excavations and refilling in all strata, disposal of surplus earth etc. complete. (BWSSB CSR I.tem No. 37 page 174) For Foul air release 700 m c/c in Complete Sewer For Actual Drops =2	10.00	21087.00	No.	2,10,870.00


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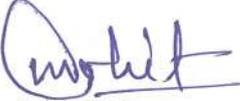

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S.N.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
16	Filling available excavated earth in trenches, plinth (CG PHED SOR, Amendment No.07 /2022-23; Item N.				
	Available excavated earth	15848.59			
	Deduct				
	Volume of pipe	-808.76			
	Sand filling from outside	-655.80			
	Concrete bedding & Encasing				
		14384.03			
	Concrete paver Block	0			
	Concrete Road	0			
	Total Refilling	14384.03	82.00	cum	11,79,491.00

Total 30943878.88
 GST 18% 5569898.20
 TOTAL 36513777.08

Say Rs. 365.14 Lacs
 Total cost of Interceptor Sewer 365.14 Lacs


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EXCAVATION QUANTITY SHEET

TOTAL EXCAVATION QUANTITY OF TOTAL ZONE

Lift \ Strata	Soils of all types Sand Gravel & Murrom	Hard murrom	Hard murrom & Boulders ,WBM Roads	Soft Rock / Asphalts Roads	Hard Rock by Cheselling	Slushy/Muddy Soil	Total (Liftwise)
Lift 0 to 1.5 m	2449.82	612.46	612.46	918.68	1224.91	306.23	6124.56
Lift 1.5 to 3.0 m	1939.40	484.85	484.85	727.28	969.70	242.43	4848.51
Lift 3.0 to 4.5 m	1377.86	344.47	344.47	516.70	688.93	172.23	3444.65
Lift 4.5 to 6.0 m	460.51	115.13	115.13	172.69	230.25	57.56	1151.27
Lift 6.0 to 7.5 m	111.84	27.96	27.96	41.94	55.92	13.98	279.60
Total (Strata wise)	6339.43	1584.87	1584.87	2377.29	3169.71	792.43	
Grand Total	15848.60						


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ZONE-3 MANHOLE EXCAVATION DETAILS

Label	Elevation (Ground) (m)	Elevation (Invert) (m)	Depth (Structure) (m)	Depth of bedding	Depth (manhole) (m)
MH-1	300.26	296.25	4.01	0.20	4.21
MH-2	300.14	296.22	3.92	0.20	4.12
MH-3	300.23	296.19	4.04	0.20	4.24
MH-4	300.28	296.17	4.11	0.20	4.31
MH-5	300.24	296.15	4.09	0.20	4.29
MH-6	300.12	296.12	4	0.20	4.20
MH-7	300.19	296.1	4.09	0.20	4.29
MH-8	300.2	296.08	4.13	0.20	4.33
MH-9	300.17	296.05	4.11	0.20	4.31
MH-10	300.09	296.03	4.06	0.20	4.26
MH-11	300.16	296.01	4.16	0.20	4.36
MH-12	300.21	295.98	4.23	0.20	4.43
MH-13	300.32	295.96	4.36	0.20	4.56
MH-14	300.44	295.94	4.5	0.20	4.70
MH-15	300.57	295.92	4.65	0.20	4.85
MH-16	300.78	295.89	4.89	0.20	5.09
MH-17	300.86	295.86	5	0.20	5.20
MH-18	300.92	295.84	5.09	0.20	5.29
MH-19	300.98	295.81	5.16	0.20	5.36
MH-20	300.97	295.79	5.18	0.20	5.38
MH-21	300.94	295.76	5.18	0.20	5.38
MH-22	300.74	295.74	5.01	0.20	5.21
MH-23	300.57	295.71	4.86	0.20	5.06
MH-24	300.39	295.68	4.71	0.20	4.91
MH-25	300.92	295.65	5.27	0.20	5.47
MH-26	301.51	295.63	5.88	0.20	6.08
MH-27	302.1	295.6	6.5	0.20	6.70
MH-28	302.71	295.58	7.13	0.20	7.33
MH-29	301.81	295.55	6.26	0.20	6.46
MH-30	300.95	295.53	5.43	0.20	5.63
MH-31	302.36	295.5	6.85	0.20	7.05


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**WET WELL AND PUMP HOUSE****Sub-Work No.10****ABSTRACT**

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 1 :- Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. (CGPHE AMEND 07 I.No. 18.15 Page 51)				
		Basic Rate	201		
	Add Extra for every additional lift of 1.5m		67		
	For lift 0.0 to 1.5 m.	1309.25	201.00	Cum	263158.00
	For lift 1.5 m to 3.0 m	1125.87	268.00	Cum	301733.00
	For lift 3.0 m to 4.5 m	956.00	335.00	Cum	320258.00
	For lift 4.5 m to 6.0 m	799.62	402.00	Cum	321447.00
	For lift 6.0 m to 7.5 m	273.41	469.00	Cum	128230.00
	Item No. 2 :- Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51				
		Basic Rate	266.00		
	Add Extra for every additional lift of 1.5m		67.00		
	Lift 6.0 to 7.5 m	448.12	534.00	Cum	239298.00
	Lift 7.5 to 9.0 m	240.81	601.00	Cum	144725.00
	Item No. 3 :- Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m. (Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51)				
		Basic Rate	465.00		
	Add Extra for every additional lift of 1.5m		120.00		
	Lift 7.5 to 9.0 m	363.05	1065.00	Cum	386650.00
	Lift 9.0 to 10.5 m	472.44	1185.00	Cum	559842.00
	Lift 10.5 to 12 m	272.79	1305.00	Cum	355994.00

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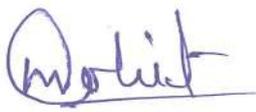

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S.No.	Items	Qty.	Rate	Unit	Amount
	Hard rock requiring chiseling / where blasting is prohibited	Basic Rate	664.00		
	Add Extra for every additional lift of 1.5m		120.00		
	Lift 10.5 to 12 m	314.76	1504.00	Cum	473399.00
	Lift 12 to 13.5 m	583.53	1624.00	Cum	947646.00
	Lift 13.5 to 15 m (For Suction pit)	73.37	1744.00	Cum	127959.00
	Item No. 4 :- Cement Concrete 1:3:6 well mixed and laid in position complete including all leads of all construction materials including curing and finishing well graded broken stone aggregate of maximum size upto 40mm (CGPHE AMEND 07 I.No. 18.40.1.3 Page 53) M-100 Grade	54.42	5029	Cum	273698.00
	Item No. 5 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) (CGPHE AMEND 07 I.No. 18.42.3 Page 54) RCC M-30 for foundation	585.54	7982.00	Cum	4673798.00
	Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHE AMEND 07 I.No. 18.43.3 Page 54) For R.C.C. Vertical wall M-300 grade RCC Grade M30	284.57	8028.00	Cum	2284536.00
	Item No. 7 :- Providing and placing in position cold twisted or uncoated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHE AMEND 07 I.No. 18.44 Page 54) Sub structure & Super structure	69609	70	kg	4872630.00


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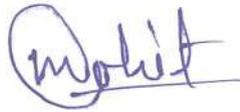

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 8 :- Providing and fixing in position C.I./M.S. steps or 22 mm dia. MS bar steps with proper anchorage, etc. and providing and applying 3 coats of ant-corrosive paint, etc complete as directed by Engineer-in-charge. (CG PHED USOR Amendment No.07, Item No.20.12, Pg.No.73)</p>	50.00	566.00	No.	28300.00
	<p>Item No. 9 :- Painting with synthetic enamel paint (cow dung) of approved brand and manufacture to give an even shade : (two or more coats) on New work . (CG PHED USOR Amed. No.07, Item No.18.77, Pg.No. 58) Inside Pump House For two Coat</p>	50.45	86.00	sqm	4338.70
	<p>Item No. 11 :- Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-in-charge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-in-charge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code: (CG PHED USOR Amed No.7; Item No.20.20.1Pg.No.75) For Inlet, Screen & Wet well</p>	1289.89	798.00	Sqm	1029332.22
	<p>Item No. 12 :- Providing, hoisting and fixing in position inverted "J" type 100 mm dia. C.I. Cowl type ventilators with mosquito proof aluminium mesh at top including applying 2 coats of anticorrosive paint, etc. complete as directed by Engineer-in-charge, weighing not less than 35 Kg. (CG PHED USOR Amendment No.07/2022-23; Item No.26.1 dated 23.12.22)</p>	10.00	1648.00	No.	16480.00


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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 13 :- Design/Drawing, fabrication, supply and erection of structural steel Automatic Outflow Regulating Gate as per standard specification with gate leaf with end girders, cast steel track plates, rubber seals with SS clamping nut bolts etc., concrete counter weight in bottom compartments of gate leaf, embedded parts consisting of trunion girders, anchor frames, U/s & D/s stoppers, still beams, SS axles, SS seals etc., fulcrum assemblies with links, SS axles, bronze bushes, sail hard curved track plate etc, lever system consisting of actuating lever, lever link, gate bracket, hoisting bracket, SS axles, bronze bushes etc. complete with hoist bridge and portal frame if required (excluding cost & weight of hoist)</p> <p>(CGWRD P No. 214 / I.No. 2602) 1500X1200 mm.</p>	10.80	155506.00	No.	1679464.80
	<p>Item No. 14 :- Cement concrete flooring with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm) finished with a floating coat of neat cement</p> <p>(CG PWD SOR. P.No.111/It.No.12.3) 40 mm thick</p>	126.00	222.00	sqm	27972.00
	<p>Item No. 15 :- Providing and fixing double glazed hermetically sealed glazing in aluminium windows, ventilators and partition etc. with 6 mm thick clear float glass both side having 12 mm air gap including providing EPDM gasket, perforated aluminium spacers, desiccants, sealant (Both primary and secondary sealant) etc. complete.</p> <p>(PWD CSR 15-16 P.NO.86 ,It.no.9.53 Powdered coated</p>	21	3159	Sqm	66339.00
	<p>Item No. 16 :- Supplying and fixing rolling shutter of approved makes made of M.S. laths interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and out side locking with push and pull arrangement complete but excluding the cost of top cover and spring.</p> <p>80x1.25mm M.S. Laths (PWD CSR 15-16 P.NO.83 ,It.no.9.27</p>	40	1691	Sqm	67640.00

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 17 :- Providing and fixing 1mm thick M.S. sheet door shutters with frame and diagonal braces of 40x40x6 mm angle iron, 3mm M.S. gusset plates at the junctions and corners i/c all necessary fittings complete including applying a priming coat of approved steel primer. with diagonal braces and central cross pieces of M.S. angle / flats as required.</p> <p>(CGPHE SOR.Amendment 7 P.No.54/It.No.18.48) Door</p>	9.45	3668.00	Sqm	34662.60
	<p>Item No. 18 :- Providing and fixing inposition M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge.</p> <p>(CGPHE SOR.Amendment 7 P.No.121/It.No.26.5)</p>	40	4087.00	m	163480.00
	<p>Item No. 19: - Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete.</p> <p>MJP CSR 2023-2024, It.No.1 Pg.No.56</p>	27.10	Rmt	1191.00	32277.00


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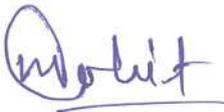

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S.No.	Items	Qty.	Rate	Unit	Amount
	<p>Item No. 20 :- Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in I.S. codes 3070. (CGPHE SOR.Amendment 7 P.No.120/It.No.20.19) For wet well at pumping station for 10 m</p>	1	14031	No.	14031.00
	<p>Item No. 21 :- Pumping out water caused by springs tidal or river seepage, broken water main or drains and like (CGPHE AMEND 07 I.No. 18.21 Page 52)</p>	12000	71.00	kl	852000.00
	<p>Item No. 22 :- Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead upto 50m and lift up to 1.5m in all kinds of soils (CGPHE AMEND 07 I.No. 18.22 Page 52)</p>	4686.04	62.00	cum	290534.17
	<p>Item No. 23 :- Structural steel work riveted, bolted or welded in builtup section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat of approved steel primer all complete. ISBM 250 X 125 X 6.9 MM Over the Inlet Chamber Over the Screen Chamber In stringers treads landings etc. of stair cases including use of chequered plate wherever required all complete. Over the Inlet Chamber Over the Screen Chamber (CGPHE AMEND 07 I.No. 18.46 Page 54)</p>	1521.840 1372.640 728.16 1843.20	96 96 100 100	kg kg kg kg	146096.64 131773.44 72816.00 184320.00

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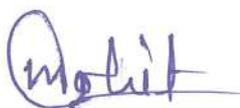

 Assistant Engineer
 Municipal Corporation
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 Municipal Corporation Durg

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 24 :- Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57 Foundation , footing, bases of columns ,etc for mass concrete Wall (any thickness) Slab	50.52 2733.32 317.82	231.00 402 449	sqm sqm sqm	11670.12 1098794.64 142701.18
				Total	22770024.51
	Item No. 25 :- Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:- (i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department. (ii) Architecural/ Structural drawing having following items :- (a) Layout plan. Elevation, cross-section i/c detailes of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell. (b) Preparation of estimate on preveling schedule of rates, architecural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.				
			5% of the estimated cost		1138501.00


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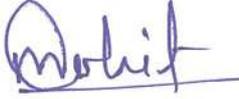
Durg Sewage Master Plan Under Amrut 2.0

S.No.	Items	Qty.	Rate	Unit	Amount
	Item No. 26: - Providing & Installation of PLC SCADA At Wet Well. As per Rate Analysis attached				2036061.10

Total Rs. 25944586.61
25944586.61

GST 18% 4670025.59

Say Rs. 30614613.00
306.15



Sub Engineer
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Assistant Engineer
Municipal Corporation
Durg(C.G)



Executive Engineer
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Durg (C.G)

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0						
WET WELL AND PUMP HOUSE						
Sub-Work No.10						
<u>Measurments</u>						
Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 1 :-						
Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.						
(CGPHE AMEND 07 I.No. 18.15 Page 51)						
Inlet Chamber						
Lift 0 to 1.5 m	1	4.10	14.15	1.5	87.02	cum
Lift 1.5 to 3.0 m	1	4.10	12.65	1.5	77.80	cum
Lift 3.0 to 4.5 m	1	4.10	11.15	1.5	68.57	cum
Lift 4.5 to 6.0 m	1	4.10	9.65	1.5	59.35	cum
Lift 6.0 to 7.5 m	1	4.10	9.10	0.55	20.52	cum
Screen Chamber						
Lift 0 to 1.5 m	1	18.45	16.45	1.5	455.25	cum
Lift 1.5 to 3.0 m	1	16.95	14.95	1.5	380.10	cum
Lift 3.0 to 4.5 m	1	15.45	13.45	1.5	311.70	cum
Lift 4.5 to 6.0 m	1	13.95	11.95	1.5	250.05	cum
Lift 6.0 to 7.5 m	1	13.40	11.40	0.55	84.02	cum
Wet Well						
Lift 0 to 1.5 m	1	25.25	20.25	1.5	766.97	cum
Lift 1.5 to 3.0 m	1	23.75	18.75	1.5	667.97	cum
Lift 3.0 to 4.5 m	1	22.25	17.25	1.5	575.72	cum
Lift 4.5 to 6.0 m	1	20.75	15.75	1.5	490.22	cum
Lift 6.0 to 7.5 m	1	20.20	15.20	0.55	168.87	cum
Abstract	Lift 0 to 1.5 m				1309.25	cum
	Lift 1.5 to 3.0 m				1125.87	cum
	Lift 3.0 to 4.5 m				956.00	cum
	Lift 4.5 to 6.0 m				799.62	cum
	Lift 6.0 to 7.5 m				273.41	cum
Total					4464.14	Cum


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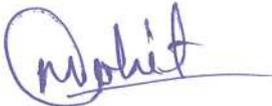

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Items	Nos.	Length	Breadth	Height	Qty.	Unit	
Item No. 2 :-							
Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.							
Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51							
Inlet Chamber							
Lift 6.0 to 7.5 m	1	4.10	8.70	0.95	33.89	cum	
Lift 7.5 to 9.0 m	1	4.10	8.15	0.55	18.38	cum	
Screen Chamber							
Lift 6.0 to 7.5 m	1	13.00	11.00	0.95	135.85	cum	
Lift 7.5 to 9.0 m	1	12.45	10.45	0.55	71.56	cum	
Wet Well							
Lift 6.0 to 7.5 m	1	19.80	14.80	0.95	278.39	cum	
Lift 7.5 to 9.0 m	1	19.25	14.25	0.55	150.87	cum	
Abstract							
					Lift 6.0 to 7.5 m	448.12	cum
					Lift 7.5 to 9.0 m	240.81	cum
					Total	688.93	Cum
Item No. 3 :-							
Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.							
(Chhattisgarh PHED USOR Amendment No.07/2022-23 I.No. 18.19.3 Page 51)							
Soft Rock							
Inlet Chamber							
Lift 7.5 to 9.0 m	1	4.10	7.20	0.95	28.04	cum	
Lift 9.0 to 10.5 m	1	4.10	6.10	1.17	29.26	cum	
Screen Chamber							
Lift 7.5 to 9.0 m	1	11.50	9.50	0.95	103.79	cum	
Lift 9.0 to 10.5 m	1	10.40	8.40	1.47	128.42	cum	
Wet Well							
Lift 7.5 to 9.0 m	1	18.30	13.30	0.95	231.22	cum	
Lift 9.0 to 10.5 m	1	17.20	12.20	1.5	314.76	cum	
Lift 10.5 to 12 m	1	17.20	12.20	1.3	272.79	cum	

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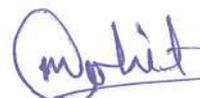

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Hard Rock						
Lift 10.5 to 12 m	1	17.20	12.20	0.2	41.97	cum
Lift 12 to 13.5 m	1	17.20	12.20	1.47	308.46	cum
Lift 12 to 13.5 m (For Suction pit)	1	12.20	6.2	0.03	2.27	cum
Lift 13.5 to 15 m (For Suction pit)	1	12.20	6.2	0.97	73.37	cum
Abstract			Lift 7.5 to 9.0 m		363.05	cum
			Lift 9.0 to 10.5 m		472.44	cum
			Lift 10.5 to 12 m		314.76	cum
			Lift 12 to 13.5 m		581.26	cum
			Lift 12 to 13.5 m (For Suction pit)		2.27	cum
			Lift 13.5 to 15 m (For Suction pit)		73.37	cum
			Total		1807.15	Cum
Item No. 4 :-						
Cement Concrete 1:3:6 well mixed and laid in position complete including all leads of all construction materials including curing and finishing well graded broken stone aggregate of maximum size upto 40mm						
(CGPHE AMEND 07 I.No. 18.40.1.3 Page 53)						
M-150 Grade PCC						
Inlet Chamber	1	4.40	4.80	0.20	4.22	Cum
Screen Chamber	1	9.40	7.40	0.20	13.91	Cum
For Wet Well	1	16.20	11.20	0.20	36.29	Cum
					54.42	cum
Item No. 5 :-						
Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal)						
(CGPHE AMEND 07 I.No. 18.42.3 Page 54)						
RCC M-30 for foundation						
Foundation bedding						
Inlet Chamber	1	4.10	4.50	0.30	5.54	Cum
Screen Chamber	1	9.10	7.10	0.30	19.38	Cum
For Wet Well	1	15.90	10.90	0.30	51.99	Cum

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Inlet Chamber						
Long Wall	2	4.50	0.40	9.67	34.81	Cum
Short Wall	1	3.70	0.40	9.67	14.31	Cum
Screen Chamber						
Long Wall	2	8.80	0.40	9.97	70.19	Cum
Short Wall	1	6.00	0.40	9.97	23.93	Cum
Short Wall	2	0.50	0.40	9.97	3.99	Cum
Wet Well						
Long Wall	2	15.00	0.5	12.97	194.55	Cum
Short Wall	2	9.00	0.5	12.97	116.73	Cum
For RCC Column Wet Well	3	0.60	0.60	15.47	16.71	Cum
	9	0.40	0.60	15.47	33.42	Cum
				Total (A)	585.54	cum
Item No. 6 :- Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) (CGPHE AMEND 07 I.No. 18.43.3 Page 54) For R.C.C. Vertical wall M-300 grade RCC Grade M30						
Inlet Chamber						
Long Wall	2	4.5	0.4	0.9	3.24	Cum
Short Wall	1	3.7	0.4	0.9	1.33	Cum
Screen Chamber						
Long Wall	2	8.8	0.4	0.9	6.34	Cum
Short Wall	1	6	0.4	0.9	2.16	Cum
Short Wall	2	0.5	0.4	0.9	0.36	Cum
Wet Well						
Long Wall	2	15.00	0.50	2.5	37.50	Cum
Short Wall	2	9.00	0.50	2.5	22.50	Cum
Pump House Wall						
Long Wall	2	15.60	0.3	6	56.16	Cum
Short Wall	2	9.00	0.3	6	32.40	Cum
Deduct Door	3	1.5	2.1	0.3	-2.84	Cum
Deduct Window	10	1.5	1	0.3	-4.50	Cum
Deduct Ventilator	10	1	0.6	0.3	-1.80	Cum
Deduct Rolling Shutter	1	5	4	0.3	-6.00	Cum

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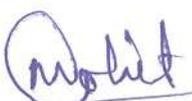

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
For RCC Slab						
For Wet Well						
For R.C.C. Top Slab M-300 grade	1	15.00	10.00	0.3	45.00	Cum
Roof Slab	1	15.20	10.20	0.2	31.01	Cum
For RCC Column Pump House	12	0.40	0.60	6	17.28	Cum
For RCC Brace Beam Wet well	2	14.00	0.4	0.75	8.40	Cum
	2	9.00	0.4	0.75	5.40	Cum
For RCC Brace Beam Pump House	2	14.40	0.4	0.75	8.64	Cum
	2	9.40	0.4	0.75	5.64	Cum
For RCC Roof Slab Beam	2	14.40	0.4	0.75	8.64	Cum
	2	9.40	0.4	0.75	5.64	Cum
For RCC Chajja						
Deduct Door	3	1.5	0.6	0.1	0.27	Cum
Deduct Window	10	1.5	0.6	0.1	0.90	Cum
Deduct Ventilator	10	1	0.6	0.1	0.60	Cum
Deduct Rolling Shutter	1	5	0.6	0.1	0.30	Cum
					Total (B)	284.57
					Total (A+B)	870.11
Item No. 7 :-						
Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (CGPHE AMEND 07 I.No. 18.44 Page 54) Sub structure & Super structure	870.1	@80kg/cum			69609	kg
Item No. 8 :-						
Providing and fixing in position C.I./M.S. steps or 22 mm dia. MS bar steps with proper anchorage, etc. and providing and applying 3 coats of ant-corrosive paint, etc complete as directed by Engineer-in-charge. (CG PHED USOR Amendment No.07, Item No.20.12, Pg.No.73) For wet well	50.0				50.00	No.
					Total	50.00
						No.

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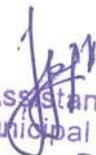

Assistant Engineer
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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 9 :-						
Painting with synthetic enamel paint (cow dung) of approved brand and manufacture to give an even shade : (two or more coats) on New work . (CG PHED USOR Amendment No.07/2022-23; Item No.14.49.1 dated 23.12.22)						
Inside Pump House						
For two Coat						
Door	3	1.5		2.1	9.5	Sqm
Window	10	1.5		1	15.0	Sqm
Ventilator	10	1		0.6	6.0	Sqm
Rolling Shutter	1	5		4	20.0	Sqm
					50.45	Sqm
Item No. 11 :-						
Providing and applying outside weather coats and inside epoxy paint of approved make (as desired by Engineer-incharge) to concrete surface of Intake well /other structure including cleaning the surface by scrapping and air blowers to the satisfaction of Engineer-incharge, necessary scaffolding, etc complete with all leads and lifts and giving satisfactory hydraulic test for water tightness as per I.S. code: (CG PHED USOR Amed No.7; Item No.20.20.1Pg.No.75)						
For Inlet Chamber						
Long Walls	2	3.70		9.67	71.56	Sqm
Short Walls	2	4.50		9.67	87.03	Sqm
Floor	1	3.70	3.70		13.69	Sqm
					172.28	Sqm
For Screen Chamber						
Long Walls	2	8.00		9.97	159.52	Sqm
Short Walls	2	6.80		9.97	135.59	Sqm
Floor	1	8.00	6.00		48.00	Sqm
					343.11	Sqm
For Wet Well						
Long Walls	2	15.00		12.97	389.10	Sqm
Short Walls	2	10.00		12.97	259.40	Sqm
Floor	1	14.00	9.00		126.00	Sqm
					774.50	Sqm
Grand Total					1289.89	Sqm


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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 15 :-						
Providing and fixing double glazed hermetically sealed glazing in aluminium windows, ventilators and partition etc. with 6 mm thick clear float glass both side having 12 mm air gap including providing EPDM gasket, perforated aluminium spacers, desiccants, sealant (Both primary and secondary sealant) etc. complete. (PWD CSR 15-16 P.NO.86 ,It.no.9.53						
Window	10.0	1.5		1.0	15.0	Sqm
Ventilator	10.0	1.0		0.6	6.0	Sqm
				Total	21.0	Sqm
Item No. 16 :-						
Supplying and fixing rolling shutter of approved makes made of M.S. laths interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and out side locking with push and pull arrangement complete but excluding the cost of top cover and spring (PWD CSR 15-16 P.NO.86 ,It.no.9.53						
Rolling Shutter	2.0	5.0		4.0	40.0	Sqm
Item No. 17 :-						
Providing and fixing 1mm thick M.S. sheet door shutters with frame and diagonal braces of 40x40x6 mm angle iron, 3mm M.S. gusset plates at the junctions and corners i/c all necessary fittings complete including applying a priming coat of approved steel primer. with diagonal braces and central cross pieces of M.S. angle / flats as required.						
Door	3	1.5		2.1	9.5	Sqm
Item No. 18 :-						
Providing and fixing inposition M.S. ladder 0.50M wide consisting of 75x10mm M.S. flats as stringers and 16mm dia M.S. bars in double rows as steps placed at 25cm c/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge.						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
(CGPHE SOR.Amendment 7 P.No.121/It.No.26.5) For Pump House	4.0	10			40.00	RM
					Total	40.00
Item No. 19: - Providing and fixing G.I. pipe railing having 1.0 M height consisting 50 x 50 x 6 mm thick M.S. angles as verticals at 1.5 M c/c and additional posts at every corner with 3 rows of 25 mm dia G.I. pipes of medium class variety as horizontal and painting 3 coats of oil paint over 1 coat of anticorrosive paint of approved colour and shade including cost of all labour, transporting bends to curved shape, etc.complete. MJP CSR 2023-2024, It.No.1 Pg.No.56 Inlet Chamber Screen Chamber	1.0 1.0	11.1 16			11.10 16.00	RM RM
					Total	27.10
Item No. 20 :- Providing and fixing in position copper lightening conductor as per IS 3070 - 1965 (with up to date amendment) including copper rod of 20mm dia as per upper terminal 1.5M long with a knob at end and with conical spike at top, copper tape conductor 20x3mm size, copper earth plate of 3mm thick and 0.81 sqm. in area, clamps at 1 M centre to centre including, necessary excavation, laying and fixing the conductor, providing and fixing 40mm G.I. pipe upto 3 M height from ground and 0.5M below ground including making all connections, filling the earthing pit with charcoal, salt, etc. and refilling and watering, etc. complete as per specifications laid down in IS 3070 (CGPHE SOR.Amendment 7 P.No.120/It.No.20.19) For wet well at pumping station 1 for 10 m					10 m	
Item No. 21 :- Pumping out water caused by springs tidal or river seepage, broken water main or drains and like (CGPHE AMEND 07 I.No. 18.21 Page 52) For wet well at pumping station	100	8	15	1	12000	kl

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
Item No. 22 :-						
Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils (CGPHE AMEND 07 I.No. 18.22 Page 52)						
For wet well at pumping station 1						
Total Excavation					6960.22	
Deduct						
PCC					-54.42	
Footing					-585.54	
Vol of Well	1	14	9	12.97	-1634.22	
					4686.04	cum
Item No. 23 :-						
Structural steel work riveted, bolted or welded in builtup section trusses and framed work i/c cutting/hoisting /fixing in position and applying a priming coat of approved steel primer all complete.						
ISBM 250 X 125 X 6.9 MM						
Over the Inlet Chamber	6	6.8	37.30		1521.840	kg
Over the Screen Chamber	4	9.2	37.30		1372.640	kg
@ 37.30 kg /Rmt						
In stringers treads landings etc. of stair cases including use of chequered plate wherever required all complete.						
(CGPHE AMEND 07 I.No. 18.46 Page 54)						
Over the Inlet Chamber	1	3.7	4.1	15.17	728.160	kg
Over the Screen Chamber	1	6	6.4	38.4	1843.200	kg
@ 48 kg /Sqm (Plate 6mm thick)						
Item No. 24: -						
Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for:						
Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No 18.64.& 18.64.4, Pg. No.56&57						
For PCC Inlet Chamber	2	(4.4+4.8)		0.20	3.68	sqm
For PCC Screen Chamber	2	(9.4+7.4)		0.30	10.08	sqm
Foundation Inlet Chamber	2	(9.1+7.1)		0.30	9.72	sqm
For Inlet Chamber						
LW	2	3.70		9.67	71.558	sqm
	2	4.50		9.67	87.03	sqm
SW	2	3.70		9.67	71.558	sqm
	2	4.50		9.67	87.03	sqm

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
For Screen Chamber						
LW	2	8.00		9.97	159.52	sqm
	2	8.80		9.97	175.472	sqm
SW	2	6.00		9.97	119.64	sqm
	2	6.80		9.97	135.592	sqm
For PCC Wet Well	2	(16.2+11.2)		0.20	10.96	sqm
Foundation Wet Well	2	(15.9+10.9)		0.30	16.08	sqm
For Collection Chamber/ Wet Well						
LW	2	14.00		12.97	363.16	sqm
	2	15.00		12.97	389.1	sqm
SW	2	9.00		12.97	233.46	sqm
	2	10.00		12.97	259.4	sqm
Pump House Wall LW	2	14.60		6	175.2	sqm
	2	15.20		6	182.4	sqm
SW	2	9.00		6	108	sqm
	2	9.60		6	115.2	sqm
Slab WetWell	1	15	10		150	sqm
Roof slab	1	15.2	10.2		155.04	sqm
Chujja	3	1.5	0.6		2.7	sqm
	10	1.5	0.6		9	sqm
	1	(1.5+0.6+0.6)		0.1	0.27	sqm
	3	(1.5+0.6+0.6)		0.1	0.81	sqm
Foundation , footing, bases of columns ,etc for mass concrete					50.52	sqm
Wall (any thickness)					2733.32	sqm
Slab					317.82	sqm
Item No. 25 :-						
Detailed physical survey, sanitary survey, Hydrological survey, Geological investigation including trial bores for soil investigation / test for preparation of river cross section, fixing of HFL, structural design & estimation for intake wall, approach bridge, coffer dam etc. complete as directed by the Engineer-in-charge in / near, river / stream / dam / lake / spring / canal etc. collection of data regarding design of complete item of intake well from relevant department etc. all level will be with reference to mean sea level including following work:-						
(i) Preparation of Contour plan general arrangement drawing, layout of site, cross-section of site on proper scale as directed by the department.						

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Items	Nos.	Length	Breadth	Height	Qty.	Unit
<p>(ii) Architectural/ Structural drawing having following items :-</p> <p>(a) Layout plan. Elevation, cross-section i/c details of cofferdam, approach bridge, intakewell, and different small element relevant to complete item of intakewell.</p> <p>(b) Preparation of estimate on prevailing schedule of rates, architectural drawing / structural drawing for technical clearance from proper competent sanctioning authority state government or it may be central government department. Complete set of drawing and estimate will be submitted in 6 sets.</p>						
<p>Item No. 26: - Providing & Installation of PLC SCADA At Wet Well. As per Rate Analysis attached</p>						


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0											
INSTRUMENTATION BILL OF QUANTITY FOR PULGAON NALA- PUMP HOUSE											
Sub Work No. 10											
Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
1	Supplying, Installing of Ultrasonic Radar type level transmitter CE marked with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range-0 to 20 mtrs, Accuracy - +/- 0.25% of Full Scale or better Enclosure- IP 67	Each	1	90,000.00	4,746.00	As per Market Rate	94,746.00	94,746.00	-	-	94,746.00
2	Supplying, Installing of pressure transmitter CE marked with following technical parameters at Raw Water Pump House and Interfacing with PLC panel including mounting arrangement. Output 4-20 mA, Display - 4" LED, Pressure Range - 0-1, 0-2, 04 PN, Accuracy - +/- 0.1 % of full scale or better, Enclosure- IP 67	Each	4	60,000.00	2,215.00	As per Market Rate	62,215.00	2,48,860.00	-	-	2,48,860.00
3	Supplying, Installing of Glycerine Filled Pressure gauge Bourdon's type as IS 3624:1987, mounting - direct bottom, stainless steel body, toughened glass window Pressure gauge 150 mm dia	Each	5	3,000.00	67.00	As per Market Rate	3,067.00	15,335.00	-	-	15,335.00
4	Supplying, Installing of Electromagnetic Flow Meter (EMF) As Per ISO 4064, for Raw/Pure water with accuracy +/- 0.5% of measured value & protection as per given specifications for size 100 mm-1000mm including sensor, transmitter surge arrester, cable GI duct if suitable size, including the pipe cutting, levelling and installation of flow meter in the pipelines with necessary tool tackles, cranes including 36 months guarantee etc. complete with necessary accessories, as may be required at site & based on technical specifications.	Each	1	6,20,000.00	13,015.00	As per Market Rate	6,33,015.00	6,33,015.00	-	-	6,33,015.00
	Nominal Diameter Flowmeter 500 mm	Each	1	6,20,000.00	13,015.00		6,33,015.00	6,33,015.00	-	-	6,33,015.00



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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
5	Valve Actuator Providing, erecting electric Valve actuators totally enclosed, weather-proof and dust proof construction with IP-67, protection class suitable for installation in any position without lubrication, leakage or other operational difficulty with special grease filled gear box and hand wheel for emergency manual operation which will automatically dis-engage on restoration of power to motor and with 10 watt single phase space heater and continuous local mechanical position indicator and individually replaceable counter gear assembly and with two torque and four limit switches with S.S. flap and operated with gear driven cams and of rating 250 Volt, 5 Amp, AC/DC, torque switch dial and with TEFC squirrel cage induction motor working on 440 Volts +/- 10%, 3 phase, 50Hz. AC of intermittent duty rating S-2, insulation class "F" and temp rise restricted to class "B" with IP - 67 protection class suitable for DOL starting and with three thermostat and 30% over load margin. The torque rating of reduction gear box shall be at least 1.5 times max. torque required for opening and closing of valve with integral starter for ON					As per Market Rate					
5.1	350mm dia	Each	2	1,19,600.00	3,479.00		1,23,079.00	2,46,158.00		-	2,46,158.00
5.2	250mm dia	Each	2	1,01,600.00	3,479.00		1,05,079.00	2,10,158.00		-	2,10,158.00
6	PLC/SCADA system Design, supply, installing, commissioning & testing of master PLC control monitoring and communication panel as per IEC 61131 at raw water sump suitable for monitoring and control of water pumps, pressure transmitter, level transmitter, flow meter, actuators etc. (MJP Electrical & Mechanical Works SOR 2020-21, Code No. 2.7)					As per MJP SOR	59,733.00	59,733.00	18%	10751.94	70,484.94


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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
7	Design, supply, installing, commissioning & testing of PLC based control monitoring and communication software as per IEC 61131 at raw water sump suitable for monitoring and control of water pumps, pressure transmitter, level transmitter, flow meter, actuators etc. (MJP Electrical & Mechanical Works SOR 2022-23, Item No. 1.5; page no.- 48)	Each	1			As per MJP SOR	55,582.00	55,582.00	18%	10004.76	65,586.76
8	Supply, Installation, Testing, Trials, Programming, Integration, Commissioning, Handing Over of Dual GSM/GPRS modem.	Set	1			As per market rate	18,000.00	18,000.00		-	18,000.00
9	Supplying, installation, testing and commissioning following rating single phase 230 volts sine wave inverter (without battery) including connection as per specification. 1.5kVA (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 11.3.3)	Each	1			As per CG PWD SOR	5,504.00	5,504.00		-	5,504.00
10	Supplying, installation, testing and commissioning following rating (sealed maintenance free) lead acid battery including connection as per specification. 150AH (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 11.4.5)	Each	1			As per CG PWD SOR	14,252.00	14,252.00		-	14,252.00
11	Supplying, installation, testing and commissioning of Analogue type bullet AHD 2MP camera VF of 1080P real time high resolution, CMOS progressive scan, true day/night capability minimum illumination: 0 lux (IR ON), TDN (Ir-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: up to 40 meters, Power:230V AC, vandal resistance, dual output AHD & CVBS as per specification. (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 27.3)	Each	4			As per CG PWD SOR	5,723.00	22,892.00		-	22,892.00


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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
12	Supplying, installation, testing and commissioning of 16 channel AHD 1080P DVR high resolution recording, H.264 high profile compression, playback 4/8/16 channels simultaneously, multiple recording option: Manual, schedule, motion detection, pentaplex operation: live view, record, play back, back up and remotely access, HDMI & VGA output simultaneously up to 1080P resolution, 1 SATA HDD, DHCP, DDNS, IE browser and CMS supported, mobile app for android and ios as per specification (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 27.9)	Each	1			As per CG PWD SOR	21,466.00	21,466.00		-	21,466.00
13	Supplying, installation, testing and commissioning of 32 inch LED monitor, table/wall mount with in build speaker minimum 5W x 2 with minimum 1 m of HDMI and USB port including remote control, connecting cable, batteries, and all accessories, connection etc. complete as per specification (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 27.49.1)	Each	1			As per CG PWD SOR	21,896.00	21,896.00		-	21,896.00
14	Supplying, Installing with Terminating & Interfacing of 2 Pair x 1 sq.mm as per IS 694 copper Shielded twisted, multistranded armoured cable on wall in GI tray or on ground. (As per 2021 cable price list)	Mtr	800	149.10	28.96		178.06	1,42,448.00		-	1,42,448.00
15	Supplying and fixing cat-6 UTP armoured cable suitable for LAN/WAN as per specification complete. (As per 2021 polycab price list)	Mtr	90	77.70	28.96		106.66	9,599.40		-	9,599.40



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Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
16	Supplying & fixing of approved make hi wall split inverter type Air conditioner unit with cooling unit (copper coil) and condensing unit (copper coil) including 5 year compressor warranty and standard length of upto 5 meter of copper piping with insulation etc. complete as per specification. 2 Ton split type inverter AC (5 star) (CG PWD Electrical & Mechanical Works SOR 2020, Code No. 24.20.9)	Each	2	55,830.00	2,000.00	As per CG PWD SOR	57,830.00	1,15,660.00		-	1,15,660.00
17	Operational & Mandatory Spare	Set	1	60,000.00	-		60,000.00	60,000.00		-	60,000.00
18	Tools & Tackles Note - Excavation & foundation work for electrical & instrumentation equipments are considered in civil estimation.	Set	1	20,000.00	-		20,000.00	20,000.00		-	20,000.00
TOTAL								20,15,304.40			20,36,061.10



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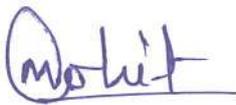


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub Work No.11****Construction of Electric Sub Station at pulgaon STP SITE**

S.NO.	PARTICULARS	Estimated Cost Rs. 103.89 Lacs			
		QUANTITY	RATE in Lacs	PER AMOUNT	
1	33/3.3 KV Sub station (i) Providing & installation of 1600 KVA transformer With off circuit tap changer. (CG PWD SOR 2020 I.No. 21.2 Page 178)	2	2361705	No. 47.23	
2	Pannel Board (i) Relay control panel for 33 KV breakers	2	600000	Set 12.00	
3	33/3.3 KVA sub station equipments / <i>Accessories</i> (i) 33 KV isolator 400/800 amps (ii) 33 KV VCB 800 amps (iii) Outdoor current transformer (iv) Potential transformer (v) Lightning arrestor (vi) ACSR conductor as required (vii) 33 KV drop out fuse (viii) Necessary 2 pole & 6 pole structure (ix) Misc. accessories such as termination kit, connectors, lugs etc. as required. (x) Sub Station earthing as per IE Rules (x) Lighting of sub station	2 2 2 2 3 1 2 1 1 1 1	80000 105000 100000 240000 30000 120000 18000 650000 120000 700000 200000	Each Each Each Each Each Job Each Job Job Job Each	1.60 2.10 2.00 4.80 0.90 1.20 0.36 6.50 1.20 7.00 2.00
4	Civil Works (i) Construction of control room, construction of foundations for sub station - equipments, cable trenches, transformer foundations & Structural steel and other misc. works.	1	1500000	Each Job 15.00	

Total 103.89
Say 103.89
Lacs



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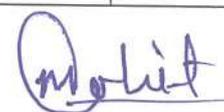
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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0										
Sub Work No.13										
Raw Water Pipeline										
		Dia.		600	mm		L =		200	m
Estimated Cost Rs. :-							59.90 Lakh			
S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)	
	Total Excavation Quantity									
	600mm Dia.	1	150.00	1.20	1.75	315.00				
	600 mm Dia.	1	50.00	1.20	1.75	105.00				
						420.00				
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.									
	70% Total Excavation Qty	1				294	Cum	201.00	59094.00	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.15/P 51)									
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed.									
	20% Total Excavation Qty	1				84	Cum	266.00	22344.00	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.16/P 51)									
3	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.									
	Soft rock with or without blasting or bituminous pavement / cement concrete road.									
	5% Total Excavation Qty	1				21	Cum	465.00	9765.00	
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.19.1/P 51)									
4	Earth work in excavation for pipe trench in all kinds of rocks in areas including dressing, stacking of useful material and disposal of unserviceable material up to lead up to 50m and lift up to 1.5m.									
	Hard rock requiring chiseling / where blasting is prohibited.									
	5% Total Excavation Qty	1				21	Cum	664.00	13944.00	
	(CGPHE SOR 2020, amendment 07/2022-23 I.N.18.19.3/P-52)									

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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
5	Supply & Filling moorum/river sand for pipe bedding or over the pipe (including supply)								
	600 mm Dia.	1	200.00	1.20	0.15	36			
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.24/P 52)					36	Cum	864.00	31104.00
6	Providing, laying and jointing including testing following socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-9) conforming to IS 8329 /2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/2018								
	600 mm					200.00	Mtr	12405.00	2481000.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.3/P 3)								
7	Providing and Laying including testing Ductile Iron Double Socket 90° Bends conforming to IS:9523/2000 having dimension as per table 15 of IS:9523/2000 in the following nominal diaMtr/sizes with external bitumen coating and internal cement mortar lining.								
	600 mm					4	Each	41750.00	167000.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.13/P 7)								
8	Providing and Laying including testing Ductile Iron Double Socket 45° Bends conforming to IS:9523/2000 having dimension as per table 16 of IS: 9523 /2000 in the following nominal diaMtr/sizes with external bitumen coating and internal cement mortar lining.								
	600 mm					2	Each	33649.00	67298.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.15/P 8)								
9	Providing and Laying including testing Ductile Iron Double Socket 22.5° Bends conforming to IS:9523/2000 having dimension as per table 17 of IS:9523/2000 in the following nominal diaMtr /sizes with external bitumen coating and internal cement mortar lining.								
	600 mm					1	Each	25817.00	25817.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.17/P 8)								


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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
10	Providing and Laying including testing Ductile Iron Double Socket 11.25° bends conforming to IS:9523/2000 having dimension as per table 18 of IS:9523/2000 in the following nominal diameter/ sizes with external bitumen coating and internal cement mortar lining.								
	600 mm					2	Each	21937.00	43874.00
	(CGPHE SOR 2020 amendment 07/2022-23 4.19/9)								
11	Providing & fixing following ductile iron single chamber triple function temperproof air valves, small orifice with screwed end as per IS : 14845-2000 including jointing & testing with cost of jointing material and rubber insertion all complete as per IS :13095-1991								
	150 mm dia					1	Each	14928.00	14928.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.50/P 21)								
12	Providing & fixing following ductile iron double flanged check valve without damper (non- return valve) including jointing & testing with cost of jointing material such as bolts, nuts and rubber insertion all complete as per IS: 5312 (Part II)								
	600 mm					1	Each	399716.00	399716.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.44/P 19)								
13	Providing & fixing of following Ductile iron double flanged sluice valves as per I.S.:14846-2000 fitted with cap including jointing & testing with cost of jointing material such as bolts, nuts, rubber insertions etc. all complete.								
	500 mm					1	Each	256125.00	256125.00
	80 mm diameter - PN-16 for Air valve					1	Each	8622.00	8622.00
	100 mm diameter - PN-16 for Scour valve					1	Each	11585.00	11585.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 4.41/P 18)								


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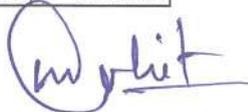

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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
14	Providing and Laying including testing Ductile Iron Double Socket branch flange Tee conforming to IS:9523/2000 having dimension as per table 21 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.								
	(CGPHE SOR 2020 amendment 07/2022-23 4.23/11)								
	100 mm diameter - PN-16 for Scour valve								
	600 x 200					1	Each	30553.00	30553.00
15	Providing and Laying including testing Ductile iron Mechanical joint collar with follower glands conforming to IS: 9523/2000 having dimension as per table 24 of IS: 9523/2000 in the following nominal diaMtr/sizes with external bitumen and internal cement mortar lining.								
	(CGPHE SOR 2020, amendment 07/2022-23 4.11/6)								
	600 mm					12	Each	70441.00	845292.00
16	Providing and Laying including testing ductile PN 16 type iron flanged spigot conforming to IS:9523/2000 having dimension as per table 24 of IS:9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.								
	(CGPHE SOR 2020 amendment 07/2022-23 4.9/5)								
	Flanged Spigot								
	600 mm					2	Each	53768.00	107536.00
17	Providing and Laying including testing ductile iron PN 16 type flanged sockets conforming to IS: 9523/2000 having dimension as per table 23 of IS: 9523/2000 in the following nominal diameter/sizes with external bitumen coating and internal cement mortar lining with finishing as per clause 13 of IS:9523/2000.								
	(CGPHE SOR 2020, amendment 07/2022-23 4.7/4)								
	Flange Socket Tail piece								
	600 mm					2	Each	47914.00	95828.00

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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
18	Labour only for cutting following Ductile Iron pipes of any type and class.								
	600 mm					12	Per Cut	530.00	6360.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.4/P 60)								
19	Chamfering of CI/DI pipes of all types and classes to make suitable for tyton joints.								
	600mm					12	Each	2691.00	32292.00
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.6/P 61)								
20	Construction of RCC valve chamber with 15 cm thick wall base course 10 cm thick in M-10. complete.								
	600 mm					2	Nos	44809.00	89618.00
	Detail in sub-estimate								
21	100 mm dia - SOR AMENDMENT 07/2022-23, CGPHE 2020 Item No. 18.79 P/58					2	Nos	7886.00	15772.00
	RCC thrust block								
	600 mm					9	Nos	13942.00	125478.00
22	Detail in sub-estimate								
	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. In depth including consolidation of Each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils								
						420.0	Cum		
	Deduction Pipe volume								
	600 mm	1	200.00	0.80	0.785	-100.48	Cum		
23						301.5	Cum	82.00	24724.64
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 18.22/P 52)								
	Carriage of Material by Mechanical transport including loading unloading & stacking etc.								
23	Surplus Earth & Moorum & dismantled CC&BT								
	Distance 5 km					118.48	Cum	222.00	26302.56
	(CG PHE, SOR AMENDMENT 07/2022-23, ITEM NO. 19.10.2/P 62)								
23	Providing and laying cement concrete for plain concrete/reinforced concrete i/c form work shuttering complete in as per drawings and specifications (for other / village roads)								
	PCC M-10(250 mm)	1	50.00	1.20	0.15	9.00	Cum	2789.00	25,101

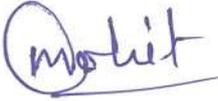

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S. No.	Particular	No.	L	B	H/D	Qty.	Unit	Rate (In Rs.)	Amount (In Rs.)
24	Providing and laying Un-reinforced Cement Concrete without Dowel bars including formwork and expansion, contraction & Longitudinal Joints as per design and as per IRC-62-2014, over a prepared base as per approved mix design and finishing to lines and grade as per Drawing for Pavement thickness less than 200mm in Low Volume Roads.								
	PCC Grade M30 with minimum: Cement Content @ 375kg/cum								
	PCC M-30(250mm)	1	50.00	1.20	0.15	9.00	Cum	4391.00	39,519
	(CG PWD ROAD SOR 2015, ITEM NO. 6.6/27) & Amendment No. 01/2015								
Sub Total Rs. :-									5076592.20
Grand Total Rs. :-									5076592.2
Add 18% GST									913786.60
Grand Total									5990378.80
IN LACS									59.90



Sub Engineer
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Assistant Engineer
Municipal Corporation
Durg (C.G)



Executive Engineer
Municipal Corporation
Durg (C.G)

DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.14****SEWAGE TREATMENT PLANT 47 MLD SBR TECHNOLOGY**

Estimated Cost Rs.

4751.0

S.NO.	PARTICULARS	QUANTITY in MLD	RATE in Lacs	PER	AMOUNT
1	<p>Designing (Aesthetically) Providing and constructing, hydraulic testing commissioning and giving satisfactory trials of modernised sewage treatment plant consisting of inlet chamber, screen chamber, Detritus tanks, Parshall flume, primary settling tanks, Aeration tanks, Secondary settling tanks, Sludge Sump and Pump House ,Sludge Thickner, Primary digester , Secondary digester, SST Sump and Pump house, Chlorine contact tank, Chlorinators, Chlorinator room, sump cum blending tank, PST sludge sump cum blending tank,Pump house, Sludge Centrifuge, gas holder, necessary piping work with 283 required valves, gates, drains, pathways, Administrative Building cum Laboratory, Laboratory equipments, tools and plants, Spare parts etc. complete as turnkey job with all involved civil electrical and mechanical works inclusive of following items, units as per detailed specification for civil, Electrical and Mechanical Components with all duties etc.complete.</p> <p>1)Inlet Chamber: Designing, providing and constructing R.C.C. (M:30) Inlet chamber designed for the peak flow 2 DWF including necessary excavation in all types of strata including walkway around the periphery. Each compartment will have phosper bronze, steel gate with extension rod, head stock, opeating wheel, G.I. Pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>2) Screen Chamber : Designing, providing and constructing and testing commissioning screen chamber, designed for average 1DWF & maximum 2 DWF in RCC (M-30), including inlet pipe/Channel from inlet chamber outlet, pipe/channel to detritus tank, free board of 0.50 m minimum, RCC walkway 1.2M wide with G.I. Pipe railing. RCC stair case of 1.2 m width from G.L. to screen chamber.</p> <p>3) Detritus Tank :Designing, providing and constructing continuously grit removal type of Detritus Tank, mechanically operated in RCC (M-30) capable of removing 100% 0.20mm size particle and above, having specific gravity 2.30, designed for one peak 2 DWF with suitable arrangement of separation of grit from putrescible solids including providing and making necessary arrangement of JB-1. inlet and outlet channels of required sizes as may be required to connect the flow to parshall flume etc. complete including hydraulic testing for water tightness of the structure having minimum free board of 0.30 m, washout arrangement to grit chamber and platform 1.20m wide RCC walkway with G.I. pipe hand railing shall be provided. A pit for collecting grit conveyed by conveyer shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as per detailed specifications and asdirected.</p>				


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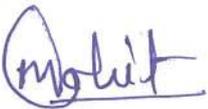

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>4) Parshall Flume: Designing, Providing and constructing Parshall Flume Channel in RCC(M-30) for measuring quantity of sewage received at the treatment works, max flow of 2 DWF and minimum flow of 1/2 DWF including providing and making necessary arrangement of approach channel as may be required to connect the flow having minimum velocity of 0.3m per second to Distribution Box (DB-1) 284 The unit shall be provided with walkway & RCC staircase having width of 1.20 m each etc. complete, including hydraulic testing for water tightness of the civil structure having free board of 0.6 m including electrically operated, flow indicating and flow integrating devices having a standby of float operated ROF meter. All arrangements as per specifications.</p> <p>5) Primary Settling Tanks with Equipments: Designing, providing, constructing and hydraulic testing in RCC (M 30) water tight Primary Settling Tanks of 1 DWF capacity with feed chamber sludge and effluent chamber, base adequately supported providing 1.20m wide clear peripheral and approach walkway interconnecting C.I. double flanged pipes from feed chamber of the clarifier distribution well grouting wherever necessary, including foundation etc. as per specifications water depth at outer side shall be minimum 3.0 meters, weir loading shall not be greater than 125 cum DMF for average flow Bottom slope shall be 1:12 The floor of</p>				


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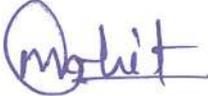

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>clarifier shall have 40 mm thick (min.) screed course of cement grout of mix in C.M. 1:2 Detention period shall be 2.25 hrs. dispersion box and stiffened weir plate made of mild steel plate not less than 8 mm thick, anticorrosive epoxy paint on both faces shall be provided Minimum free board of 0.50 m. be provided it includes inlet pipe from distribution chamber, central shaft inlet baffle outlet chamber, Scum remover, skimming device, scum chamber, connecting channel from PST outlet chamber to DB-2 as per detailed specifications.</p> <p>6) Aeration Tank: Designing, providing and constructing in RCC mix (M-30) Aeration Tank in compartments to handle combined flow of 1 DWF, incoming flow and recirculation flow including construction of inlet, outlet and distribution chamber DB-3 and providing 1.20m wide clear peripheral and approach walk ways, expansion joints wherever necessary, including foundation etc. as per specifications. Peak factor shall be 2, F/M ratio shall be 0.40, low speed aerator speed between 20 to 100 RPM recirculation flow @ 50% and free board 0.60 m Depth, (SWD) 3.50 m minimum D.O. level at A.T. 2 Mg/Lit, MLVSS concentration shall be 2500 Mg/Lit</p> <p>and MLVSS concentration shall be 2000 Mg/Lit, HRT shall be 4 to 6 hours and STR 6-8 days. It should have compartments for washing, oxygen transfer capacity of mechanical aerator shall not be less than 1.5 Kg/KWH, BOD of effluent 20 mg/lit with input to aerator 0.15 to 0.30 Kwh/1000 cum. of Aeration tank. All related works shall be as per detailed specifications.</p>				


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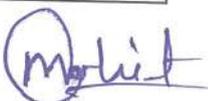

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>7) Secondary Settling Tanks with Equipments: Designing, providing & constructing in RCC (M-30) water tight secondary 285 settling tank having detention period 2 hours and SWD shall be 4.20 meter. The effluent BOD & SS from the secondary clarifier shall not be more then 20 Mg/lit and 30 mg/lit respectively. It should be hydraulically tested, bottom floor slope of 1:12 and free board of 0.60 m minimum Dispersion box shall be made of Mild Steel plate not less then 8 mm thick with anticorrosive epoxy paint from both faces and well stiffened The sewage admitted at the centre flowing upward and outwards towards periphery be slowly and continuously collected towards a convenient discharge point near centre by a rotating wheel arm. The Clarifier will be completed with end drive half rotating bridge, structural steel rake, over flow weir, walkway diffuser, over load alarms, having push bottons, starters for the clarifier, walkway and the suitable sludge withdrawing arrangement with flush valve capable of withdrawing moisture content not more then 97% to 98%, slorotating sludge scrapper mechanism fitted with squeezes including providing and making necessary arrangement to connect the flow to outlet chamber (DB-4) then the gravity mains for final diaposal and as per detailed specifications and obligatory provision. All other arrangements shall be as per detailed specifications</p> <p>8) Sludge Thickner with Equipments: Designing providing and constructing water tight of Sludge Thickner (Gravity type) including foundation in RCC (M-30) with inlet and outlet chamber influent well, inlet and outlet pipes, with sludge pit and sludge removal arrangement, grouting wherever necessary with walkway all- around of 1.20 m width G.I. pipe railing interconnecting CI pipes all</p> <p>9) Primary Digester with mixer equipment (Fixed Cover) Designing, providing and constructing unit of water tight and gas tight Primary Digester suitable for 1 DWF plant and complete with pipe gallery, building, staircase for access</p>				

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>from dome of digester into inside staircase, walkways at springing levels etc. walls and base slab being in RCC M-300, domes in stucutural concrete including providing burners and civil works for gas collection, grouting wherever necessary etc. complete as per specifications. It should be designed for min 90 C and max. 450C. and minimum detention time of 30 days, water depth shall not be more then 8.5m free board shall be 0.6m with inlet and outlet arrangement of D.I. flanged pipes including giving hydraulic testing and air tightness testing. The item includes providing works for collecting Gas and Gasburner as per specification.</p> <p>9)Secondary Digester with equipment (Fixed cover) Designing, providing and constructing including foudation unit of watertight and gastight Secondary Digester to deal with 1 DWF complete with pipe 286 gallery, building, staircase for access from dome of digester into inside, staircase to walkways at springing levels etc., Walls and base slab and domes being in RCC M-30, providing arrangement for digested sludge from digesters to centrifuge, providing burners and civil works for gas collection grouting wherever necessary etc. complete.as per specifications and obligatory provision All other arrangements as per detailed specifications.</p> <p>10) S.S.T. Sump & Pump House with recirculation Pumps and Sludge Pumps to Digester: Designing, providing & constructing Sump & Pump house of requisite capacity with ceiling height not less then 6.M., Sludge stream for recirculation to aeration tank & excess sludge to SCBT, including C.I. Piping to carry this flow to sump as per detailed specification & as directed by Engineer-incharge.</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>11) Chlorine Contact Tank: Designing, providing and constructing Chlorine Contact chamber of adequate capacity to deal with 1 DWF. Average flow. The chlorine contact tank should be of 30 minutes capacity during average flow to achieve 99.99% coliform reduction. Chlorine dose shall be maintained as per standard provisions including provisions including designing, providing and constructing water supply arrangement for chlorination, including providing dewatering and bypass arrangements jointing to final effluent main and outlet weir etc complete. The effluent quality should match with the standards laid down by Maharashtra Water pollution Control Board and as per the obligatory provision and detailed specifications and as directed by Engineer-in-charge.</p>				
	<p>12) Chlorinator and Chlorinator Room/Tonner Room: Designing, providing and constructing chlorinators vacuum type 2 Nos each having capacity of 10 Kg/Hr as per obligatory provisions and detailed specifications with necessary provision of chlorinator room having floor area not less than 30 Sqmt.including automatic residual chlorine controller with actuator and residual chlorine analyser including cost of chlorine cylinder, piping, valves, measuring and controlling equipments, safty devices, lifting equipments, etc. complete as per IS 10553 (Part-1) 1993 The</p>				
	<p>13) Sump cum Blending Tank (SCBT) Designing providing and constructing sump cum blending tank of appropriate size and detention time with free board of 0.60 m. The slope of floor 1:4 with suction pit at the center as per detailed specifications and obligatory requirements.</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>14) P.S.T. Sump Cum Blending Tank, Pump House with recirculation pumps: Designing providing and constructing pump house of appropriate size with pumps, ceiling height minimum 6m over the circular sump for discharging the sludge to thickener and recycling of flow for blending with D.I. piping etc. complete as per detailed specifications.</p> <p>15) Sludge Centrifuge Room with Centrifuges: Designing, providing constructing and installing including foundation etc. Sludge Centrifuge to handle the sludge flow of one day in one hour per unit with sludge dewatering unit drain etc. Complete as per specifications. Sludge centrifuge with all necessary arrangements as per detailed specifications mentioned in Volume -II and Volume -III of tender and obligatory provisions, be provided with satisfactory functioning.</p> <p>16) Gas Holder: Designing, providing and constructing gas holder having gas collection system, gas flow meter and gas burner with floating dome arrangement and storage time 6 hrs. to be constructed in M- 300 having appropriate diameter as per detailed specifications and obligatory provisions. The floating dome shall be of 8mm thick M.S. Plate minimum and shall be provided with two coats of anticorrosive epoxy coating from both faces.</p> <p>17) Outfall Sewer: Designing providing and constructing appropriate Outfall Sewer of R.C.C. NP-2 pipe, to discharge treated effluent, untreated effluent from outlet chamber (after secondary clarifier) to the local nallah at a point shown on the drawing including necessary chambers for inspection / cleaning including necessary excavation dewatering, refilling, concrete encasing/bedding concrete steps to reach the nallah bed level, pitching and energy dissipation chamber in the nallah portion etc. complete.</p>				

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>18) Piping work in D.I.- including Sluice Valve, Reflux Valve, M. S. Gate: Providing laying and jointing pipes other than those already included in the above items for interconnection by-pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates accessories and cost of jointing materials. The item includes required channels with gates for interconnection of units by pass drains etc. for all units and as directed etc. complete as per detailed specifications.</p> <p>19) All the structural steel work / fabrications are to be provided with application of Hot Dip Zinc coating according to specifications as per IS 4759 :1996 (Reaffirmed2006)</p> <p>Administrative Building cum Laboratory (G+1)- Designing providing and constructing Administrative Building, Office Cum 288 Laboratory including stores. This shall be a building having appropriate Carpet area at ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M-250 framed structure B. B. masonry (II-Class in C. M. 1:6) 20 mm cement plaster in C. M. 1:3 inside and outside painting. Aluminum door and window with glass panels, mosaic tile flooring and skirting and all other allied items, fixtures fastening electrification arrangement water supply arrangement etc. complete. The building will have laboratory on upper floor of administrative building and should be so centralised that it should not be attached with any unit but should have complete control of every unit as per Laboratory Equipment, beautification, telephone and intercom arrangement and Wireless system etc. complete.</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.</p> <p>The rates are as under :- Cost of 20 MLD / Area required 1.2 Ha. (No. of bays - 4)</p> <p>Add per MLD above 20 MLD upto 47 MLD</p> <p>Amendment No.7 CG PHED USOR 2022-23, Item No. 22.2.4, Pg. No. 91</p> <p>Note: The rates computed in the analysis of water treatment plant and sewage treatment plant donot include the cost of (i) Out sourcing for consultancy (ii) detailed survey, (iii) soil investigation, (iv) detailed hydraulic, (v) structural designing, (vi) Lab articles, glass wares and equipments, (vii) other specifically required articles to construct the plants. (viii) disposal of sludge up to nearest natural drainage system (ix) external development like external and internal electrification, (x) cost of chemicals, man powers etc during trial run of 3 months, and (xi) cost of O &M for subsequent another 9 months,</p> <p>(xii) If required, suitable provision for PLC SCADA system may also be included. Since, the above said charges has to be either owned by the agency 289 or by the department therefore, it is necessary to include cost of these charges in the preparation of estimate. The tentative provisions for above said items may be considered as under:-</p>				
		20	165541000	mld	1655.41
		27	6621000	mld	1787.67


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	Total cost of 47 MLD STP (Without GST)	47		MLD	3443.08
	Description of items				
1	Out sourcing for consultancy	0.10%	3.44	LS	3.44
2	Detailed survey,	0.10%	3.44	LS	3.44
3	Soil investigation ,	0.10%	3.44	LS	3.44
4	Detailed hydraulic design	0.20%	6.89	LS	6.89
5	Structural designing,	0.30%	10.33	LS	10.33
6	Lab articles, glass wares and equipments ,	1.00%	34.43	LS	34.43
7	Other specifically required articles to construct the plants.	0.10%	3.44	LS	3.44
8	Disposal of sludge up to nearest natural drainage system	1.50%	51.65	LS	51.65
9	External development like external and internal electrification,	0.50%	17.22	LS	17.22
10	Cost of chemicals, man powers etc. during trial run of 3 months,	0.50%	17.22	LS	17.22
11	If required, suitable provision for PLC-SCADA	1.50%	51.65	LS	51.65

Total 3646.22

Say 3646.2
Lacs

Calculating Rates for 47 MLD STP based on SBR Technology:

Rate for Capacity of plant 47 MLD 3646.22

Adding 10% extra for Nitrogen & Phosphorous removal 364.62

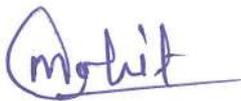
Scada For STP 15.34

Total 4026.19

Add 18% GST 724.71

Total Cost of 47 MLD Plant based on above calculated rate Rs. Lacs 4,750.90

Say Rs. Lacs 4,751.00



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0												
INSTRUMENTATION BILL OF QUANTITY FOR STP												
Sub Work No.14												
Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST	
1	Supplying, Installing of pH Analyzer as per IUPAC at A.F. & interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range- 0 to 14, Accuracy - better than +/- 0.1% of Full Scale, Enclosure- IP 67	1	Each	90,000.00	6,327.00	As per Market Rate	96,327.00	96,327.00	0%	-	96,327.00	
2	Supplying, Installing of BOD & COD Analyzer interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range-0 to 30 & , 0 to 100 Accuracy - better than +/- 1% of Full Scale, Enclosure- IP 67	1	Each	12,00,000.00	14,400.00	As per Market Rate	12,14,400.00	12,14,400.00	0%	-	12,14,400.00	
3	Supplying, Installing of Turbidity analyzer as per ISO 7027 scattering light method at A.F. & interfacing with PLC panel. Turbidity analyzer shall comprises of 3 components i.e. sensors, signal distributor & transmitter with indicator with 2 outputs, 1 o PLC & another to local display including mounting arrangement. Output 4-20 mA, Display - 4" LED, Range - 0 - 50mg/l, Accuracy - +/- 0.02 of full scale or better, Enclosure- IP 67	1	Each	2,00,000.00	23,405.00	As per Market Rate	2,23,405.00	2,23,405.00	0%	-	2,23,405.00	
Note - 1. STP related instrumentation price considered in civil estimation. (Per MLD basis)												
2. Excavation & foundation work of instrumentations are considered in civil estimation.												
TOTAL								15,34,132.00				15,34,132.00


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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Sub-Work No.14****SEWAGE TREATMENT PLANT 30 MLD SBR TECHNOLOGY**

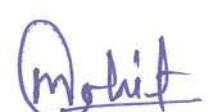
Estimated Cost Rs.

3204.0

S.NO.	PARTICULARS	QUANTITY in MLD	RATE in Lacs	PER	AMOUNT
1	<p>Designing (Aesthetically) Providing and constructing, hydraulic testing commissioning and giving satisfactory trials of modernised sewage treatment plant consisting of inlet chamber, screen chamber, Detritus tanks, Parshall flume, primary settling tanks, Aeration tanks, Secondary settling tanks, Sludge Sump and Pump House ,Sludge Thickner, Primary digester , Secondary digester, SST Sump and Pump house, Chlorine contact tank, Chlorinators, Chlorinator room, sump cum blending tank, PST sludge sump cum blending tank,Pump house, Sludge Centrifuge, gas holder, necessary piping work with 283 required valves, gates, drains, pathways, Administrative Building cum Laboratory, Laboratory equipments, tools and plants, Spare parts etc. complete as turnkey job with all involved civil electrical and mechanical works inclusive of following items, units as per detailed specification for civil, Electrical and Mechanical Components with all duties etc.complete.</p> <p>1)Inlet Chamber: Designing, providing and constructing R.C.C. (M:30) Inlet chamber designed for the peak flow 2 DWF including necessary excavation in all types of strata including walkway around the periphery. Each compartment will have phosper bronze, steel gate with extension rod, head stock, operating wheel, G.I. Pipe railing etc. The work includes providing and making necessary arrangements to connect the flow to screen chamber by approach channel as directed and as per specifications</p>				


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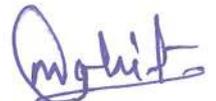

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>2) Screen Chamber : Designing, providing and constructing and testing commissioning screen chamber, designed for average IDWF & maximum 2 DWF in RCC (M-30), including inlet pipe/Channel from inlet chamber outlet, pipe/channel to detritus tank, free board of 0.50 m minimum, RCC walkway 1.2M wide with G.I. Pipe railing. RCC stair case of 1.2 m width from G.L. to screen chamber.</p> <p>3) Detritus Tank :Designing, providing and constructing continuously grit removal type of Detritus Tank, mechanically operated in RCC (M-30) capable of removing 100% 0.20mm size particle and above, having specific gravity 2.30, designed for one peak 2 DWF with suitable arrangement of separation of grit from putrescible solids including providing and making necessary arrangement of JB-1. inlet and outlet channels of required sizes as may be required to connect the flow to parshall flume etc. complete including hydraulic testing for water tightness of the structure having minimum free board of 0.30 m, washout arrangement to grit chamber and platform 1.20m wide RCC walkway with G.I. pipe hand railing shall be provided. A pit for collecting grit conveyed by conveyor shall be provided. It should be suitable to handle the grit for carting. All arrangements shall be as per detailed specifications and asdirected.</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>4) Parshall Flume: Designing, Providing and constructing Parshall Flume Channel in RCC(M-30) for measuring quantity of sewage received at the treatment works, max flow of 2 DWF and minimum flow of 1/2 DWF including providing and making necessary arrangement of approach channel as may be required to connect the flow having minimum velocity of 0.3m per second to Distribution Box (DB-1) 284 The unit shall be provided with walkway & RCC staircase having width of 1.20 m each etc. complete, including hydraulic testing for water tightness of the civil structure having free board of 0.6 m including electrically operated, flow indicating and flow integrating devices having a standby of float operated ROF meter. All arrangements as per specifications.</p> <p>5) Primary Settling Tanks with Equipments: Designing, providing, constructing and hydraulic testing in RCC (M 30) water tight Primary Settling Tanks of 1 DWF capacity with feed chamber sludge and effluent chamber, base adequately supported providing 1.20m wide clear peripheral and approach walkway interconnecting C.I. double flanged pipes from feed chamber of the clarifier distribution well grouting wherever necessary, including foundation etc. as per specifications water depth at outer side shall be minimum 3.0 meters, weir loading shall not be greater than 125 cum DMF for average flow Bottom slope shall be 1:12 The floor of</p>				


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>clarifier shall have 40 mm thick (min.) screed course of cement grout of mix in C.M. 1:2 Detention period shall be 2.25 hrs. dispersion box and stiffened weir plate made of mild steel plate not less than 8 mm thick, anticorrosive epoxy paint on both faces shall be provided Minimum free board of 0.50 m. be provided it includes inlet pipe from distribution chamber, central shaft inlet baffle outlet chamber, Scum remover, skimming device, scum chamber, connecting channel from PST outlet chamber to DB-2 as per detailed specifications.</p> <p>6) Aeration Tank: Designing, providing and constructing in RCC mix (M-30) Aeration Tank in compartments to handle combined flow of 1 DWF, incoming flow and recirculation flow including construction of inlet, outlet and distribution chamber DB-3 and providing 1.20m wide clear peripheral and approach walk ways, expansion joints wherever necessary, including foundation etc. as per specifications. Peak factor shall be 2, F/M ratio shall be 0.40, low speed aerator speed between 20 to 100 RPM recirculation flow @ 50% and free board 0.60 m Depth, (SWD) 3.50 m minimum D.O. level at A.T. 2 Mg/Lit, MLVSS concentration shall be 2500 Mg/Lit</p> <p>and MLVSS concentration shall be 2000 Mg/Lit, HRT shall be 4 to 6 hours and STR 6-8 days. It should have compartments for washing, oxygen transfer capacity of mechanical aerator shall not be less than 1.5 Kg/KWH, BOD of effluent 20 mg/lit with input to aerator 0.15 to 0.30 Kwh/1000 cum. of Aeration tank. All related works shall be as per detailed specifications.</p>				


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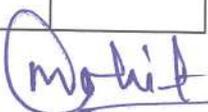

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>7) Secondary Settling Tanks with Equipments: Designing, providing & constructing in RCC (M-30) water tight secondary 285 settling tank having detention period 2 hours and SWD shall be 4.20 meter. The effluent BOD & SS from the secondary clarifier shall not be more than 20 Mg/lit and 30 mg/lit respectively. It should be hydraulically tested, bottom floor slope of 1:12 and free board of 0.60 m minimum Dispersion box shall be made of Mild Steel plate not less than 8 mm thick with anticorrosive epoxy paint from both faces and well stiffened The sewage admitted at the centre flowing upward and outwards towards periphery be slowly and continuously collected towards a convenient discharge point near centre by a rotating</p> <p>wheel arm. The Clarifier will be completed with end drive half rotating bridge, structural steel rake, over flow weir, walkway diffuser, over load alarms, having push buttons, starters for the clarifier, walkway and the suitable sludge withdrawing arrangement with flush valve capable of withdrawing moisture content not more than 97% to 98%, slorotating sludge scrapper mechanism fitted with squeezes including providing and making necessary arrangement to connect the flow to outlet chamber (DB-4) then the gravity mains for final diaposal and as per detailed specifications and obligatory provision. All other arrangements shall be as per detailed specifications</p> <p>8) Sludge Thickner with Equipments: Designing providing and constructing water tight of Sludge Thickner (Gravity type) including foundation in RCC (M-30) with inlet and outlet chamber influent well, inlet and outlet pipes, with sludge pit and sludge removal arrangement, grouting wherever necessary with walkway all- around of 1.20 m width G.I. pipe railing interconnecting CI pipes all</p> <p>9) Primary Digester with mixer equipment (Fixed Cover) Designing, providing and constructing unit of water tight and gas tight Primary Digester suitable for 1 DWF plant and complete with pipe gallery, building, staircase for access</p>				

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>from dome of digester into inside staircase, walkways at springing levels etc. walls and base slab being in RCC M-300, domes in stucutural concrete including providing burners and civil works for gas collection, grouting wherever necessary etc. complete as per specifications. It should be designed for min 90 C and max. 450C. and minimum detention time of 30 days, water depth shall not be more then 8.5m free board shall be 0.6m with inlet and outlet arrangement of D.I. flanged pipes including giving hydraulic testing and air tightness testing. The item includes providing works for collecting Gas and Gasburner as per specification.</p> <p>9)Secondary Digester with equipment (Fixed cover) Designing, providing and constructing including foudation unit of watertight and gastight Secondary Digester to deal with 1 DWF complete with pipe 286 gallery, building, staircase for access from dome of digester into inside, staircase to walkways at springing levels etc., Walls and base slab and domes being in RCC M-30, providing arrangement for digested sludge from digesters to centrifuge, providing burners and civil works for gas collection grouting wherever necessary etc. complete.as per specifications and obligatory provision All other arrangements as per detailed specifications.</p> <p>10) S.S.T. Sump & Pump House with recirculation Pumps and Sludge Pumps to Digester: Designing, providing & constructing Sump & Pump house of requisite capacity with ceiling height not less then 6.M., Sludge stream for recirculation to aeration tank & excess sludge to SCBT, including C.I. Piping to carry this flow to sump as per detailed specification & as directed by Engineer-incharge.</p>				


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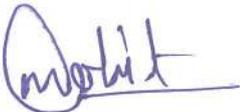

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>11) Chlorine Contact Tank: Designing, providing and constructing Chlorine Contact chamber of adequate capacity to deal with 1 DWF. Average flow. The chlorine contact tank should be of 30 minutes capacity during average flow to achieve 99.99% coliform reduction. Chlorine dose shall be maintained as per standard provisions including provisions including designing, providing and constructing water supply arrangement for chlorination, including providing dewatering and bypass arrangements jointing to final effluent main and outlet weir etc complete. The effluent quality should match with the standards laid down by Maharashtra Water pollution Control Board and as per the obligatory provision and detailed specifications and as directed by Engineer-in-charge.</p> <p>12) Chlorinator and Chlorinator Room/Tonner Room: Designing, providing and constructing chlorinators vacuum type 2 Nos each having capacity of 10 Kg/Hr as per obligatory provisions and detailed specifications with necessary provision of chlorinator room having floor area not less then 30 Sqmt.including automatic residual chlorine controller with actuator and residual chlorine analyser including cost of chlorine cylinder, piping, valves, measuring and controlling equipments, safty devices, lifting equipments, etc. complete as per IS 10552 (Part) 1982 The tonner room</p> <p>13) Sump cum Blending Tank (SCBT) Designing providing and constructing sump cum blending tank of appropriate size and detention time with free board of 0.60 m. The slope of floor 1:4 with suction pit at the center as per detailed specifications and obligatory requirements.</p>				


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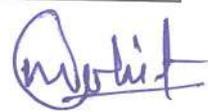

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>14) P.S.T. Sump Cum Blending Tank, Pump House with recirculation pumps: Designing providing and constructing pump house of appropriate size with pumps, ceiling height minimum 6m over the circular sump for discharging the sludge to thickener and recycling of flow for blending with D.I. piping etc. complete as per detailed specifications.</p> <p>15) Sludge Centrifuge Room with Centrifuges: Designing, providing constructing and installing including foundation etc. Sludge Centrifuge to handle the sludge flow of one day in one hour per unit with sludge dewatering unit drain etc. Complete as per specifications. Sludge centrifuge with all necessary arrangements as per detailed specifications mentioned in Volume -II and Volume -III of tender and obligatory provisions, be provided with satisfactory functioning.</p> <p>16) Gas Holder: Designing, providing and constructing gas holder having gas collection system, gas flow meter and gas burner with floating dome arrangement and storage time 6 hrs. to be constructed in M- 300 having appropriate diameter as per detailed specifications and obligatory provisions. The floating dome shall be of 8mm thick M.S. Plate minimum and shall be provided with two coats of anticorrosive epoxy coating from both faces.</p> <p>17) Outfall Sewer: Designing providing and constructing appropriate Outfall Sewer of R.C.C. NP-2 pipe, to discharge treated effluent, untreated effluent from outlet chamber (after secondary clarifier) to the local nallah at a point shown on the drawing including necessary chambers for inspection / cleaning including necessary excavation dewatering, refilling, concrete encasing/bedding concrete steps to reach the nallah bed level, pitching and energy dissipation chamber in the nallah portion etc. complete.</p>				

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>18) Piping work in D.I.- including Sluice Valve, Reflux Valve, M. S. Gate: Providing laying and jointing pipes other than those already included in the above items for interconnection by-pass drains etc. of all units including adequate numbers of manhole chambers. The item includes excavations, refilling and hydraulic testing of pipes, valves, gates accessories and cost of jointing materials. The item includes required channels with gates for interconnection of units by pass drains etc. for all units and as directed etc. complete as per detailed specifications.</p> <p>19) All the structural steel work / fabrications are to be provided with application of Hot Dip Zinc coating according to specifications as per IS 4759 :1996 (Reaffirmed 2006)</p> <p>Administrative Building cum Laboratory (G+1) Designing providing and constructing Administrative Building, Office Cum 288 Laboratory including stores. This shall be a building having appropriate Carpet area at ground floor and at first floor complete as per specifications including necessary excavation, foundation in RCC M-250 framed structure B. B. masonry (II-Class in C. M. 1:6) 20 mm cement plaster in C. M. 1:3 inside and outside painting. Aluminum door and window with glass panels, mosaic tile flooring and skirting and all other allied items, fixtures fastening electrification arrangement water supply arrangement etc. complete. The building will have laboratory on upper floor of administrative building and should be so centralised that it should not be attached with any unit but should have complete control of every unit as per Laboratory Equipment, beautification, telephone and intercom arrangement and Wireless system etc. complete.</p>				


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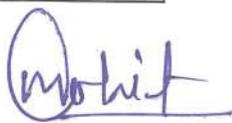

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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	<p>This USOR contains the rates of all the items without GST. No claims against GST shall be entertained at any level. GST shall be paid by the Agency/ Contractor directly to the concerning department. Howerer, All the estimates prepared on this USOR will include GST, as an extra amount as per prevailing rates on the sum of the estimate to arrive at the gross amount.</p> <p>The rates are as under :- Cost of 20 MLD / Area required 1.2 Ha. (No. of bays - 4)</p> <p>Add per MLD above 20 MLD upto 30 MLD</p> <p>Amendment No.7 CG PHED USOR 2022-23, Item No. 22.2.4, Pg. No. 91</p> <p>Note: The rates computed in the analysis of water treatment plant and sewage treatment plant donot include the cost of (i) Out sourcing for consultancy (ii) detailed survey, (iii) soil investigation, (iv) detailed hydraulic, (v) structural designing, (vi) Lab articles, glass wares and equipments, (vii) other specifically required articles to construct the plants. (viii) disposal of sludge up to nearest natural drainage system (ix) external development like external and internal electrification, (x) cost of chemicals, man powers etc during trial run of 3 months, and (xi) cost of O &M for subsequent another 9 months,</p> <p>(xii) If required, suitable provision for PLC SCADA system may also be included. Since, the above said charges has to be either owned by the agency 289 or by the department therefore, it is necessary to include cost of these charges in the preparation of estimate. The tentative provisions for above said items may be considered as under:-</p>				
		20	165541000	mld	1655.41
		10	6621000	mld	662.1


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S.NO.	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
	Total cost of 30 MLD STP (Without GST)	30		MLD	2317.51
	Description of items				
1	Out sourcing for consultancy	0.10%	2.32	LS	2.32
2	Detailed survey,	0.10%	2.32	LS	2.32
3	Soil investigation ,	0.10%	2.32	LS	2.32
4	Detailed hydraulic design	0.20%	4.64	LS	4.64
5	Structural designing,	0.30%	6.95	LS	6.95
6	Lab articles, glass wares and equipments ,	1.00%	23.18	LS	23.18
7	Other specifically required articles to construct the plants.	0.10%	2.32	LS	2.32
8	Disposal of sludge up to nearest natural drainage system	1.50%	34.76	LS	34.76
9	External development like external and internal electrification,	0.50%	11.59	LS	11.59
10	Cost of chemicals, man powers etc. during trial run of 3 months,	0.50%	11.59	LS	11.59
11	If required, suitable provision for PLC-SCADA	1.50%	34.76	LS	34.76
	Total				2454.24

Say **2454.2**
Lacs

Calculating Rates for 47 MLD STP based on SBR Technology:

Rate for Capacity of plant 47 MLD	2454.24
Adding 10% extra for Nitrogen & Phosphorous removal	245.42
Scada For STP	15.34
Total	2715.01
Add 18% GST	488.70
Total Cost of 47 MLD Plant based on above calculated rate	Rs. Lacs 3,203.71

Say

Rs. Lacs **3,204.00**



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0											
INSTRUMENTATION BILL OF QUANTITY FOR STP											
Sub Work No. 14											
Sr. No.	Description	UOM	Qty	Supply	Installation	SOR Reference code	Unit Rate Supply & Installation	Amount	GST	Total GST Amount	Total Amount with GST
1	Supplying, Installing of pH Analyzer as per IUPAC at A.F. & interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range- 0 to 14, Accuracy - better than +/- 0.1% of Full Scale, Enclosure- IP 67	1	Each	90,000.00	6,327.00	As per Market Rate	96,327.00	96,327.00	0%	-	96,327.00
2	Supplying, Installing of BOD & COD Analyzer interfacing with PLC panel including mounting arrangement. Output-4-20 mA, Display - 4" LED, Range-0 to 30 & 0 to 100 Accuracy - better than +/- 1% of Full Scale, Enclosure- IP 67	1	Each	12,00,000.00	14,400.00	As per Market Rate	12,14,400.00	12,14,400.00	0%	-	12,14,400.00
3	Supplying, Installing of Turbidity analyzer as per ISO 7027 scattering light method at A.F. & interfacing with PLC panel. Turbidity analyzer shall comprises of 3 components i.e. sensors, signal distributor & transmitter with indicator with 2 outputs, 1 o PLC & another to local display including mounting arrangement. Output 4-20 mA, Display - 4" LED, Range - 0 - 50mg/l, Accuracy - +/- 0.02 of full scale or better, Enclosure- IP 67	1	Each	2,00,000.00	23,405.00	As per Market Rate	2,23,405.00	2,23,405.00	0%	-	2,23,405.00
Note - 1. STP related instrumentation price considered in civil estimation. (Per MLD basis) 2. Excavation & foundation work of instrumentations are considered in civil estimation.											
TOTAL								15,34,132.00			15,34,132.00



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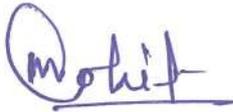
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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0**Allied Civil Works****Sub Work No. 15****Estimated Cost Rs. 896.03 Lacs**

S.R No	Particulars	Qty	Rate	Per	Amount (Rs. In lacs)
1	Steel work welded in built up sections/ framed work including cutting, hoisting, fixing in position and applying a priming coat of red oxide zinc chromate primer. Steel Gate - approximate weight - 200kg (PWD SOR, I.No.9.6.1/P-80) For 6 Gates For Shankar Nala STP For 4 Gates For Pulgaon Nala STP	2000	70	Kg	1.40
	Construction of Compound Wall for STP for L - 500 m Long (Plot Size 150m x 100m)	500	6612	per meter	33.06
3	Construction of Compound Wall for STP and wet well for L - 400 m Long in Pulgaon Nala	400	6612	per meter	26.45
4	Staff Quarter at STP(2 Nos G type) with Septic Tank 1 for Shankar Nala and 1 for Pulgaon Nala	2	3190693	Job	63.81
5	Staff Quarter at STP(6 Nos H type) with Septic Tank 1 for Shankar Nala and 1 for Pulgaon Nala	2	6101083	Job	122.02
6	Provision for Electric line charges upto STP For Pulgaon and Shankar Nala	2	15000000	Job	300.00
7	Add 3% Contingencies				349.29
Total Rs.					896.03 Lacs



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DURG SEWAGE MASTER PLAN UNDER AMRUT 2.0
ESTIMATE FOR BOUNDARY WALL AT STP

Sub-Work No.15

Items	Nos.	L	B	H	Qty.	Unit	Rate	Amount
Item No. 1 :- Excavation for all types and sizes of foundations, trenches and drains or for any other purpose including disposal of excavated stuff upto 1.5 m lift and lead upto 50m (at least 5m away from the excavated area), including dressing and leveling of pits. (PWD SOR, I.No. 1.1.1/P-9)								
In all types of soils. For column	34	1.20	1.20	1.50	73.44	Cum	185.00	13586
For Beam	33	1.800	0.40	0.45	10.69	Cum	185.00	1978
	for	100	m length of Boundary Wall					
Item No. 2 :- Providing and laying nominal mix plain cement concrete with crushed stone aggregate using concrete mixer in all works upto plinth level excluding cost of form work. 1:2:4 (M-15)								
For Colum	34	1.20	1.20	0.10	4.896	Cum	3552	17391
For Beam	33		0.40	0.10	1.32	Cum	3552	4689
(PWD SOR, I.No. 3.1.3/P-23)								
1:2:4 M-150 Coping Center of the wall	33	2.70	0.200	0.05	0.89	Cum	3552	3161
1:2:4 M-150 Coping Over wall	34	3.00	0.200	0.05	1.02	Cum	3552	3623
Item No. 3 :- Providing and laying design mix reinforced cement concrete with crushed graded stone aggregate 20mm nominal size using batching plant, transit mixer and concrete pump, in all works upto plinth level excluding cost of form work. (PWD SOR, I.No. 3.3.1/P-23)								
Footing (M-25)								
Footing Rectangular	34	1.00	1.00	0.15	5.1	Cum		
Footing Trapezoidal								
A1	34	1.00	1.00		34	Sqm		
A2	34	0.40	0.30		4.08	Sqm		
(0.3/3)x[(1.0x1.0+0.3x0.2)+{(1.0x1.0 x 0.3x0.2)} ^{1/2}]								
					4.99	Cum		
					10.09	Cum		
Extra for laying PCC/RCC of any grade in superstructure above plinth level (PWD SOR, I.No. 3.4/P-23)							97.5	
Column & Beam (M-25)						Total	4395.5	
Column	34	2.9	0.3	0.2	5.92			
Beam	34	2.70	0.20	0.30	5.51			
With Additional rate above plinth					11.43	cum	4395.5	50241

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Items	Nos.	L	B	H	Qty.	Unit	Rate	Amount
Item No. 4 :- Providing and fixing form work including centring, shuttering, strutting, staging, propping bracing etc. complete and including its removal at all levels, for: (PWD SOR, I.No.2.1.1&2.1.6/P-16)								
Foundation	34	4	1	0.1	13.6	Sqm	139	1890
Column	34	2	0.2	2.95	40.12	Sqm		
	34	2	0.2	2.95	40.12	Sqm		
Beam	34	1	0.2	2.7	18.36	Sqm		
	34	2	0.3	2.7	55.08	Sqm		
					153.68	Sqm	356	54710
Item No. 5 :- Brick work with modular well burnt clay bricks of crushing strength not less than 35 kg/sqcm and water absorption not more than 20% in foundation and plinth in: Cement Mortar 1:4 (1 Cement : 4 Coarse Sand) (PWD SOR, I.No.7.1/P-44)	34	2.70	0.20	2.10	38.56	cum	4010	154626
Item No. 6 :- Providing and placing in position reinforcement for R.C.C. work including straightening, cutting, bending, binding etc. complete as per drawings including cost of binding wire in foundation and plinth all complete: (PWD SOR, I.No.3.12.1/P-24)	80 kg/cum				1721.26	kg	54.5	93809
Item No. 7 :- Providing and making 15mm thick cement plaster on the rough side of single or half brick wall of mix: In Cement Mortar 1:4 (1 cement : 4 fine sand) (PWD SOR, I.No.11.3.2/P-103)	2	100.00		2.10	420	Sqm	120	50400
Item No. 8 :- Finishing walls with water proofing cement paint of required shade to give an even shade. (PWD SOR, I.No.14.14.1/P-133)	2	100.00		2.10	420	Sqm	41	17220
Item No. 9 :- Distempering with acrylic washable distemper to give an even shade. (PWD SOR, I.No.14.9.1/P-132)	2	100.00		2.10	420	Sqm	38	15960
Item No. 10 :- Providing and filling in plinth with sand/ Crusher dust and hard moorum under floor in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering, including dressing etc. complete.								

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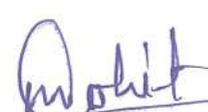
Items	Nos.	L	B	H	Qty.	Unit	Rate	Amount
(PWD SOR, I.No.1.18/P-11)								
For Colum	34	1.20	1.200	0.10	4.9	Cum	371	1818
For Beam	33	2.70	0.40	0.05	1.78	Cum	371	660
Item No. 11 :- Filling from available excavated stuff (Excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20cm in depth consolidating each deposited layer by ramming and watering with a lead upto 50 M. and lift upto 1.5 M.								
Total Excavation					84.13	Cum		
Deduct Footing Excavation					-10.09	Cum		
Deduct Beam Excavation					-5.51	Cum		
Column upto GL	34	0.85	0.2	0.3	-5.92	Cum		
(PWD SOR, I.No.1.17/P-11) Totals					62.61	Cum	65	4070
Item No. 12 :- Providing and fixing concert in a coil fencing with required dia 610 mm (having 50 nos. round per 6 metre length) up to 3m height of wall with existing angle iron 'Y' shaped laced 2.4 m or 3.00 m apart tied with G.I. staples and G.I. clips to retain horizontal including necessary bolts or G.I. barbed wire tied to angle iron all complete as per direction of Engineer-incharge with reinforced barbed tape (R.B.T.) / Spring core (2.5mm thick) wire of high tensile strength of 165 kg/ sq.mm with tape (0.52 mm thick) and weight 3.478gm/ metre (cost of M.S. angle, C.C. blocks shall be paid separately) CG PWD Building SOR 9.40 page 84	1	100.00			100.00	Cum	164	16400
Item No. 13 :- Steel work welded in built up sections/ framed work including cutting, hoisting, fixing in position and applying a priming coat of red oxide zinc chromate primer. Y shaped Angle Size 35 x 35 x 6 CG PWD Building SOR 9.60 page 80	34 1	1.40 47.6 142.8		47.60 3 Kg/m	142.8 142.8	kg Kg	70	9996
Item No. 14 :- Painting on new work (two or more coats) to give an even shade with: Satin synthetic enamel paint CG PWD Building SOR 14.22.1 page 134	1	100	0.14		14	sqm	55	770

Total Rs. 560347
Add 18% GST 100862
Say Rs. 661209
Rate per meter Rs. 6612


Executive Engineer
Municipal Corporation Durg

Puranik Brothers Consulting Engineers, Nagpur


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Durg Sewage Master Plan under Amrut 2.0**Abstract****Sub Work No. 16****STORM WATER DRAIN ESTIMATE**

Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51 Under this item	14016.00	cum	201.00	2817216.00
2	areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51	3504.00	cum	266.00	932064.00
3	Providing and laying mechanically mixed cement with crushed stone aggregate excluding centering shuttering (with 40mm nominal size graded stone aggregate) 1:2:4 (M-15) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.40.1.4, Pg. No.53	1632.00	cum	5910	9645120.00
4	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) 1:0.75:1.5 (M-30) For Foundation Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.43.3, Pg. No.54	3192.00	cum	7982	25478544.00
5	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) 1:0.75:1.5 (M-30)	2400.00 2400.00	cum cum	8028 8028	19267200.00 19267200.00

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Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Sno.	ITEM	QTY	UNIT	RATE	AMOUNT
	Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.43.3, Pg. No.54				
6	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.44, Pg. No.54	386000.00	Kg	70.00	27020000.00
7	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Side of RCC Foundation Outside and Inside of RCC wall Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.64, Pg. No.56	800.00 9600.00	Sqm. Sqm.	231.00 402.00	184800.00 3859200.00
8	sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils (CG PHED SOR, Amendment No.07 /2022-23;	8696.00	Cum	82.00	713072.00
9	Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like. (CG PHED SOR AMEND 7 P.52 It.No. 18.21)	7200.00	KL	71	511200
				Total	109695616.00

G-TOTAL 109695616.00

GST 18% 19745210.88

TOTAL 129440826.88

Say Rs.

1294.41 Laacs

12.94 Cr.


 Sub Engineer
 Municipal Corporation


 Assistant Engineer
 Municipal Corporation
 DURG(C.G)

Durg Sewage Master Plan under Amrut 2.0

Measurement

Sub Work No. 16

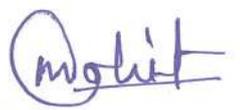
STORM WATER DRAIN ESTIMATE

Sno.	ITEM	No.	L	B	H	QTY
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.15, Pg. No.51	1	800	14.6	1.2	14016
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.16, Pg. No.51	1	800	14.6	0.3	3504
3	Providing and laying mechanically mixed cement concrete with crushed stone aggregate excluding centering and shuttering (with 40mm nominal size graded stone aggregate) 1:2:4 (M-15) Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.40.1.4, Pg. No.53	1	800	13.6	0.15	1632
4	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in foundation/plinth (20mm graded metal) 1:0.75:1.5 (M-30) For Foundation Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.43.3, Pg. No.54	1	800	13.3	0.3	3192
5	Providing & laying mechanically mixed R.C.C. excluding centering & shuttering and reinforcement in superstructure up to 4 mtr. Height above plinth level (20mm graded metal) 1:0.75:1.5 (M-30) Above ground Above Ground Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.43.3, Pg. No.54	1 2	800 800	13.3 0.5	0.2 3	2128.00 2400.00
6	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. Sub structure 50 kg/cum Super structure 50 kg/cum Total Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.44, Pg. No.54					159600.00 226400.00 386000.00

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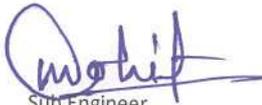

Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Sno.	ITEM	No.	L	B	H	QTY
7	Providing & fixing form work i/c centering and shuttering including strutting, propping etc. and removal of form work for: Side of RCC Foundation Outside and Inside of RCC wall Chhattisgarh PHED USOR Amendment No.07/2022-23; Item No.18.64, Pg. No.56	2 4	0.5 3	800 800		800.00 9600.00
8	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Available excavated earth Total Refilling (CG PHED SOR, Amendment No.07 /2022-23; Item N.-18.27, Pg No.-52)					14016 -5320 8696
9	Pumping out water caused by springs, tides or river seepage, broken water mains or drains or well or the like. (CG PHED SOR AMEND 7 P.52 It.No. 18.21)	30	8	30 Hp		7200


Executive Engineer
Municipal Corporation Durg


Sub Engineer
Municipal Corporation
Durg (C.G)


Assistant Engineer
Municipal Corporation
Durg C.G)

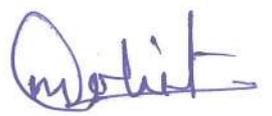
Durg Sewage Master Plan under Amrut 2.0**Sub Work No. 17**

Name of Work : Providing, Erecting and Commissioning of Solar Power Plant (Roof Top) of 0.73 MWp for Shankar Nala STP and 0.49 For Pulgaon Nala STP

Sr. No.	Particulars Of Item	Rate	Qty	Unit	Amount
1	Item No. 1 A) Solar Plant : Designing, Providing installing, commissioning & Testing of 0.73 MWp roof Mounted Solar Power on grid system and nett metering of Capacity 0.73 MWp PV plant benchmark) consisting of following component 1) PV Modules - 2)String Inverter 3) Fabrication 4) Cable / Connector/Wire 5) Installation Charges 6) Civil Work / Hardware 7) Load Side Evacuation Etc. complete	52500000.00	0.73	MWp	38325000.00
2	Item No. 1 A) Solar Plant : Designing, Providing installing, commissioning & Testing of 1.22 MWp Ground Mounted Solar Power on grid system and nett metering of Capacity 1.22 MWp PV plant benchmark) consisting of following component 1) PV Modules - 2)String Inverter 3) Fabrication 4) Cable / Connector/Wire 5) Installation Charges 6) Civil Work / Hardware 7) Load Side Evacuation Etc. complete	52500000.00	0.49	MWp	25725000.00
					64050000.00
				Total Rs.	64050000.00
				Total Rs. In Lakhs.	640.50
				Total Rs. In Cr.	6.405


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

O & M AND FINANCE


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

O & M Cost

Sub Work No. 18

Opex for base year 47 MLD STP					
A	HR				1,29,00,000
1	Project Engineer	1	Nos/Month	40,000	40,000
2	Account Manager	1	Nos/Month	35000	35,000
3	Civil Engineer	2	Nos/Month	30,000	60,000
4	Electro-Mechanical Engineer	2	Nos/Month	30,000	60,000
5	STP Shift In-charge	3	Nos/Month	22000	66,000
6	Pump Operator	8	nos.	20,000	1,60,000
7	STP Operator	3	nos.	25,000	75,000
8	SCADA Operator	6	nos.	25,000	1,50,000
9	Labour	8	nos.	16,000	1,28,000
10	Chemist	2	nos.	25,000	50,000
11	Electrician	2	nos.	18,000	36,000
12	Fitter	4	nos.	18,000	72,000
13	Security	8	nos.	16,000	1,28,000
14	Lineman	1	nos.	15000	15,000
B	Chemicals				84,70,738
1					
2	Chlorine	141	Kg/day	70	9,870
3	Coagulant (Alum)	-	Kg/day	20	
4	DWPE	35.25	Kg/day	350	12,338
5	Lab chemicals	1	LS/Day	1,000	1,000
C	Electricity				7,90,63,015
1	Submersible Pumping Machinery At shankar nallah SPS	22860	KWH/day	6.7	5,59,04,130
2	Yard lighting & Auxiliary load at shankar nallah SPS	20	KWH/day	6.7	48,910
3	STP of 47 MLD	9,400	KWH/day	6.7	2,29,87,700
4	Yard lighting	50	KWH/day	6.7	1,22,275
D	Transport				18,00,000
1	Four wheeler	0	nos.	5000	0
2	Two wheelers	0	nos.	1,200	0
3	Tractor with trolley	1	nos.	30,000	360000
E	Office communication	0	mobiles	1500	0
F	Office electricity	1	Rs./month	2000	24000
G	Stationary & consumables	1	Rs./month	3,000	36000
H	Repairs and maintenance cost	1			
1	Minor Maintenance	1	Rs./month	35,000	420000
2	Major Maintenance	1	Rs./month	60,000	720000
3	Maintenance for Solar Panal	1	Rs./annum	20000	240000
	Total				10,22,33,753
	Cost of O&M Charges without electrierty per year				2,31,70,738
	Add 18% GST				41,70,733
	Add 1% Labour Cess				2,31,707
	Cost of O&M Charges With GST				2,75,73,178
	Cost of O&M Charges for 15 years				41,35,97,665

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Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

O & M Cost

Sub Work No. 19

Opex for base year 30 MLD STP					
A	HR				68,40,000
1	Project Engineer	1	Nos/Month	40,000	40,000
2	Account Manager	0	Nos/Month	0	0
3	Civil Engineer	1	Nos/Month	30,000	30,000
4	Electro-Mechanical Engineer	1	Nos/Month	30,000	30,000
5	STP Shift In-charge	0	Nos/Month	0	0
6	Pump Operator	4	nos.	20,000	80,000
7	STP Operator	1	nos.	25,000	25,000
8	SCADA Operator	3	nos.	25,000	75,000
9	Labour	5	nos.	16,000	80,000
10	Chemist	1	nos.	25,000	25,000
11	Electrician	2	nos.	18,000	36,000
12	Fitter	3	nos.	18,000	54,000
13	Security	5	nos.	16,000	80,000
14	Lineman	1	nos.	15000	15,000
B	Chemicals				55,38,875
1					
2	Chlorine	90	Kg/day	70	6,300
3	Coagulant (Alum)	-	Kg/day	20	
4	DWPE	22.5	Kg/day	350	7,875
5	Lab chemicals	1	LS/Day	1,000	1,000
C	Electricity				3,03,33,982
1	Submersible Pumping Machinery At shankar nallah SPS	6334	KWH/day	6.7	1,54,89,797
2	Yard lighting & Auxiliary load at shankar nallah SPS	20	KWH/day	6.7	48,910
3	STP of 30 MLD	6,000	KWH/day	6.7	1,46,73,000
4	Yard lighting	50	KWH/day	6.7	1,22,275
D	Transport				18,00,000
1	Four wheeler	0	nos.	5000	0
2	Two wheelers	0	nos.	1,200	0
3	Tractor with trolley	1	nos.	30,000	360000
E	Office communication	0	mobiles	1500	0
F	Office electricity	1	Rs./month	2000	24000
G	Stationary & consumables	1	Rs./month	3,000	36000
H	Repairs and maintenance cost				
1	Minor Maintenance	1	Rs./month	35,000	420000
2	Major Maintenance	1	Rs./month	60,000	720000
3	Maintenance for Solar	1	Rs./month	20,000	240000
	Total				4,45,12,857
	Cost of O&M Charges without electricity per year				1,41,78,875
	Add 18% GST				25,52,198
	Add 1% Labour Cess				1,41,789
	Cost of O&M Charges With GST				1,68,72,861
	Cost of O&M Charges for 15 years				25,30,92,919

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Executive Engineer
Municipal Corporation Durg

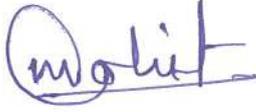
Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

O & M Cost				
Sub Work No. 20				
0.73 MWp Solar Plant For Shankar nala				
A	Maintanance Work For Shankar Nala			
1	Maintenance Worker	2	Nos/Month	25,000
				50,000
	Total			50,000
	Cost of O&M Charges for 1 year			6,00,000
	Add 18 % GST			1,08,000
	Add 1% Labour Cess			6,000
	Cost of O&M Charges With GST			7,14,000
	Cost of O&M Charges for 15 years			1,07,10,000


Executive Engineer
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Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

O & M Cost

Sub Work No. 21

0.49 MWp Solar Plant for Pulgaon Nala				
A	Maintanance Work For Shankar Nala			
1	Maintenance Worker	2	Nos/Month	25,000
				50,000
	Total			50,000
	Cost of O&M Charges for 1 year			6,00,000
	Add 18 % GST			1,08,000
	Add 1% Labour Cess			6,000
	Cost of O&M Charges With GST			7,14,000
	Cost of O&M Charges for 15 years			1,07,10,000


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

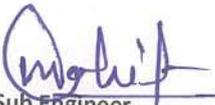
Durg Sewage Master Plan under Amrut 2.0

FINANCING PATTERN UNDER AMRUT MISSION

Sr No.	Description of Item	Amount Rs. In Lacs
1	Total Cost of The Project (Part A)	11351.99
Total Cost (Part A) =		11351.99

Year	Govt. India 33.33%	State Aid 46.67%	ULB 20%
Fund	3783.62	5297.97	2270.4
2024-25	1248.59	1748.33	749.23
2025-26	1286.43	1801.31	771.94
2026-27	1248.59	1748.33	749.23
Total	3783.62	5297.97	2270.40

11351.99


Sub Engineer
Municipal Corporation
Durg (C.G)


Assistant Engineer
Municipal Corporation
Durg (C.G)


Executive Engineer
Municipal Corporation Du

Durg Sewage Master Plan under Amrut 2.0

Cost of Outfall Water

Say Rs. 1907.71 lacs For the year 2040

Cost of production of Outfall Water per 1000 litres

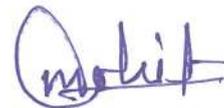
$$\text{Year 2025} = \frac{1467.47 \times 10^5 \times 10^3}{365 \times 59.30 \times 10^6} = 6.78$$

$$\text{Year 2040} = \frac{1907.71 \times 10^5 \times 10^3}{365 \times 76.40 \times 10^6} = 6.84$$

$$\text{Year 2055} = \frac{2480.03 \times 10^5 \times 10^3}{365 \times 88.92 \times 10^6} = 7.64$$


Executive Engineer
Municipal Corporation Durg


Assistant Engineer
Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

Durg Sewage Master Plan under Amrut 2.0

PER CAPITA COST

Sr No.	Description of Item	Amount Rs. In Lacs
1	Total Cost of The Project (Part A)	11351.99
	Total Cost (A) =	11351.99

Year	Population	Per Capita Cost
2025	360049.00	3153.00
2040	482895.00	2351.00
2055	647835.00	1753.00

Sr No.	Description of Item	Amount Rs. In Lacs
1	Total Cost of O&M including electricity	1907.71
	Total	1907.71

Year	Population	Per Capita Cost
2025	360049.00	530.00
2040	482895.00	396.00
2055	647835.00	295.00


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Durg Sewage Master Plan under Amrut 2.0

Revenue Statement

Sr. No.	Year	Particulars	Quantity of water in KL	Rate per KL	Total Revenue per Day	Total Revenue per Month	Total Revenue per Year	Total Cost of O&M	Net Revenue per year after O&M
1	2025	DURG	77000	10.50	8,08,500	2,42,55,000	29,10,60,000	14,67,46,610	14,43,13,391
2	2040	DURG Considering 30% increase	77000	13.65	10,51,050	3,15,31,500	37,83,78,000	19,07,70,592	18,76,07,408
3	2055	DURG Considering 30% increase	77000	17.75	13,66,365	4,09,90,950	49,18,91,400	24,80,01,770	24,38,89,630

Year	Revenue Collected Rs.
2025	2910.60
2040	3783.78
2055	4918.91


Executive Engineer
Municipal Corporation Durg


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Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg

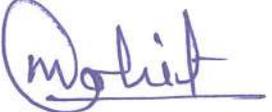
DRAWINGS



Executive Engineer
Municipal Corporation Durg



Assistant Engineer
Municipal Corporation
Durg



Sub Engineer
Municipal Corporation Durg

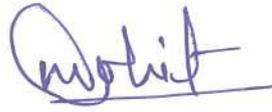
**CONSTRUCTION, TESTING, COMMISSIONING OF ALL THE
COMPONENTS OF DURG SEWAGE MASTER PLAN**

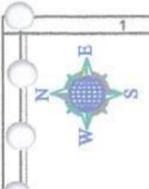
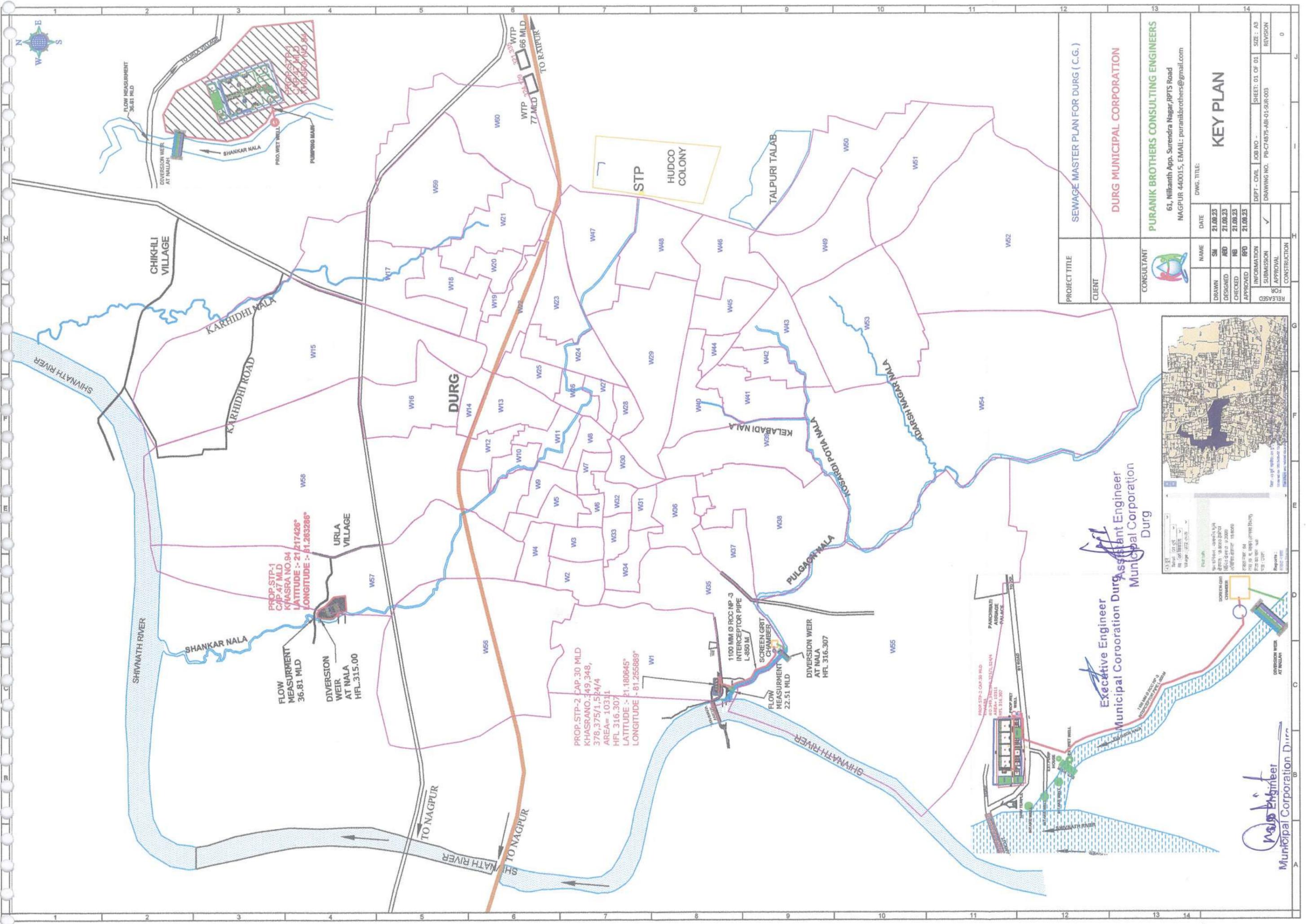
**LIST OF DRAWINGS
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7	Zone Boundary Map	
8	Weir and Intercepting Chamber for Shankar Nala	
9	Wet Well Shankar Nalla	
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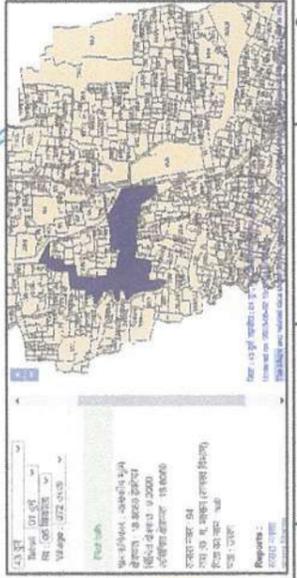

Executive Engineer
Municipal Corporation Durg


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Municipal Corporation
Durg


Sub Engineer
Municipal Corporation Durg



PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	 PURANIK BROTHERS CONSULTING ENGINEERS 61, Wilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
RELEASED	NAME	DATE	DWG. TITLE
DESIGNED	SM	21.08.23	KEY PLAN
CHECKED	ABD	21.08.23	
APPROVED	MB	21.08.23	
INFORMATION	RPD	21.08.23	
SUBMISSION			
APPROVAL			
CONSTRUCTION			
DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE : A3
DRAWING NO. PB-C74875-ABI-01-SUR-003	REVISION		REVISION
			0



PROP.STP-1
CAP.47 MLD
KHASRA NO.94
LATITUDE :- 21°21'7426"
LONGITUDE :- 81°26'3286"

FLOW MEASUREMENT
36.81 MLD
DIVERSION WEIR
AT NALA
HFL.315.00

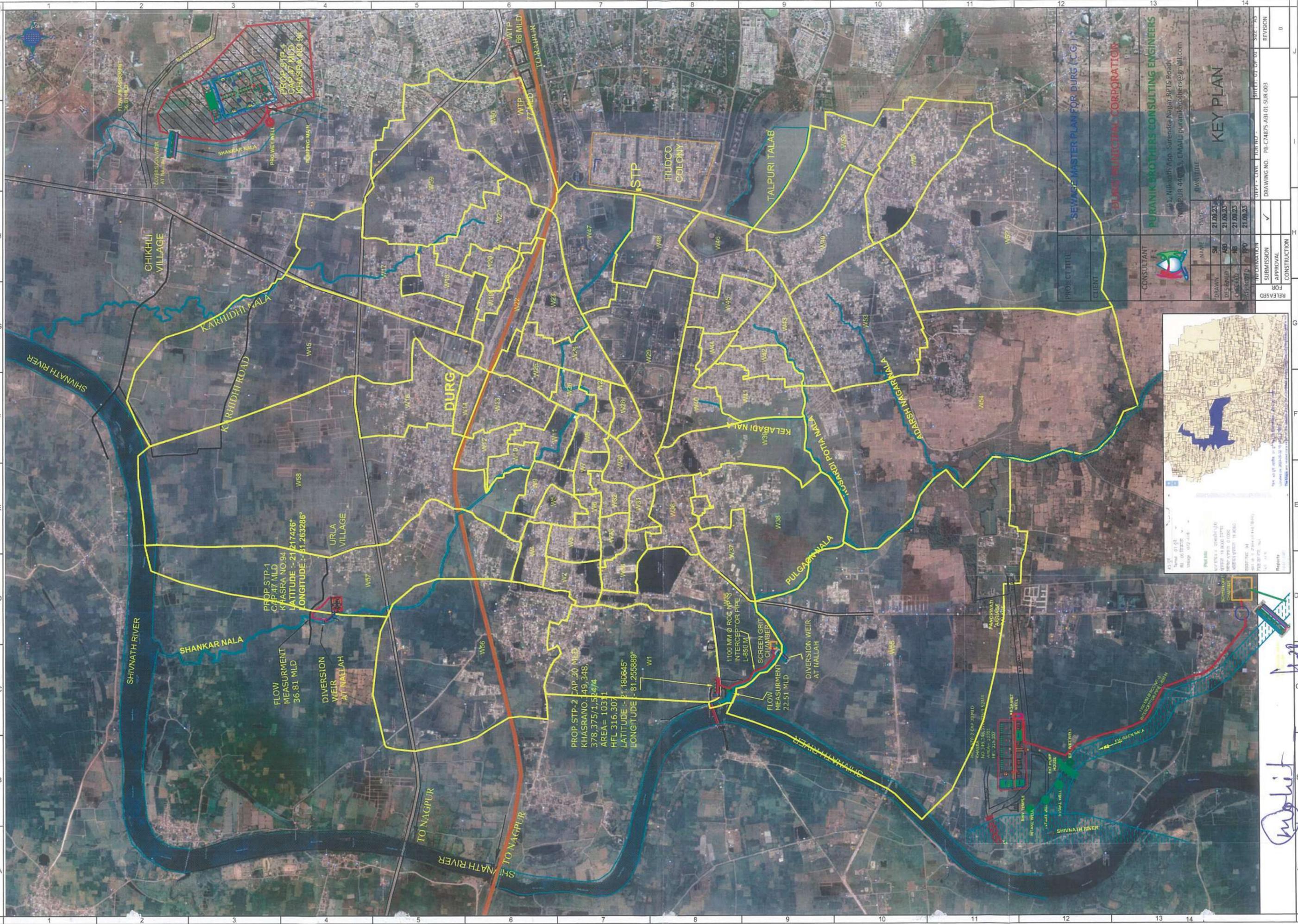
PROP.STP-2 CAP.30 MLD
KHASRANO.149,348,
378,375/1,524/4
AREA= 10311
HFL 316.307
LATITUDE :- 21.180645°
LONGITUDE - 81.255889°

1100 MM Ø RCC NP-3
INTERCEPTOR PIPE
L-850 M
SCREEN GRIT
CHAMBER
FLOW MEASUREMENT
22.51 MLD
DIVERSION WEIR
AT NALA
HFL 316.307

PROP.STP-3 CAP.30 MLD
KHASRA NO.12113,12114
AREA= 12113
HFL 316.307
LATITUDE :- 21.180645°
LONGITUDE - 81.255889°

Executive Engineer
Municipal Corporation Durg
Assistant Engineer
Municipal Corporation Durg

Executive Engineer
Municipal Corporation Durg



PROJ. STP-4
CAP. 47 MLD
KHASRA NO. 94
SHASRA NO. 94

PROP. STP-1
CAP. 47 MLD
KHASRA NO. 94
LATITUDE :- 21.217426°
LONGITUDE :- 81.263286°

PROP. STP-2 CAP. 30 MLD
KHASRANO. 149, 348,
378, 375, 1, 524/4
AREA = 10311
HFL 316.307
LATITUDE :- 21.180645°
LONGITUDE :- 81.255989°

1100 MM Ø RCC W/95
INTERCEPTOR PIPE
L-850 M

PROP. STP-3
CAP. 30 MLD
KHASRA NO. 10311
HFL 316.307

PROJECT TITLE	SEWERAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	PURANIK BROTHERS CONSULTING ENGINEERS 63, Akshay Spp, Surendra Nagar, R.P.T.S Road, W-3 PUR 44-003, E-MAIL: puranikbros@gmail.com		
RELEASED FOR	INTERPRETATION	APPROVAL	CONSTRUCTION
NAME	DATE	DATE	DATE
SI	21.08.23	21.09.23	21.09.23
DR			
CH			
AP			
APPROVED			
SUBMISSION	✓		
FOR			
CONSTRUCTION			
REVISION			0

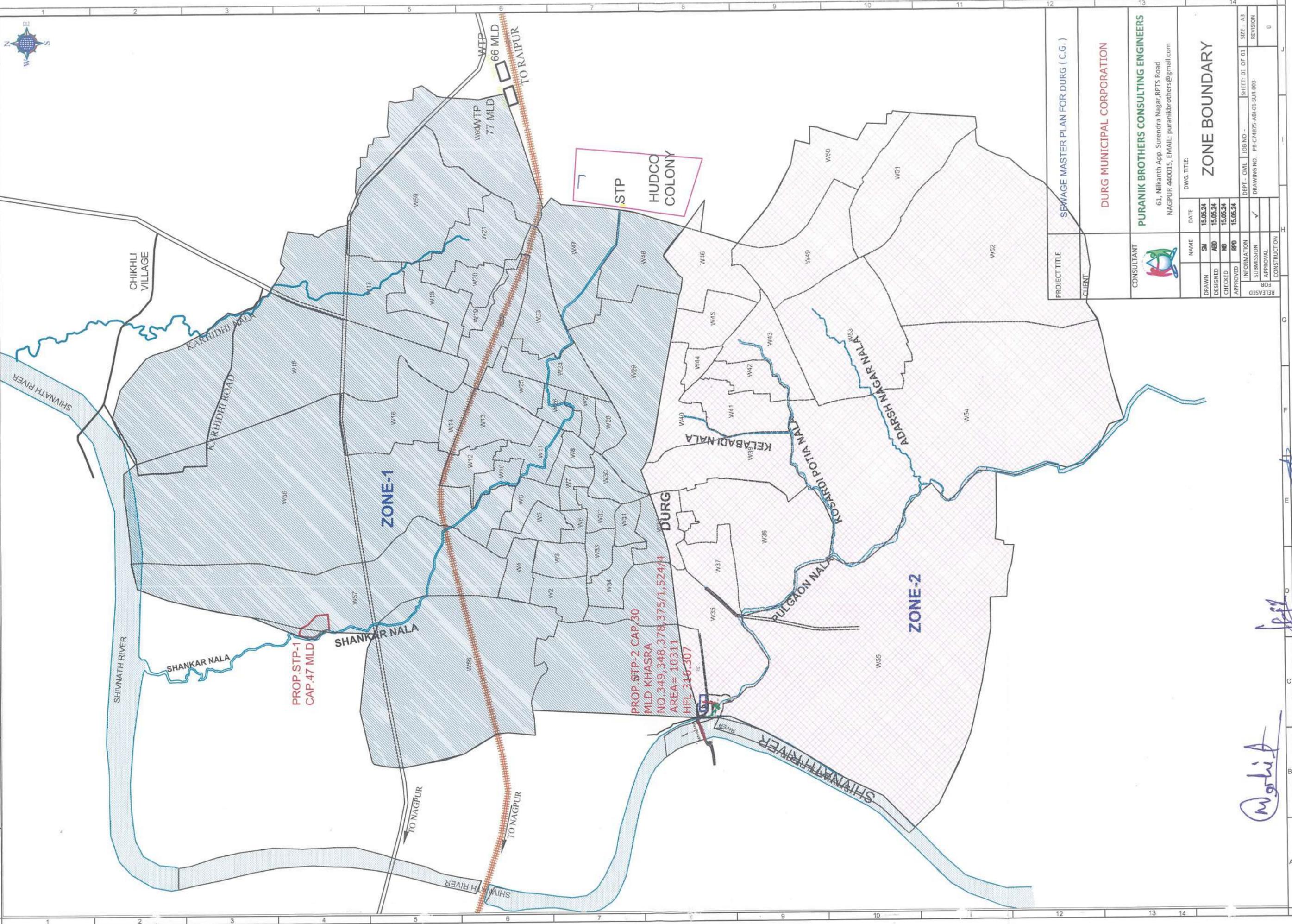


Mohit

Sub Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation

Executive Engineer



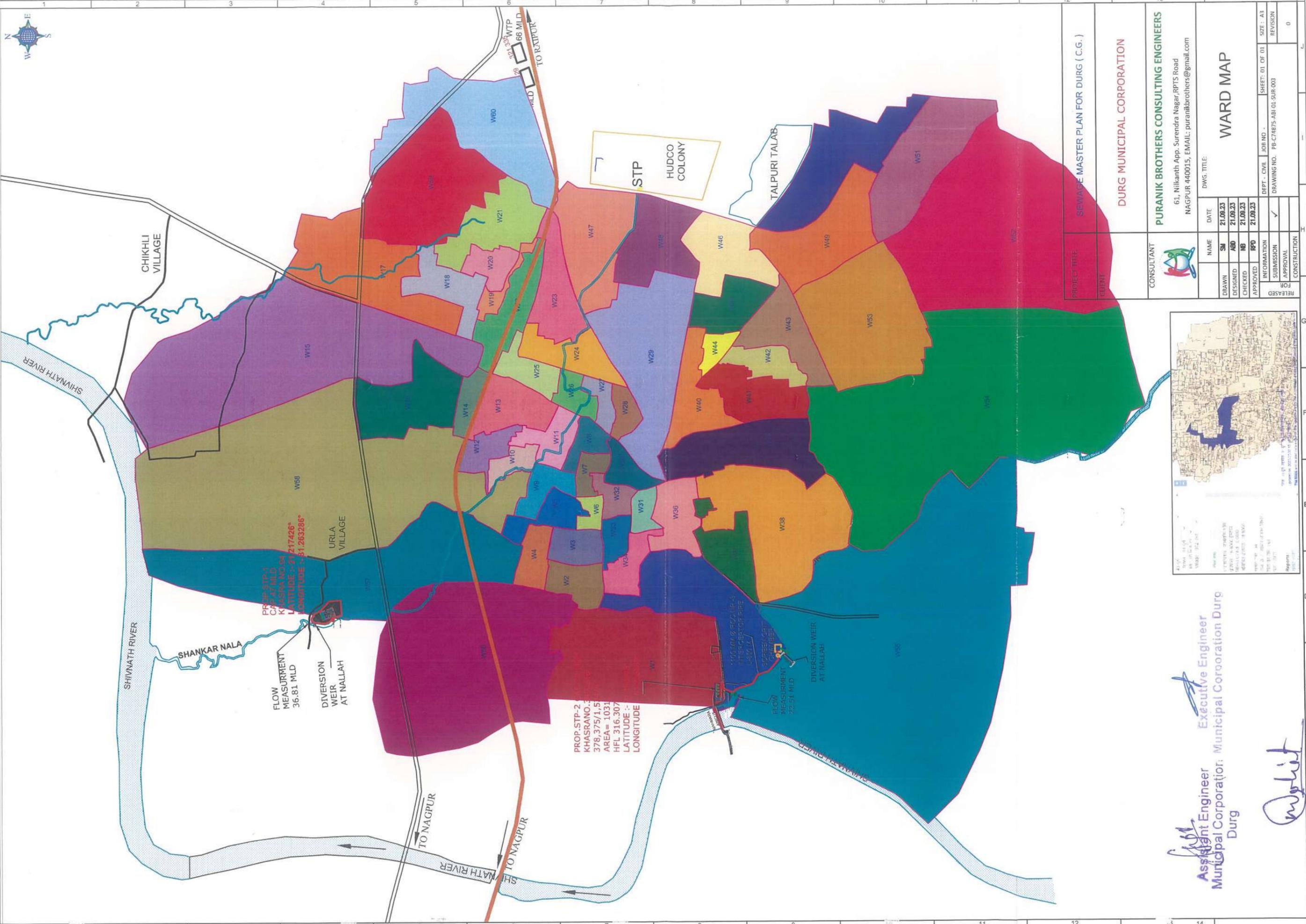
PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App, Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
DWG. TITLE:		ZONE BOUNDARY	
RELEASED	DATE	NAME	DATE
FOR	15.05.24	SM	15.05.24
APPROVAL	15.05.24	ABD	15.05.24
CONSTRUCTION	15.05.24	MB	15.05.24
INFORMATION		RPD	15.05.24
SUBMISSION			
REVISION			
DEPT. - CIVIL	JOB NO. -	SHEET. 01. OF 01	SIZE: A3
DRAWING NO. -	PR. C74875-ABI-01-SUR.003		REVISION
			0

Mohit

Sub Engineer
Municipal Corporation Durg

[Signature]
Assistant Engineer
Municipal Corporation Durg

[Signature]
Executive Engineer
Municipal Corporation Durg



PROP. STP-1
 CAP. 47 MLD
 KINASRA NO. 54
 LATITUDE :- 21.217426°
 LONGITUDE :- 81.263286°

FLOW MEASUREMENT
 36.81 MLD
 DIVERSION WEIR
 AT NALLAH

PROP. STP-2
 KHASRANO. 3
 378,375/1,5
 AREA= 1031
 HFL 316.307
 LATITUDE :-
 LONGITUDE

FLOW MEASUREMENT
 23.51 MLD
 DIVERSION WEIR
 AT NALLAH

STP
 HUDCO
 COLONY

TALPURI TALAB

CHIKHLI
 VILLAGE

URLA
 VILLAGE

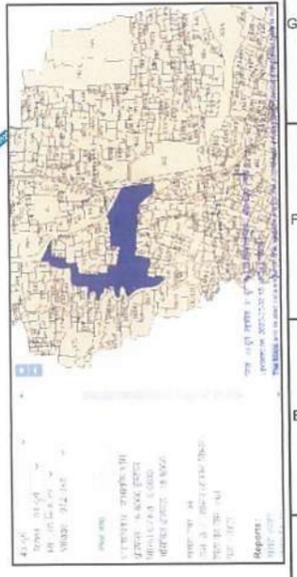
Assistant Engineer
 Municipal Corporation
 Durg

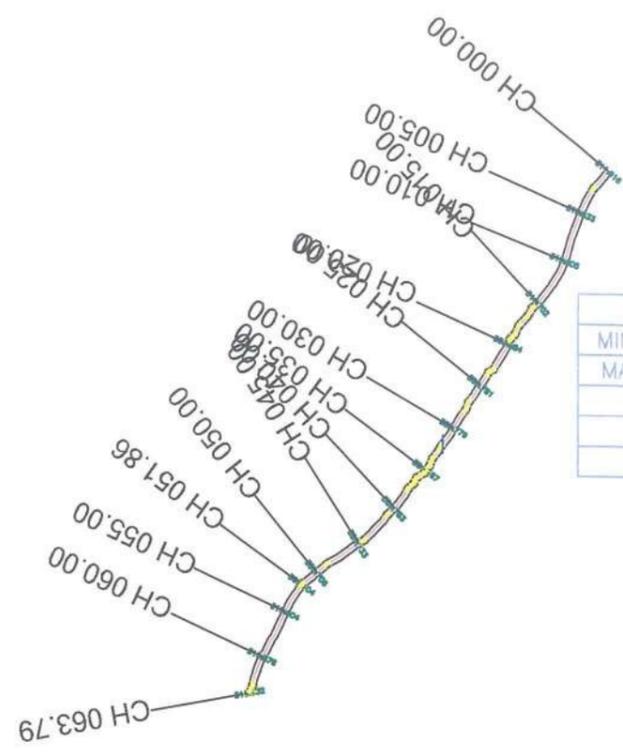
Executive Engineer
 Municipal Corporation Durg

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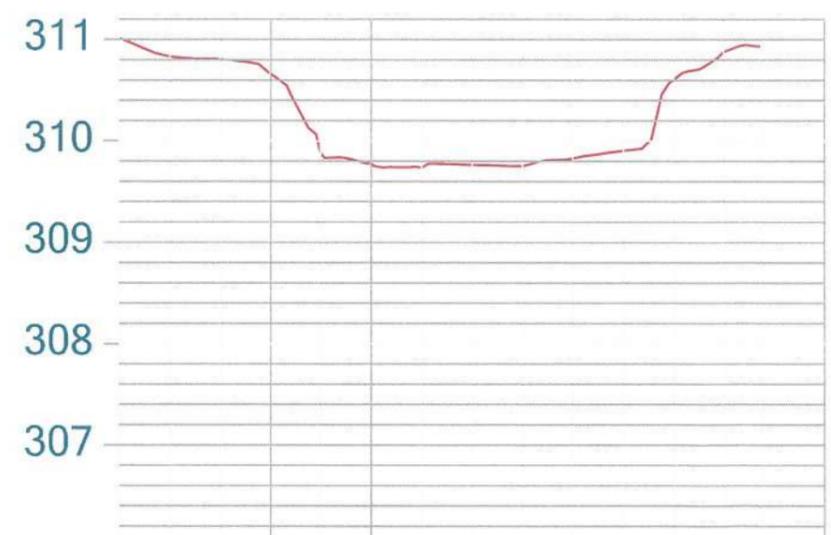
Sub Engineer
 Municipal Corporation Durg

PROJECT TITLE:		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT:		DURG MUNICIPAL CORPORATION	
CONSULTANT:		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
NAME	DATE	DWG. TITLE:	
SM	21.08.23	WARD MAP	SIZE: A3
ASD	21.08.23		
NB	21.08.23		
RPD	21.08.23		
INFORMATION		DEPT. - CIVIL	JOB NO. -
APPROVAL		SHEET: 01 OF 01	REVISION
CONSTRUCTION		DRAWING NO. - PB-C74875-ABI-01-SUR-003	0





NODE 0-0	
MINIMUM GL :	309.704 @ 51.86 M
MAXIMUM GL :	311.016 @ 0.00 M
LENGTH :	63.79 M
PIPE DIA :	0 MM
Line: I	



Datum: 306.0

Chainage	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	63.795
Ground	311.016	310.833	310.805	310.702	309.884	309.781	309.740	309.767	309.753	309.833	309.906	310.604	310.878	310.932
Pipe Specification	← RCC PIPE DIA 1100 →													

[Signature]
Executive Engineer
Municipal Corporation Durg

[Signature]
Assistant Engineer
Municipal Corporation
Durg

[Signature]
Sub Engineer
Municipal Corporation Durg

PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
	NAME	DATE	DWG. TITLE:
DRAWN	SM	30.05.24	PULGAON NALA CROSS SECTION
DESIGNED	ABD	30.05.24	
CHECKED	NB	30.05.24	
APPROVED	RPD	30.05.24	
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION	✓	SHEET: 01 OF 01
	APPROVAL	DRAWING NO. PB-C74875-AB1-01-SUR-003	SIZE : A3
	CONSTRUCTION		REVISION
			D

FLOW MEASUREMENT
36.81 MLD

DIVERSION WEIR
AT NALLAH

PRO.WET WELL

PROP.STP-1
CAP.47 MLD
KHASRA NO.94
LATITUDE :- 21.217426°
LONGITUDE :- 81.263286°

SHANKAR NALA

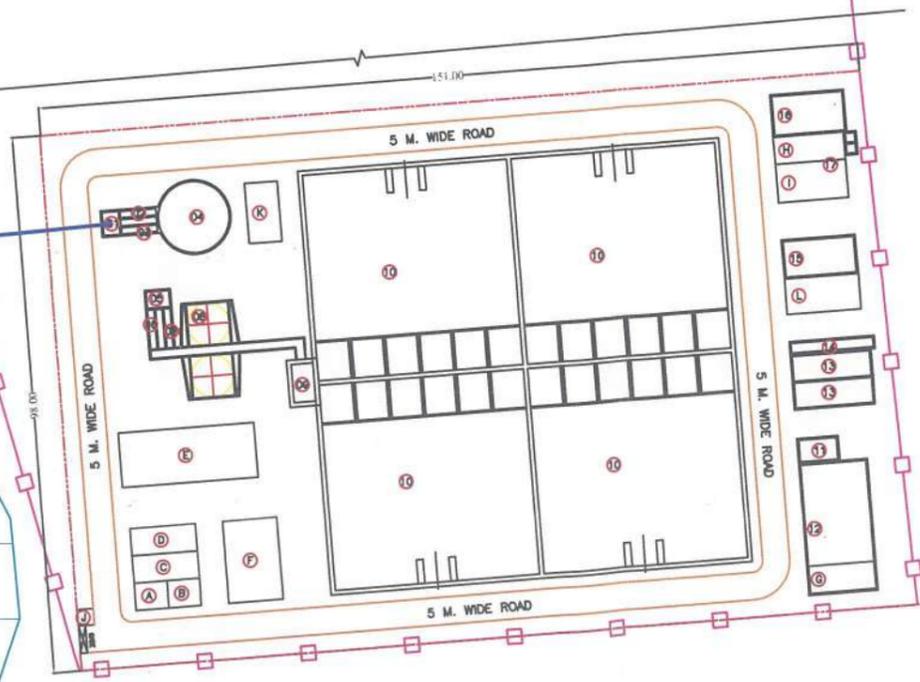
PUMPING MAIN

TO URLA VILLAGE

TO BELOUDI

URLA VILLAGE

TO DURG

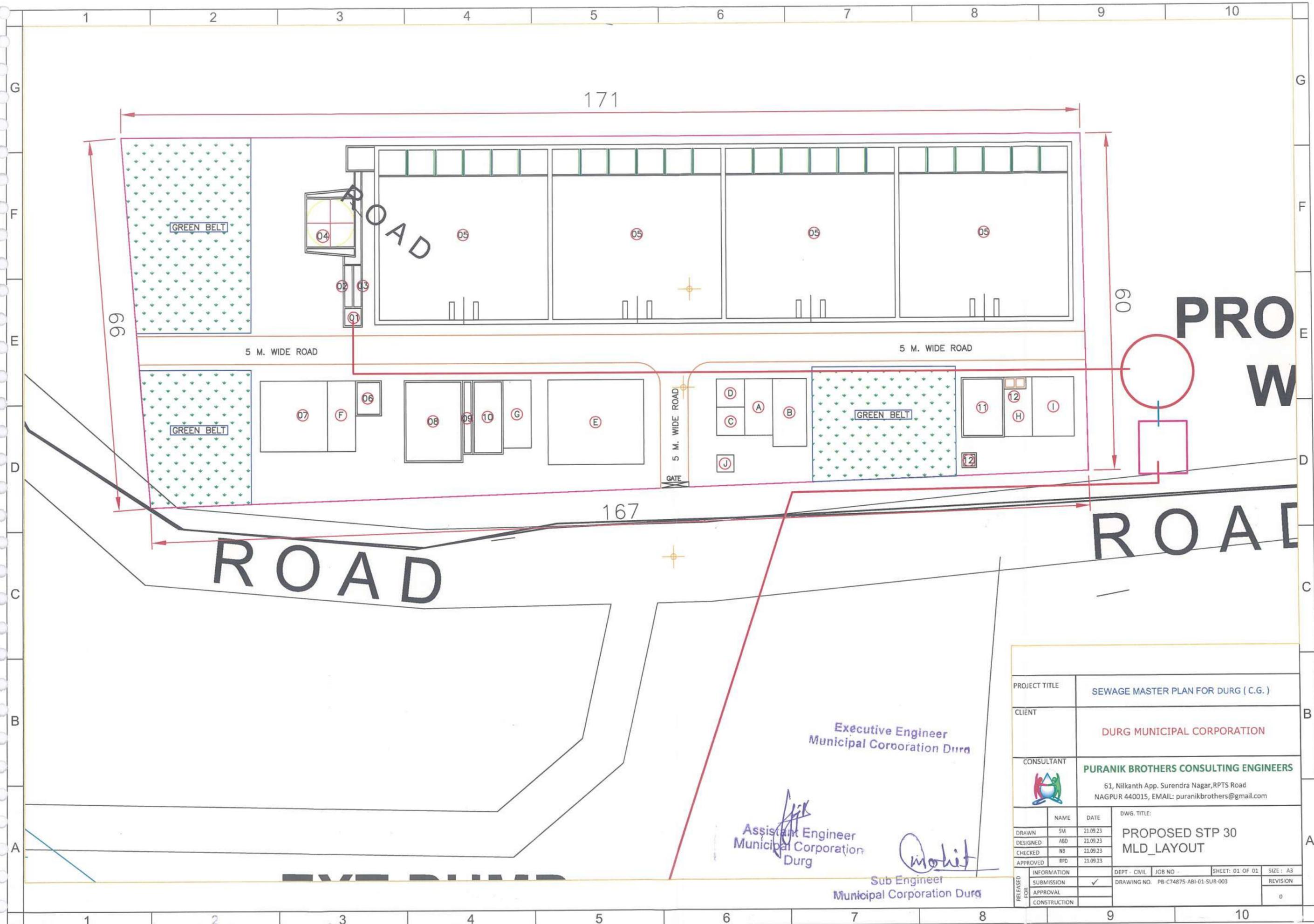


[Signature]
Executive Engineer
Municipal Corporation Durg

[Signature]
Assistant Engineer
Municipal Corporation
Durg

[Signature]
Municipal Corporation Durg

PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
	NAME	DATE	DWG. TITLE:
DRAWN	SM	10.05.24	PROP.STP 47 MLD CONTOUR MAP
DESIGNED	ABD	10.05.24	
CHECKED	NB	10.05.24	
APPROVED	RPD	10.05.24	
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION	✓	SHEET: 01 OF 01
	APPROVAL		SIZE: A3
	CONSTRUCTION		REVISION
			0

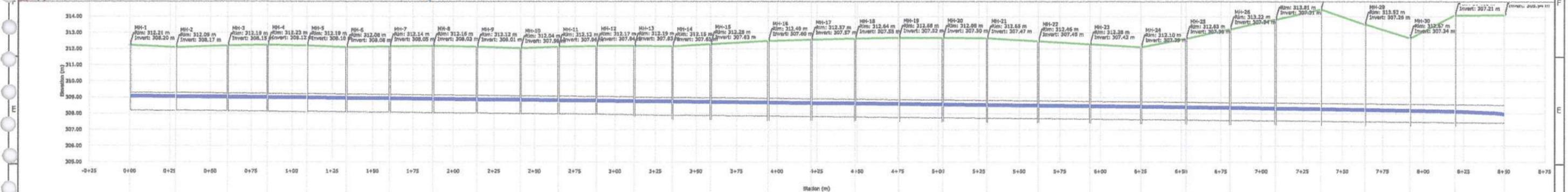
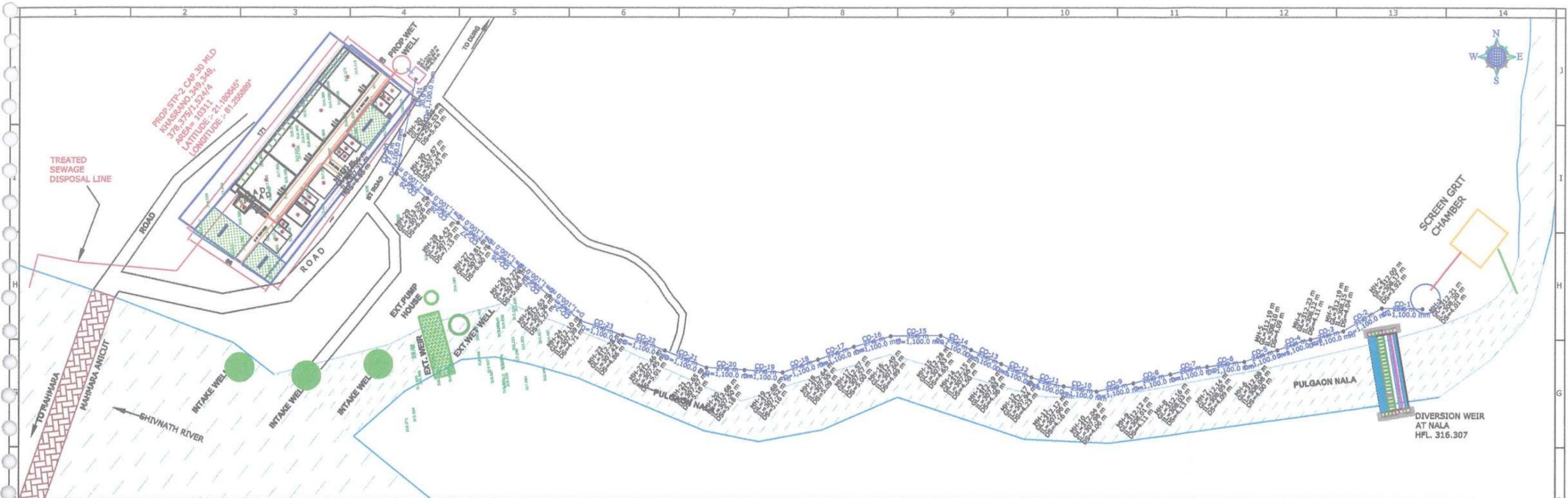


Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
	NAME	DATE	DWG. TITLE:
DRAWN	SM	21.09.23	PROPOSED STP 30 MLD_LAYOUT
DESIGNED	ABD	21.09.23	
CHECKED	NB	21.09.23	
APPROVED	RPD	21.09.23	
RELEASED FOR			
INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
SUBMISSION			SIZE: A3
APPROVAL			DRAWING NO. PB-C74875-ABI-01-SUR-003
CONSTRUCTION			REVISION
			0



Element ID/Label	131/CO-1	134/CO-2	163/CO-3	164/CO-4	169/CO-5	169/CO-6	170/CO-7	171/CO-8	173/CO-9	188/CO-10	197/CO-11	198/CO-12	199/CO-13	200/CO-14	148/CO-15	203/CO-16	204/CO-17	205/CO-18	207/CO-19	208/CO-20	211/CO-21	212/CO-22	213/CO-23	220/CO-24	221/CO-25	222/CO-26	223/CO-27	224/CO-28	225/CO-29	226/CO-30	180/CO-31	
Length (Meters)	28.6	31.8	24.4	24.4	24.4	26.9	26.9	26.9	26.9	23.5	23.5	23.5	23.5	23.5	27.1	27.1	27.1	27.1	27.1	31.8	31.8	31.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	30.9	
Rise (Unifed) (m)/Material	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC	1.10/RCC											
Flow (MLD)	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74		
Slope (Calculated) (1/S)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100		
Element ID/Label	127/MH-1	130/MH-2	133/MH-3	161/MH-4	162/MH-5	136/MH-6	168/MH-7	167/MH-8	168/MH-9	139/MH-10	192/MH-11	193/MH-12	194/MH-13	193/MH-14	142/MH-15	149/MH-16	201/MH-17	202/MH-18	149/MH-19	208/MH-20	132/MH-21	209/MH-22	210/MH-23	189/MH-24	214/MH-25	213/MH-26	216/MH-27	217/MH-28	218/MH-29	219/MH-30	188/MH-31	227/O-1
Elevation (Ground) (m)	312.21	312.09	312.19	312.23	312.19	312.08	312.14	312.16	312.12	312.04	312.12	312.17	312.19	312.15	312.28	312.49	312.57	312.64	312.68	312.68	312.69	312.46	312.28	312.10	312.83	312.22	313.61	314.42	313.52	312.67	314.06	314.10
Elevation (Invert) (m)	308.20	308.17	308.15	308.12	308.10	308.08	308.03	308.03	308.01	307.98	307.86	307.84	307.83	307.83	307.83	307.60	307.57	307.55	307.52	307.50	307.47	307.45	307.42	307.39	307.36	307.34	307.31	307.29	307.28	307.24	307.21	305.94
Station (m)	0+00	0+32	0+60	0+85	1+09	1+34	1+61	1+87	2+14	2+41	2+65	2+89	3+12	3+35	3+59	3+84	4+11	4+39	4+66	4+93	5+20	5+47	5+74	6+01	6+28	6+55	6+82	7+09	7+36	7+64	7+92	8+20


Executive Engineer
 Municipal Corporation Durg


Assistant Engineer
 Municipal Corporation Durg


Sub Engineer
 Municipal Corporation Durg

PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
NAME	DATE	DWG. TITLE:	
DRAWN SM	30.05.24	PULGAON NALA INTERCEPTOR PIPE L-SECTION	
DESIGNED ABD	30.05.24		
CHECKED NB	30.05.24		
APPROVED RPD	30.05.24		
INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
SUBMISSION	✓		SIZE: A3
APPROVAL		DRAWING NO. PB-C74875-ABI-01-SUR-003	REVISION
CONSTRUCTION			0



PROP.STP-2 CAP.30 MLD KHASRANO.349,348,
378,375/1,524/4
AREA= 10311
LATITUDE :- 21.180645°
LONGITUDE :- 81.255889°

PROP.WET WELL

TO DURG

BT ROAD

ROAD

INTAKE WELL

EXT.PUMP HOUSE

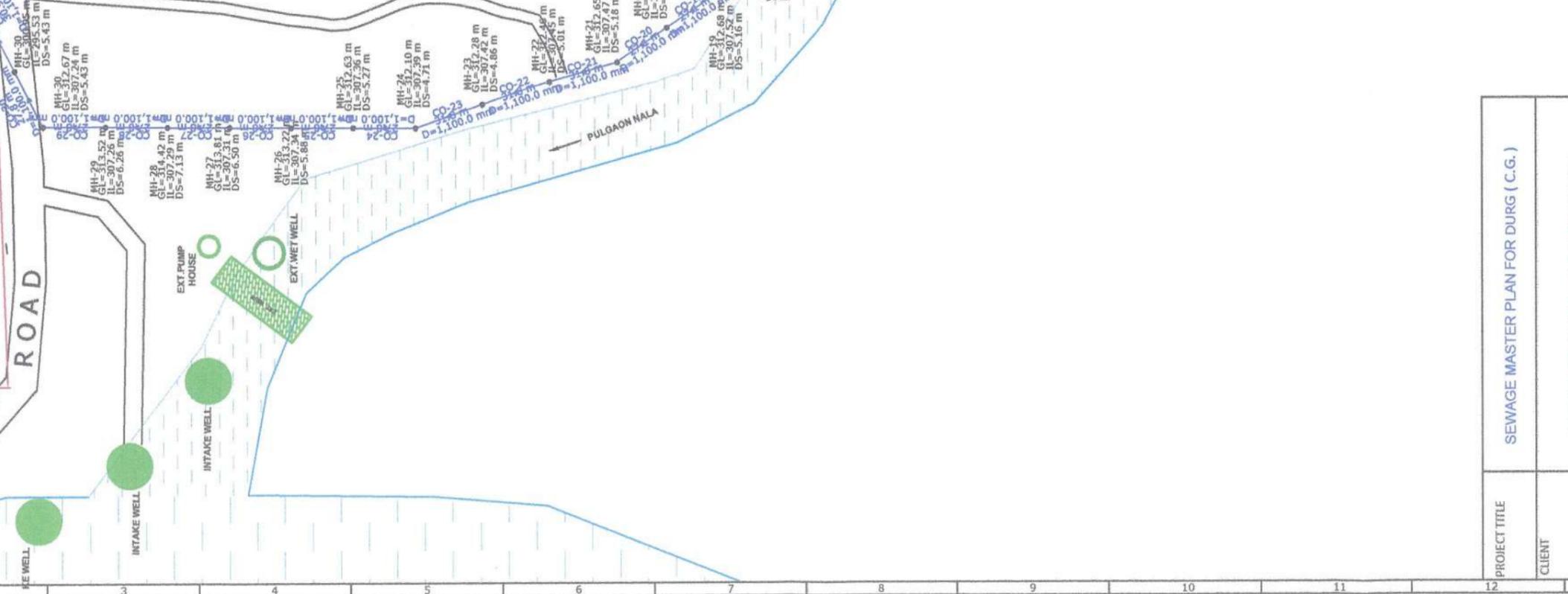
EXT.WET WELL

SCREEN GRIT CHAMBER

DIVERSION WEIR AT NALA HFL-316.307

PULGAON NALA

PULGAON NALA

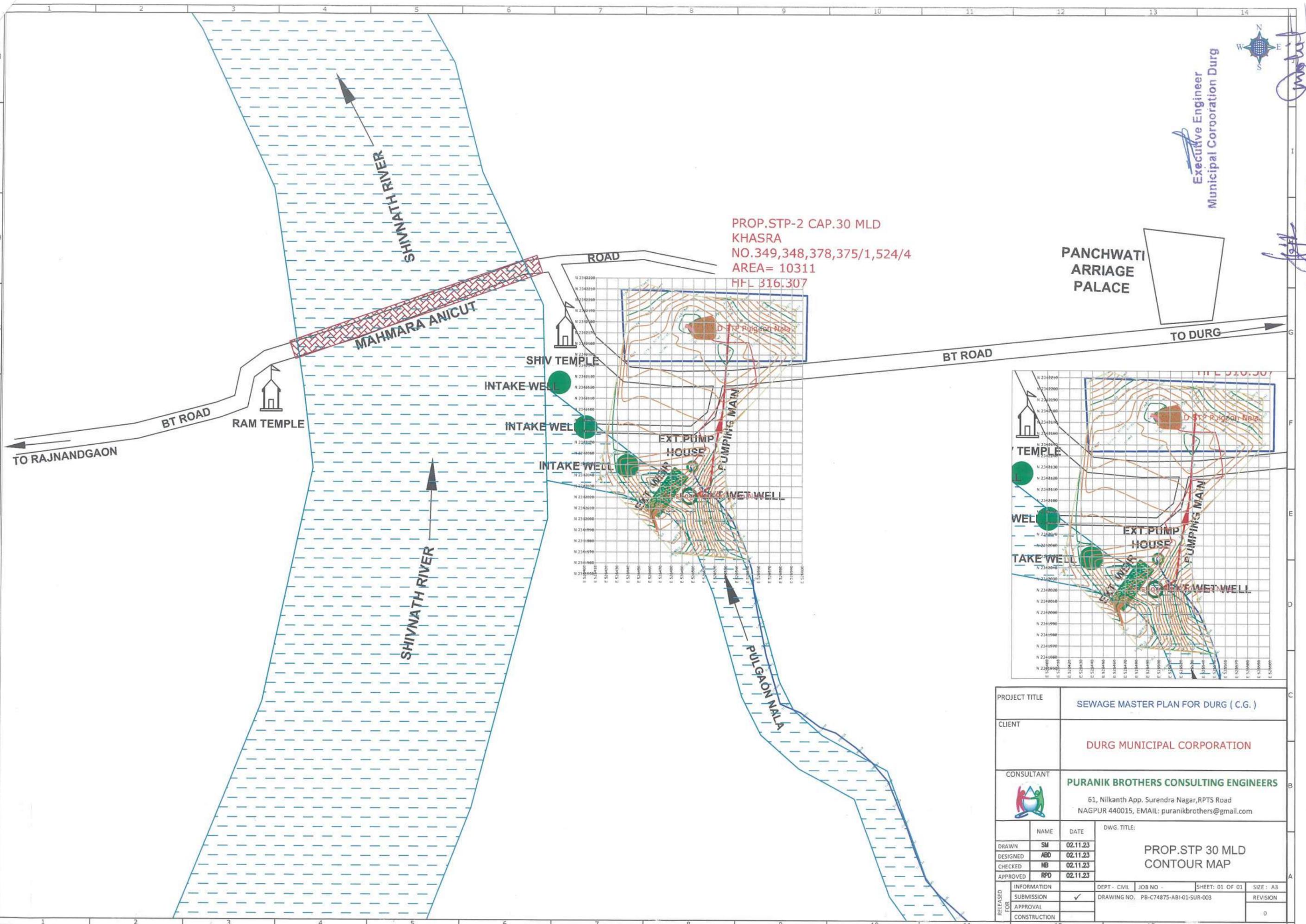


PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road MAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
DRAWN DESIGNED CHECKED APPROVED	NAME	DATE	DWG. TITLE:
	SM ABD NB RFD	30.05.24 30.05.24 30.05.24	INTERCAPTER PIPE
FOR RELEASED	INFORMATION	DEPT. - CIVIL	JOB NO. -
APPROVAL	SUBMISSION	DRAWING NO. PB-C74875-ABJ-01-SUR-003	SHEET: 01 OF 01
CONSTRUCTION	REVISION		SIZE: A3
			REVISION
			0

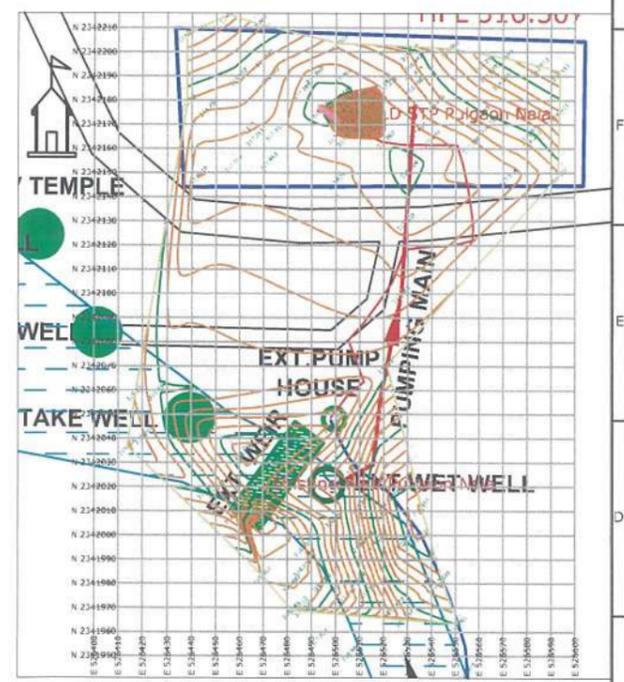
Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation Durg

Sub Engineer
Municipal Corporation Durg



PROP.STP-2 CAP.30 MLD
 KHASRA
 NO.349,348,378,375/1,524/4
 AREA= 10311
 HFL 316.307



PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
	NAME	DATE	DWG. TITLE:
DRAWN	SM	02.11.23	PROP.STP 30 MLD CONTOUR MAP
DESIGNED	ABD	02.11.23	
CHECKED	NB	02.11.23	
APPROVED	RPD	02.11.23	
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION	✓	SHEET: 01 OF 01
	APPROVAL		SIZE : A3
	CONSTRUCTION		DRAWING NO. PB-C74875-ABI-01-SUR-003
			REVISION
			0

Executive Engineer
 Municipal Corporation Durg

Assistant Engineer
 Municipal Corporation

Sub Engineer
 Municipal Corporation





FLOW MEASUREMENT
36.81 MLD

DIVERSION WEIR
AT NALLAH

TO URLA

SHANKAR NALA

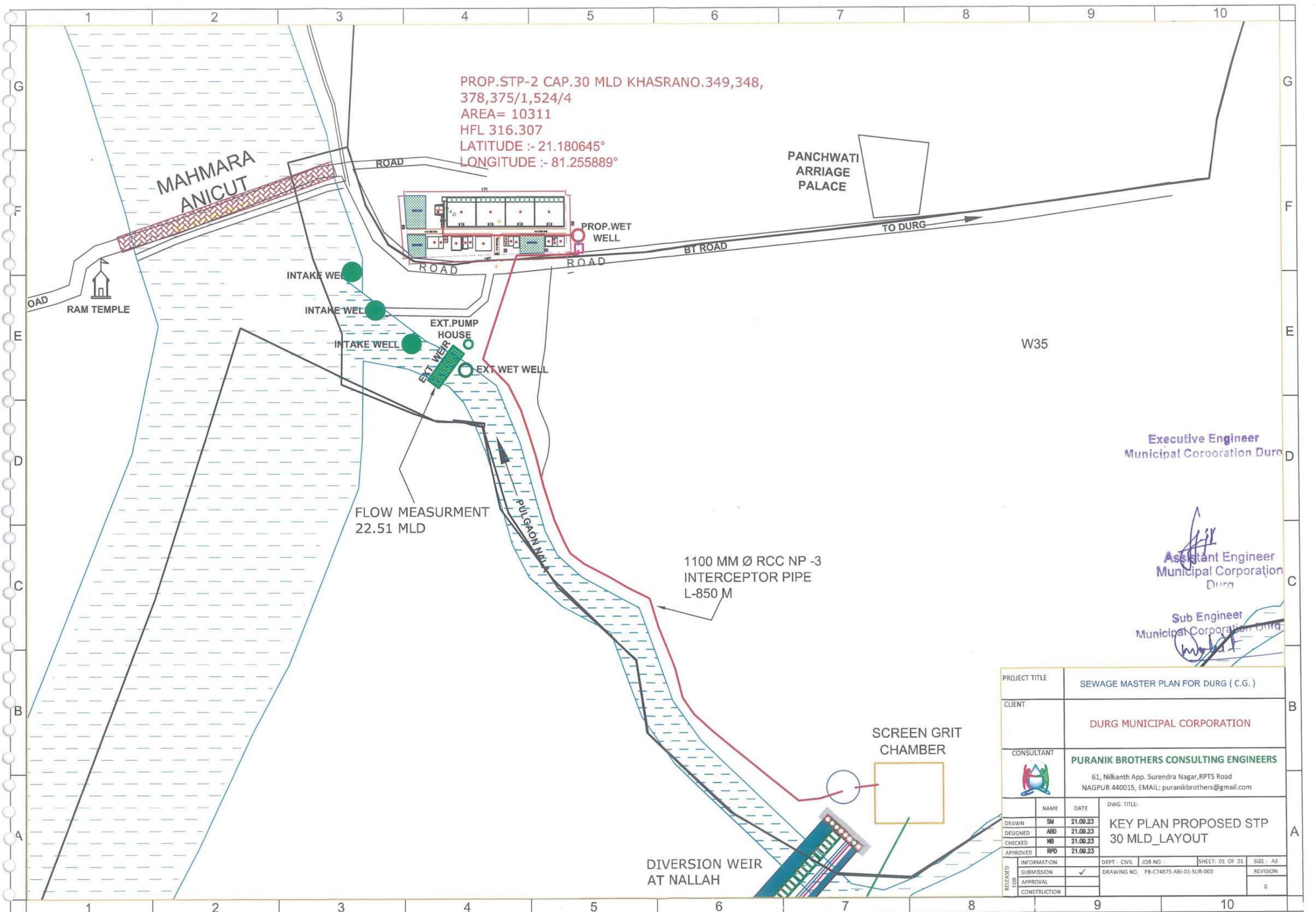
PRO.WET WELL

PUMPING MAIN

[Signature]
Executive Engineer
Municipal Corporation Durg

[Signature]
Assistant Engineer
Municipal Corporation
Durg
[Signature]
Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT		DURG MUNICIPAL CORPORATION		
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
	NAME	DATE	DWG. TITLE:	
DRAWN	SM	10.05.24	PROP.STP 47 MLD CONTOUR MAP	
DESIGNED	ABD	10.05.24		
CHECKED	NB	10.05.24		
APPROVED	RPD	10.05.24		
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
	SUBMISSION	✓	DRAWING NO. PB-C74875-ABI-01-SUR-003	SIZE : A3
	APPROVAL			REVISION
	CONSTRUCTION			0



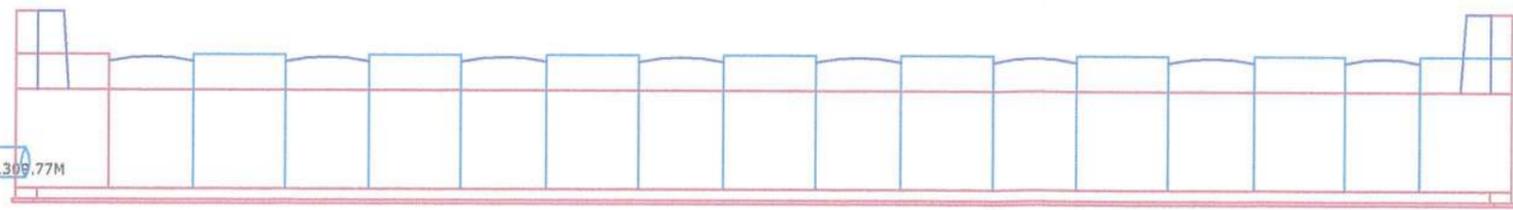
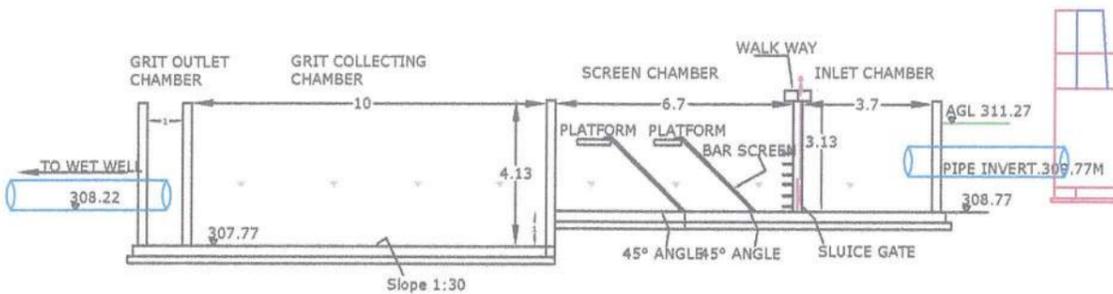
PROP.STP-2 CAP.30 MLD KHASRANO.349,348,
 378,375/1,524/4
 AREA= 10311
 HFL 316.307
 LATITUDE :- 21.180645°
 LONGITUDE :- 81.255889°

Executive Engineer
 Municipal Corporation Durg

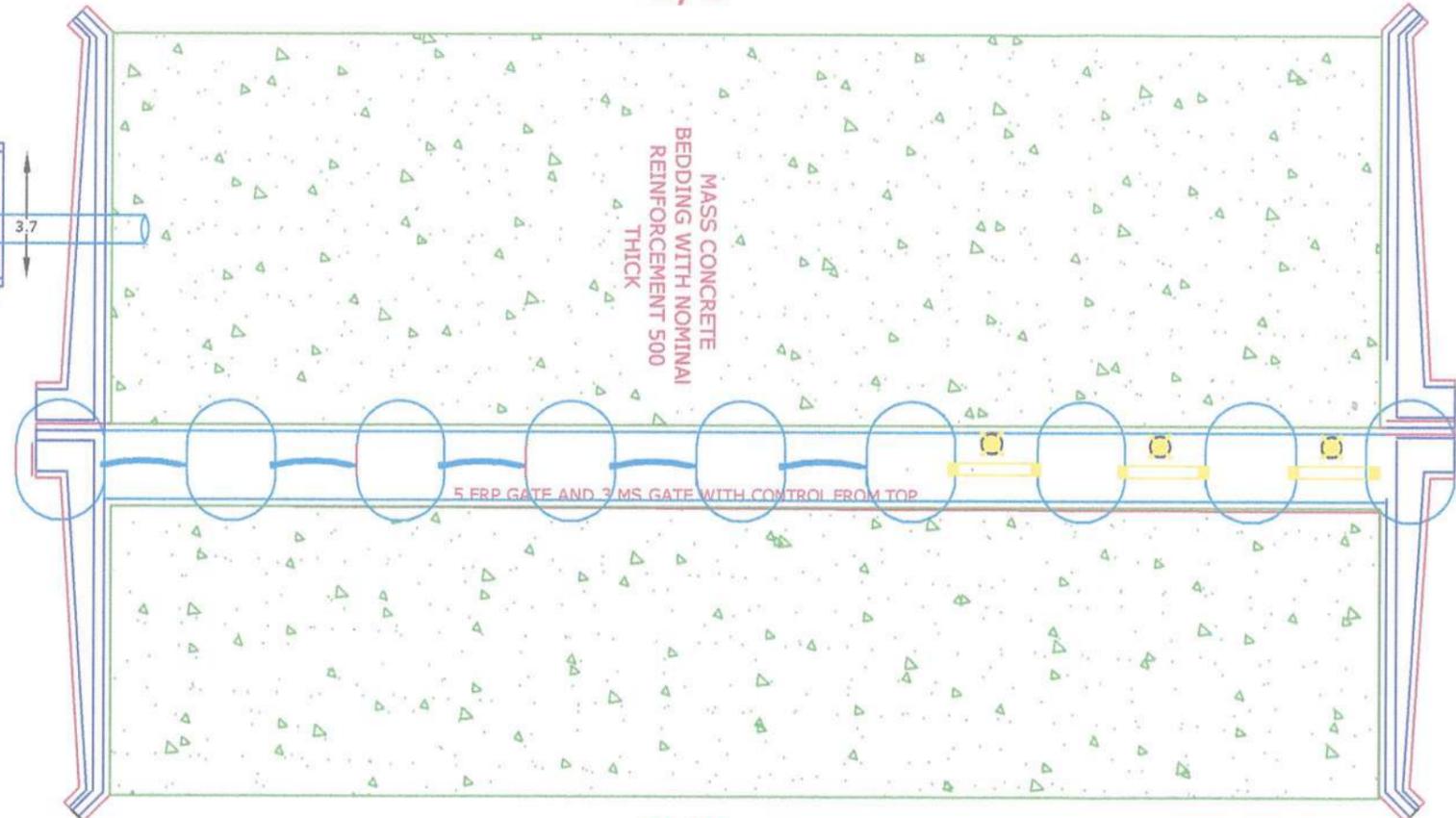
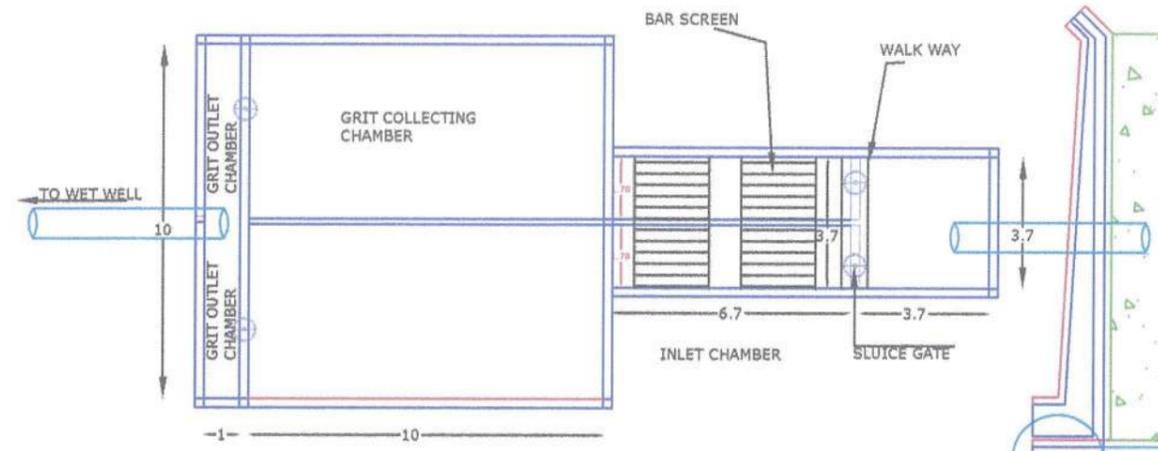
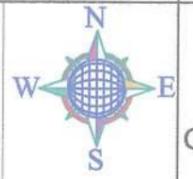
Assistant Engineer
 Municipal Corporation Durg

Sub Engineer
 Municipal Corporation Durg

PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
	NAME	DATE	DWG. TITLE:
DRAWN	SM	21.09.23	KEY PLAN PROPOSED STP 30 MLD_LAYOUT
DESIGNED	ABD	21.09.23	
CHECKED	NB	21.09.23	
APPROVED	RPD	21.09.23	
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION	✓	SHEET: 01 OF 01
	APPROVAL		SIZE : A3
	CONSTRUCTION	DRAWING NO. PB-C74875-ABI-01-SUR-003	REVISION
			0



SECTION



U/S

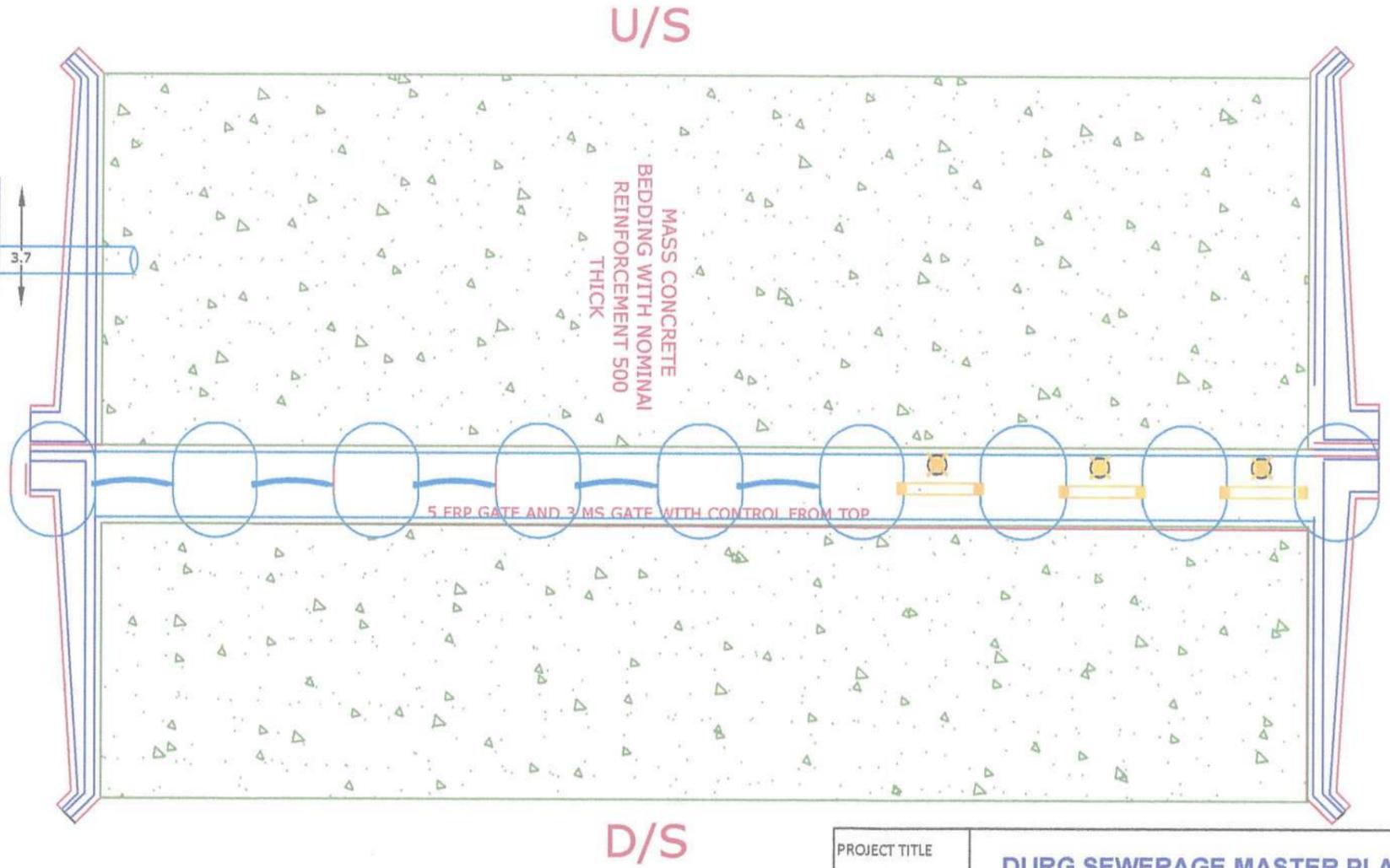
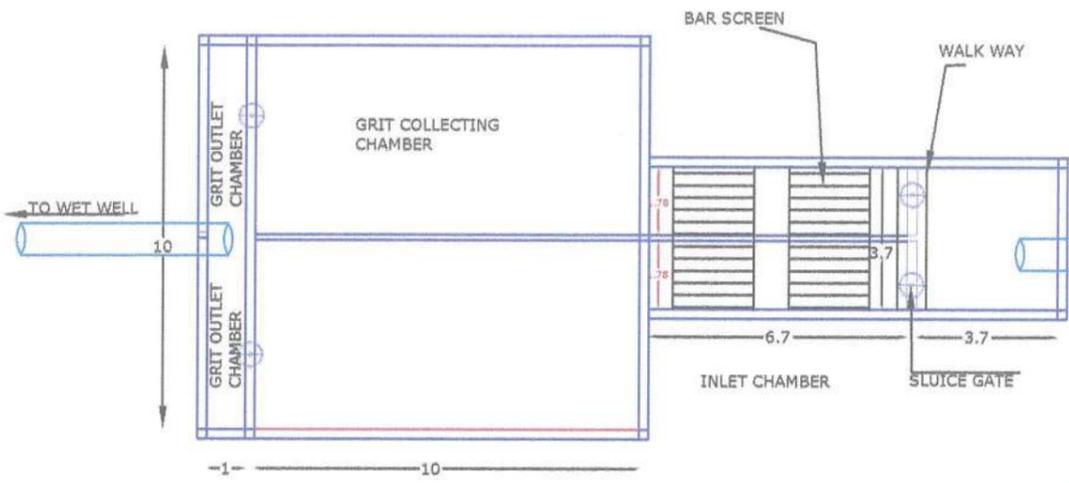
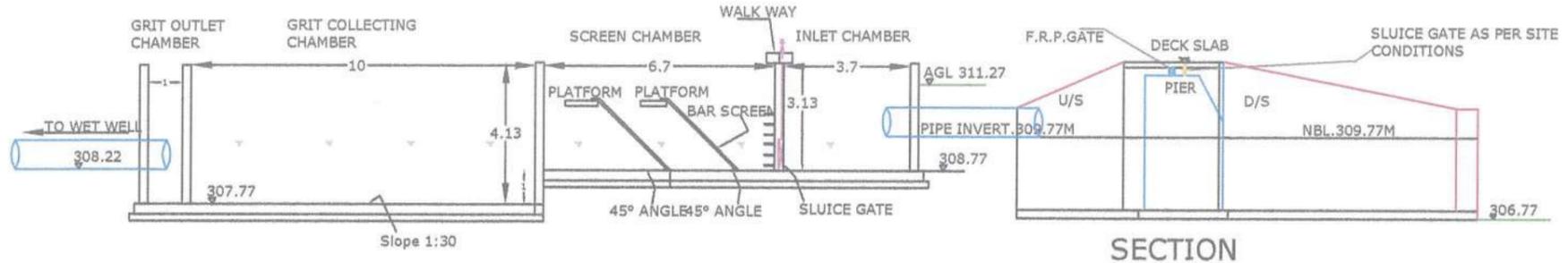
D/S

PROJECT TITLE		DURG SEWERAGE MASTER PLAN			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
NAME	DATE	DWG. TITLE:			
DRAWN SM	06,01,24	DIVERSION WEIR & INTERCAPTING CHAMBER FOR PULGAON NALA			
DESIGNED ABD	06,01,24				
CHECKED NB	06,01,24				
APPROVED RPD	06,01,24				
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE: A3
	SUBMISSION			DRAWING NO. PB-C74875-NBB-01-SUR-002	REVISION
	APPROVAL				0
	CONSTRUCTION				

[Signature]
 Executive Engineer
 Municipal Corporation Durg

[Signature]
 Assistant Engineer
 Municipal Corporation
 Durg

[Signature]
 Sub Engineer
 Municipal Corporation Durg



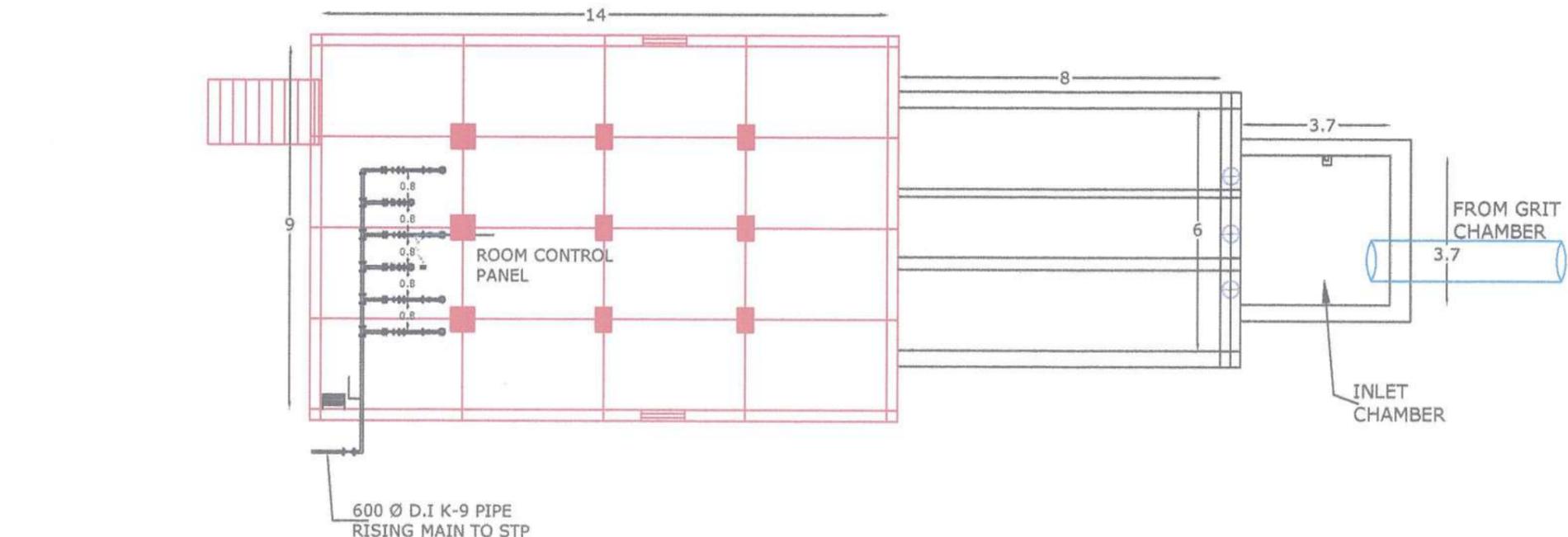
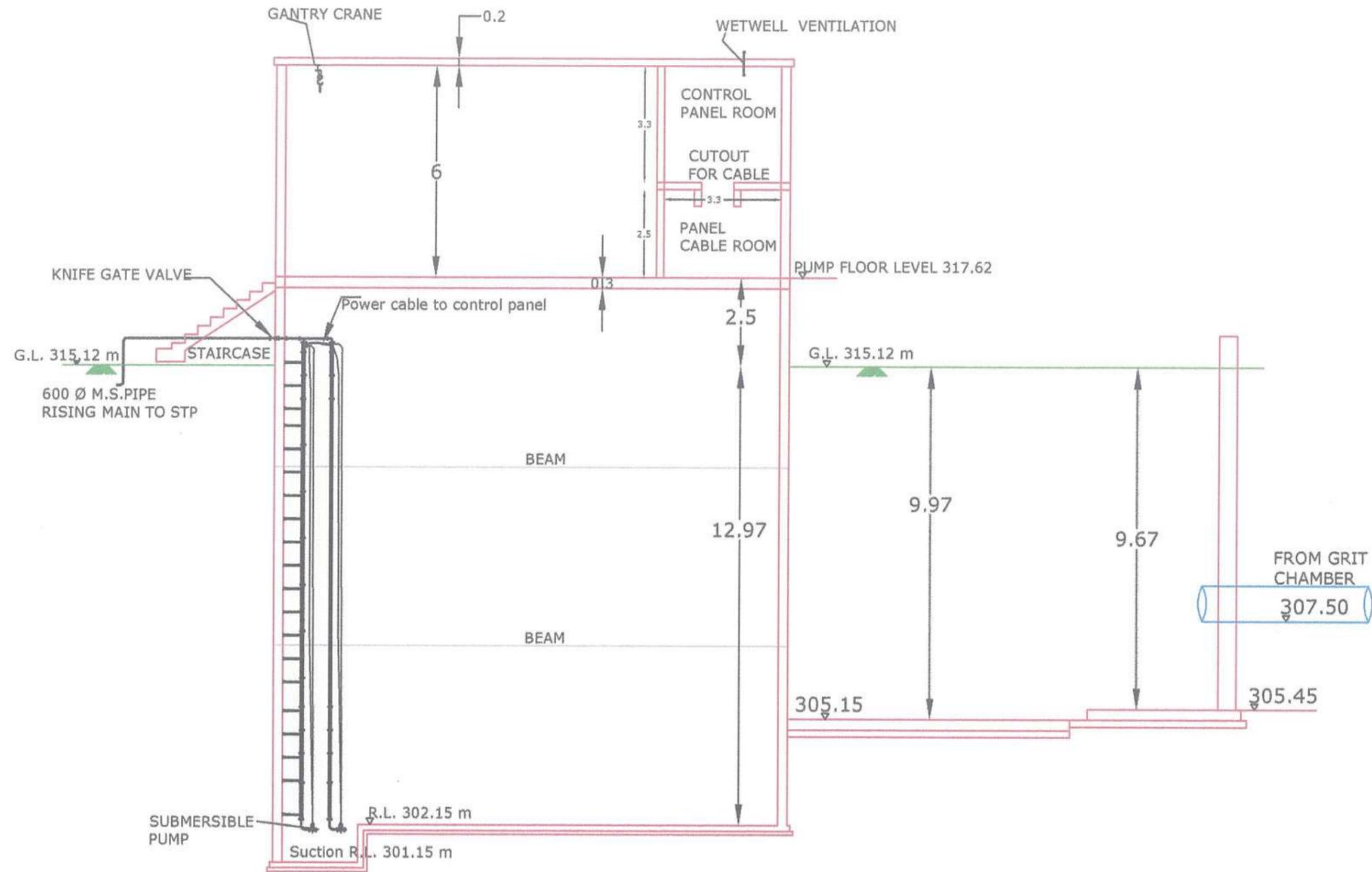
Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
DRAWN		NAME	DATE	DWG. TITLE:	
DESIGNED		SM	06,01,24	DIVERSION WEIR & INTERCEPTING CHAMBER PULGAON NALA	
CHECKED		ABD	06,01,24		
APPROVED		NB	06,01,24		
RELEASED FOR		RPD	06,01,24		
INFORMATION		DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE: A3
SUBMISSION		✓	DRAWING NO. PB-C74875-NBB-01-SUR-002		REVISION
APPROVAL					
CONSTRUCTION					0

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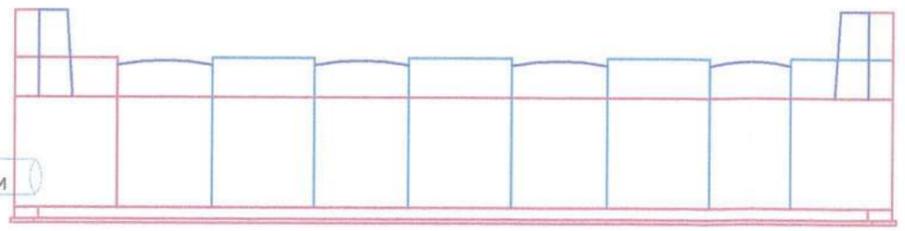
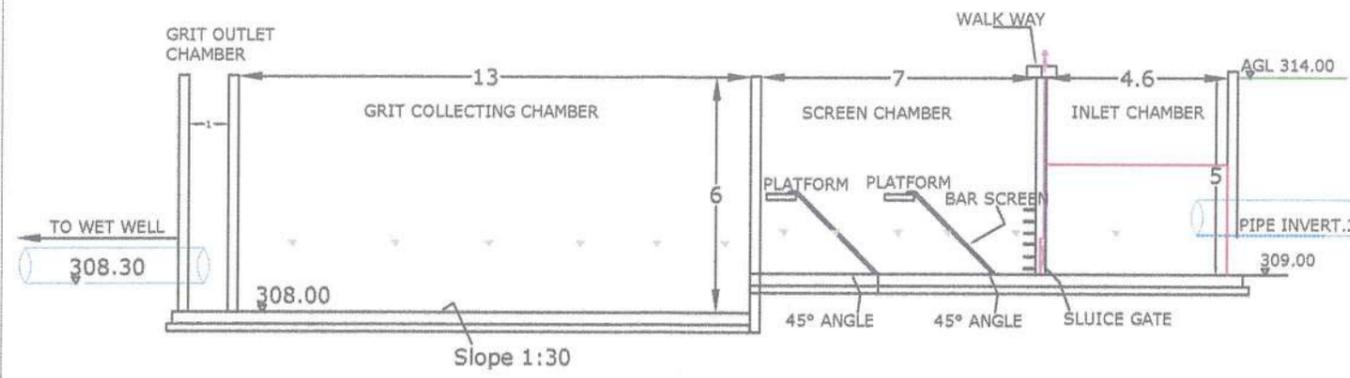
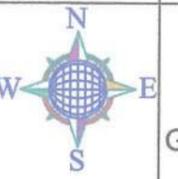
Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation Durg

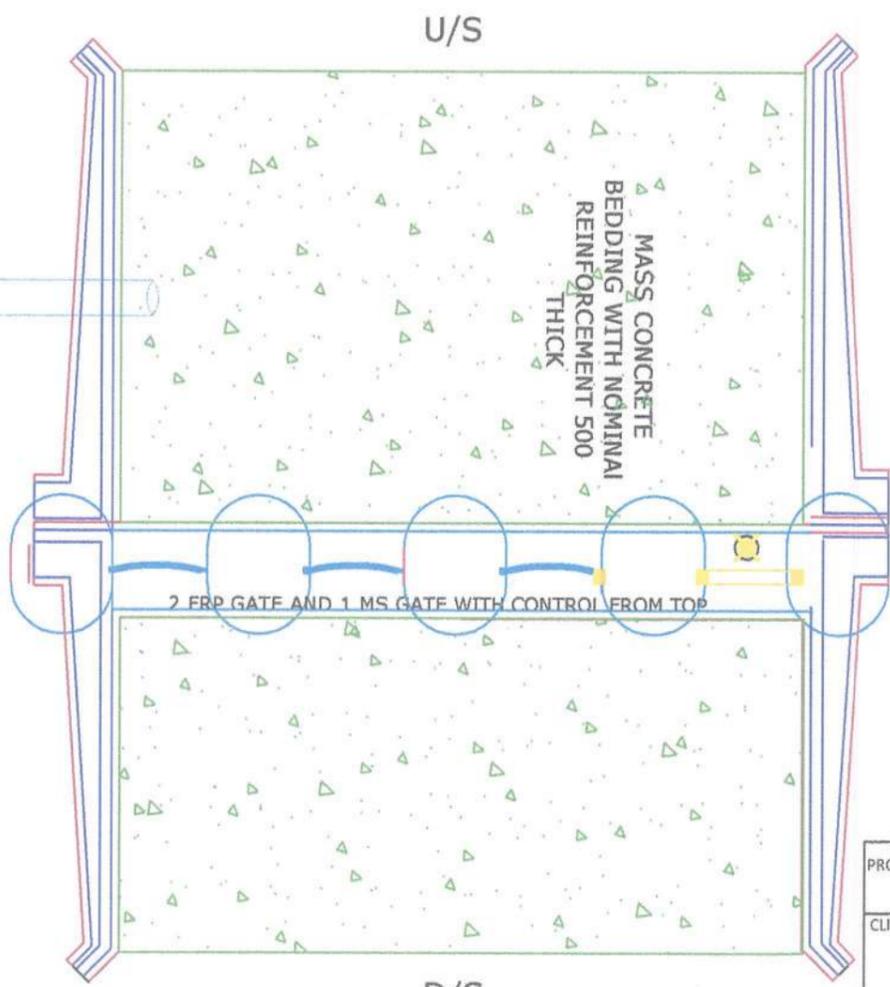
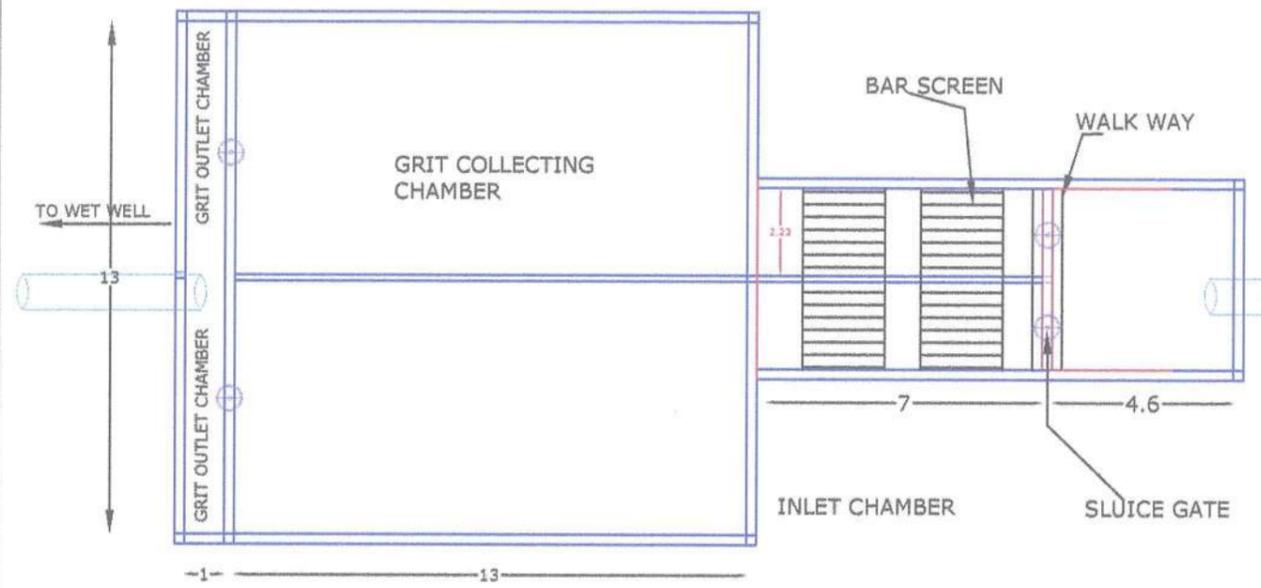
Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
		NAME		DATE	
DRAWN		SM		06,01,24	
DESIGNED		ABD		06,01,24	
CHECKED		NB		06,01,24	
APPROVED		RPD		06,01,24	
		DWG. TITLE:			
		PUMPING STATION (WET WELL) PULGAON NALA			
INFORMATION		DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE: A3
SUBMISSION		DRAWING NO. PB-C74875-NBB-01-SUR-002		REVISION	
APPROVAL					
CONSTRUCTION				0	

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SECTION

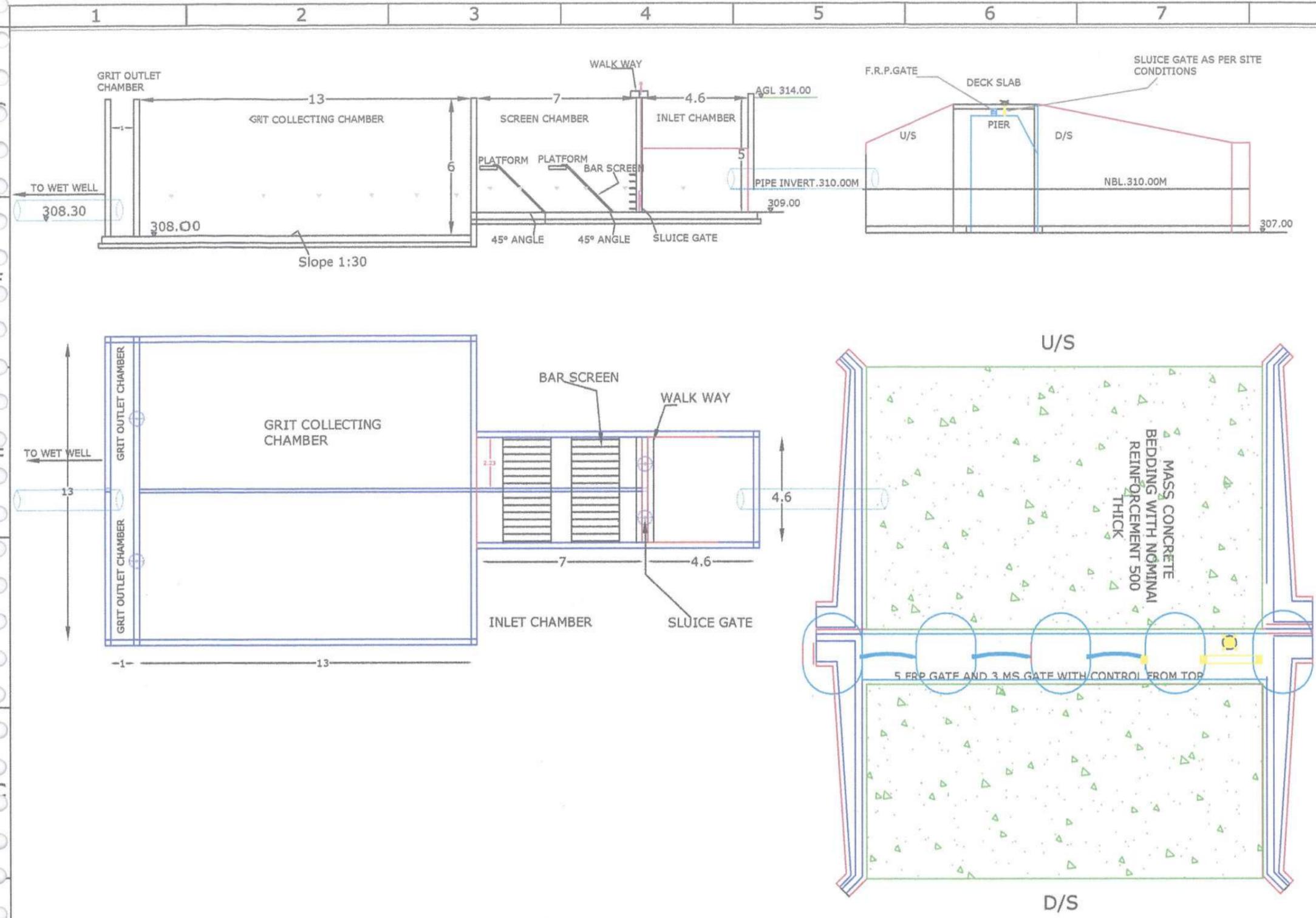


[Signature]
Executive Engineer
Municipal Corporation Durg

[Signature]
Assistant Engineer
Municipal Corporation
Durg

[Signature]
Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN	
CLIENT		DURG MUNICIPAL CORPORATION	
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com	
NAME	DATE	DWG. TITLE:	
DRAWN SM	06,01,24	DIVERSION WEIR & INTERCAPTING CHAMBER FOR SHANKAR NALA	
DESIGNED ABD	06,01,24		
CHECKED NB	06,01,24		
APPROVED RPD	06,01,24		
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION	✓	SHEET: 01 OF 01
	APPROVAL	DRAWING NO. PB-C74875-NBB-01-SUR-002	SIZE: A3
	CONSTRUCTION		REVISION
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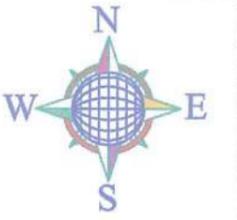
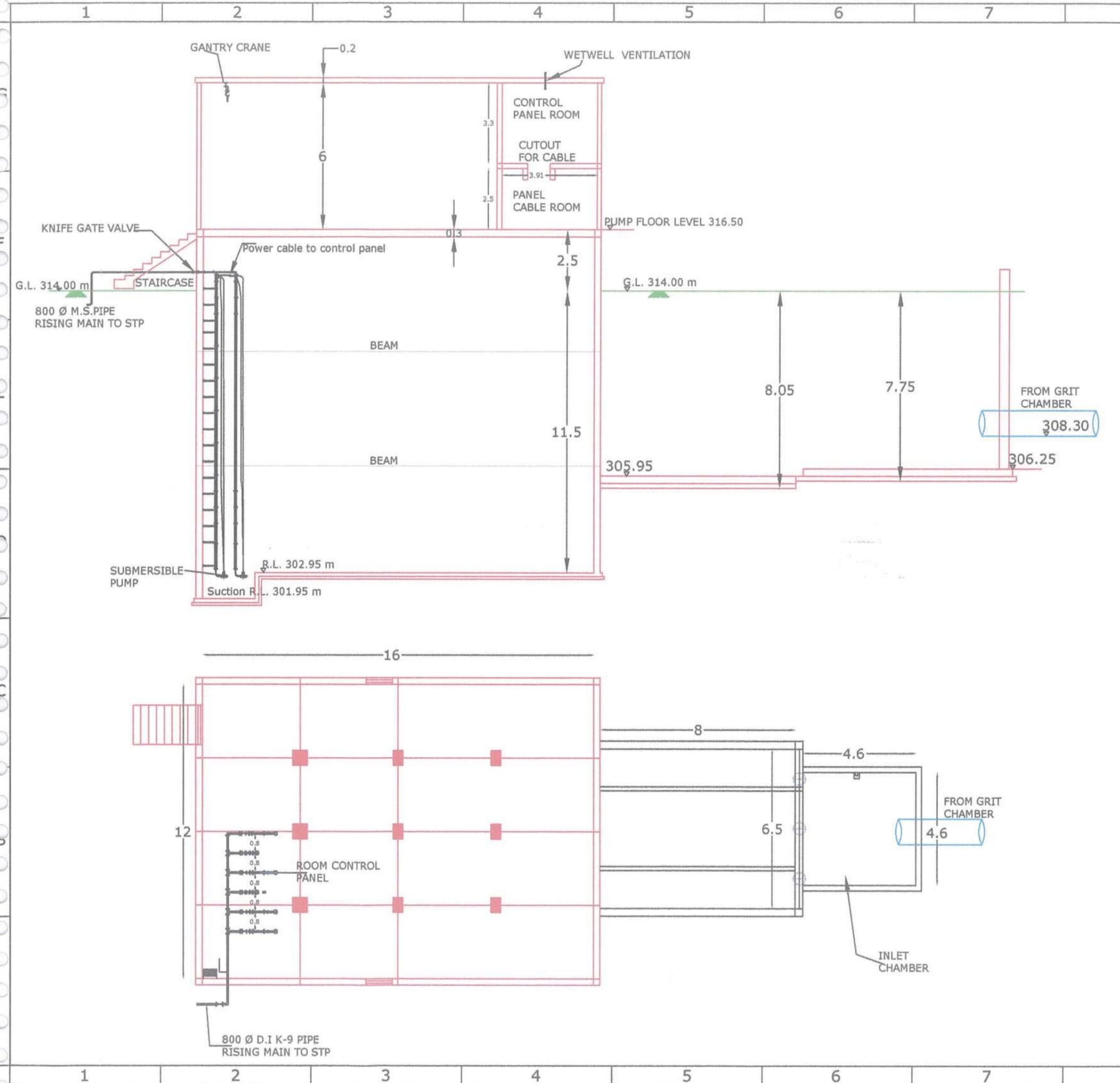


Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
		NAME		DATE	
DRAWN		SM		06,01,24	
DESIGNED		ABD		06,01,24	
CHECKED		NB		06,01,24	
APPROVED		RPD		06,01,24	
		DWG. TITLE:			
		DIVERSION WEIR & INTERCEPTING CHAMBER SHANKAR NALA			
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE : A3
	SUBMISSION			DRAWING NO. PB-C74875-NBB-01-SUR-002	REVISION
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		CONSTRUCTION			

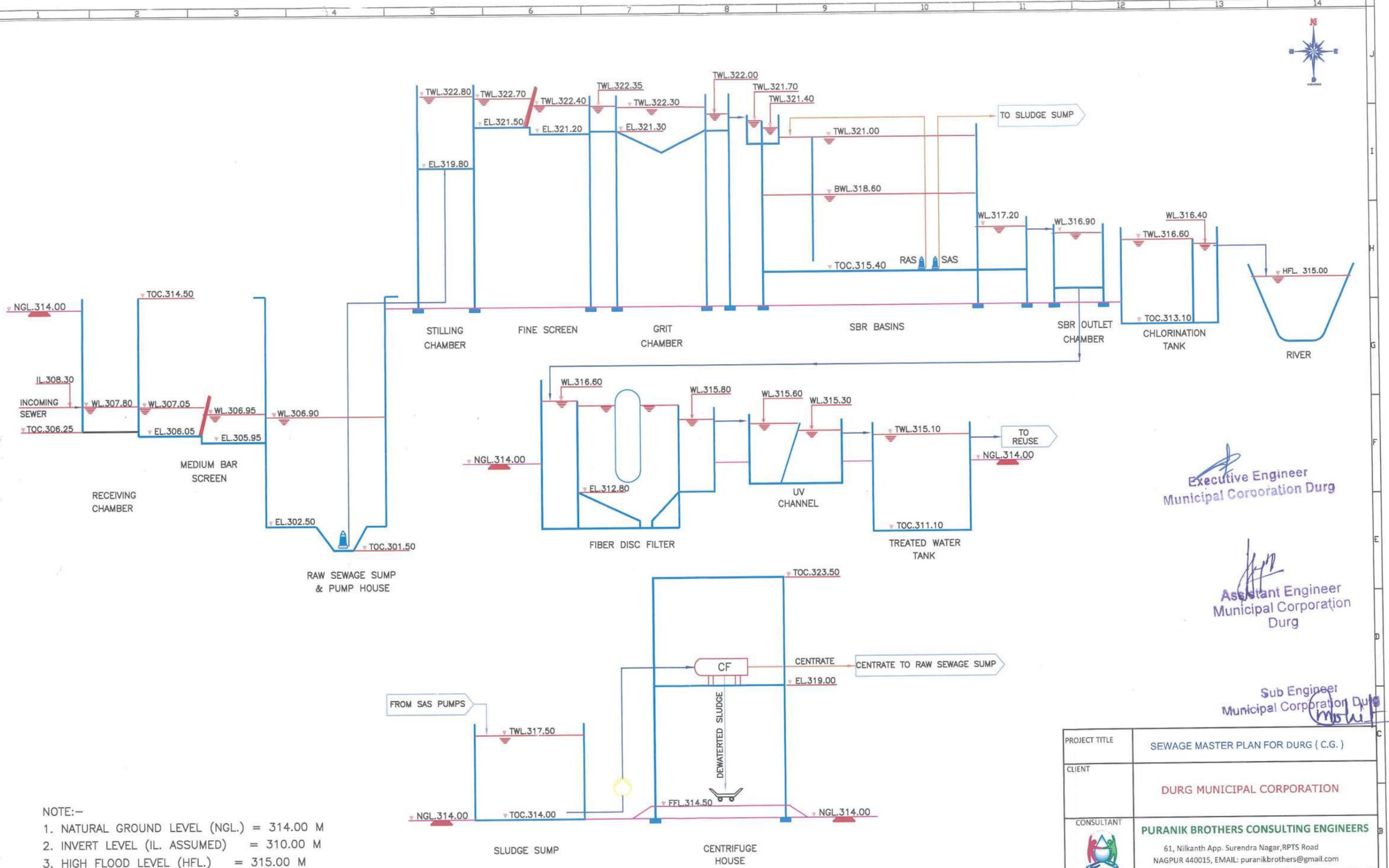


[Signature]
 Executive Engineer
 Municipal Corporation Durg

[Signature]
 Assistant Engineer
 Municipal Corporation
 Durg

[Signature]
 Sub Engineer
 Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN		
CLIENT		DURG MUNICIPAL CORPORATION		
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
DRAWN		NAME	DATE	DWG. TITLE: PUMPING STATION (WET WELL) SHANKAR NALA
DESIGNED		ABD	06,01,24	
CHECKED		NB	06,01,24	
APPROVED		RPD	06,01,24	
RELEASED FOR CONSTRUCTION				
INFORMATION		DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
SUBMISSION		DRAWING NO. PB-C74875-NBB-01-SUR-002		SIZE : A3
APPROVAL				REVISION
CONSTRUCTION				0



- NOTE:-
1. NATURAL GROUND LEVEL (NGL.) = 314.00 M
 2. INVERT LEVEL (IL. ASSUMED) = 310.00 M
 3. HIGH FLOOD LEVEL (HFL.) = 315.00 M

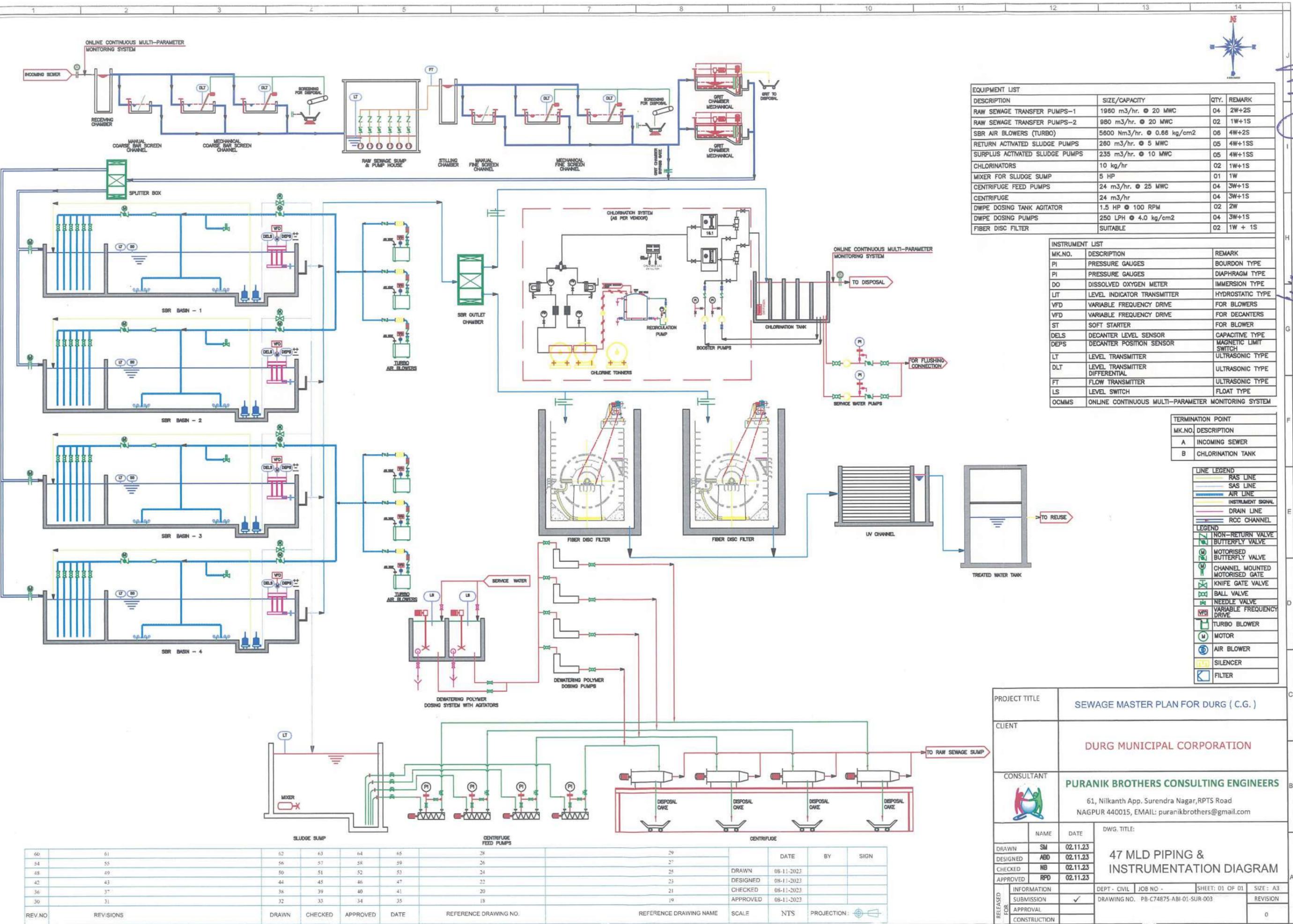
[Signature]
 Executive Engineer
 Municipal Corporation Durg

[Signature]
 Assistant Engineer
 Municipal Corporation Durg

[Signature]
 Sub Engineer
 Municipal Corporation Durg

REV.NO	REVISIONS	DRAWN	CHECKED	APPROVED	DATE	REFERENCE DRAWING NO.	REFERENCE DRAWING NAME	SCALE	1:150	PROJECTION
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26										
24										
23										
20										
18										

PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
NAME	DATE	DWG. TITLE:	
SM	02.11.23	47 MLD HYDRAULIC FLOW DIAGRAM	
ABD	02.11.23		
NB	02.11.23		
RPD	02.11.23		
INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
SUBMISSION			SIZE: A3
APPROVAL			DRAWING NO: P8-C74875-ABI-01-SUR-003
CONSTRUCTION			REVISION
			0



DESCRIPTION	SIZE/CAPACITY	QTY.	REMARK
RAW SEWAGE TRANSFER PUMPS-1	1960 m ³ /hr. @ 20 MWC	04	2W+2S
RAW SEWAGE TRANSFER PUMPS-2	980 m ³ /hr. @ 20 MWC	02	1W+1S
SBR AIR BLOWERS (TURBO)	5600 Nm ³ /hr. @ 0.66 kg/cm ²	06	4W+2S
RETURN ACTIVATED SLUDGE PUMPS	280 m ³ /hr. @ 5 MWC	05	4W+1SS
SURPLUS ACTIVATED SLUDGE PUMPS	235 m ³ /hr. @ 10 MWC	05	4W+1SS
CHLORINATORS	10 kg/hr	02	1W+1S
MIXER FOR SLUDGE SUMP	5 HP	01	1W
CENTRIFUGE FEED PUMPS	24 m ³ /hr. @ 25 MWC	04	3W+1S
CENTRIFUGE	24 m ³ /hr	04	3W+1S
DWPE DOSING TANK AGITATOR	1.5 HP @ 100 RPM	02	2W
DWPE DOSING PUMPS	250 LPH @ 4.0 kg/cm ²	04	3W+1S
FIBER DISC FILTER	SUITABLE	02	1W + 1S

MK.NO.	DESCRIPTION	REMARK
PI	PRESSURE GAUGES	BOURDON TYPE
PI	PRESSURE GAUGES	DIAPHRAGM TYPE
DO	DISSOLVED OXYGEN METER	IMMERSION TYPE
LIT	LEVEL INDICATOR TRANSMITTER	HYDROSTATIC TYPE
VFD	VARIABLE FREQUENCY DRIVE	FOR BLOWERS
VFD	VARIABLE FREQUENCY DRIVE	FOR DECANTERS
ST	SOFT STARTER	FOR BLOWER
DELS	DECANTER LEVEL SENSOR	CAPACITIVE TYPE
DEPS	DECANTER POSITION SENSOR	MAGNETIC LIMIT SWITCH
LT	LEVEL TRANSMITTER	ULTRASONIC TYPE
DLT	LEVEL TRANSMITTER DIFFERENTIAL	ULTRASONIC TYPE
FT	FLOW TRANSMITTER	ULTRASONIC TYPE
LS	LEVEL SWITCH	FLOAT TYPE
OCMS	ONLINE CONTINUOUS MULTI-PARAMETER MONITORING SYSTEM	

MK.NO.	DESCRIPTION
A	INCOMING SEWER
B	CHLORINATION TANK

LINE LEGEND	
	RAS LINE
	SAS LINE
	AIR LINE
	INSTRUMENT SIGNAL
	DRAIN LINE
	RCC CHANNEL

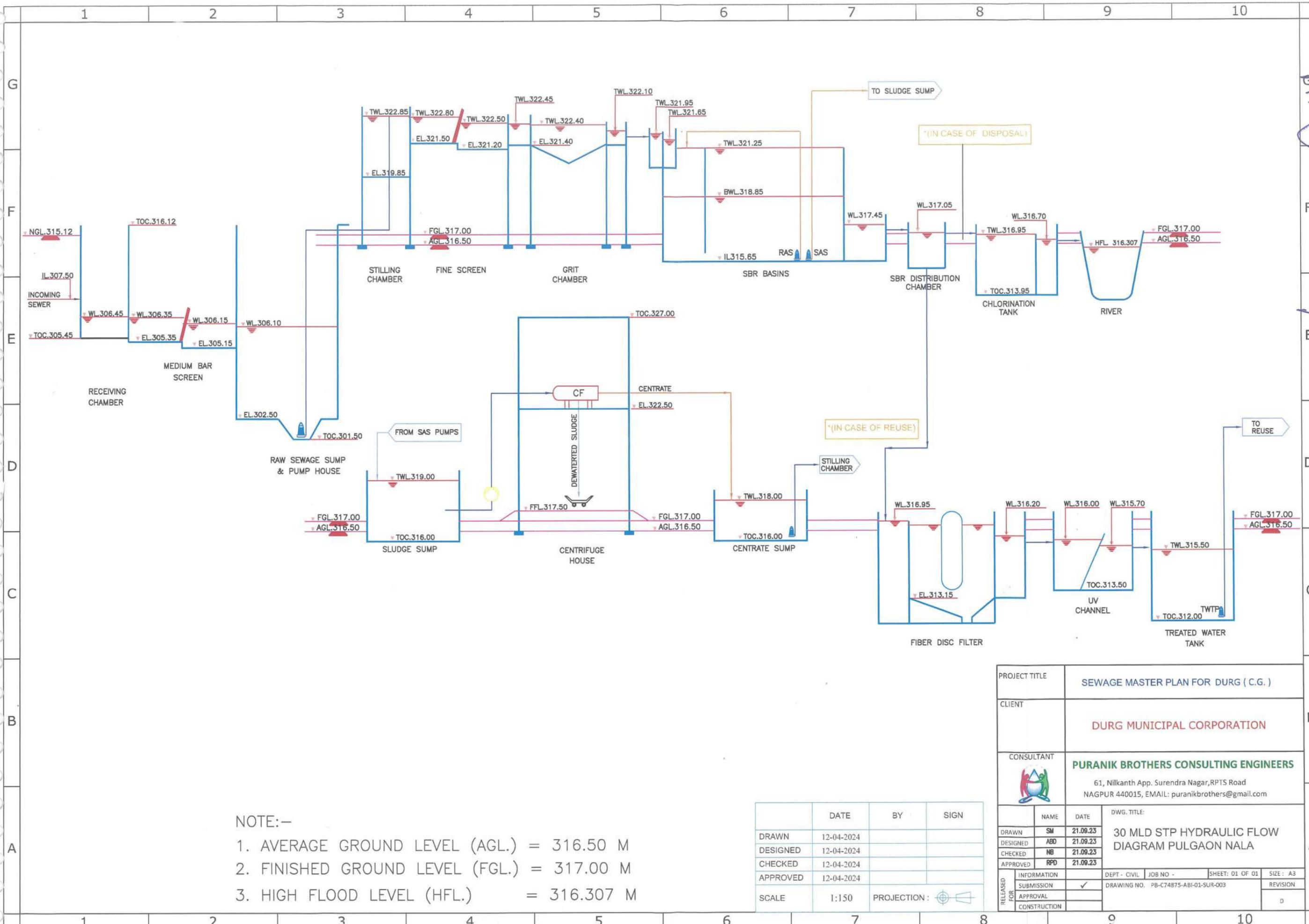
LEGEND	
	NON-RETURN VALVE
	BUTTERFLY VALVE
	MOTORIZED BUTTERFLY VALVE
	CHANNEL MOUNTED MOTORIZED GATE
	KNIFE GATE VALVE
	BALL VALVE
	NEEDLE VALVE
	VARIABLE FREQUENCY DRIVE
	TURBO BLOWER
	MOTOR
	AIR BLOWER
	SILENCER
	FILTER

PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
DRAWN	NAME	DATE	DWG. TITLE:
DESIGNED	SM	02.11.23	47 MLD PIPING & INSTRUMENTATION DIAGRAM
CHECKED	ABD	02.11.23	
APPROVED	NB	02.11.23	
APPROVED	RPD	02.11.23	
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -
	SUBMISSION		SHEET: 01 OF 01
	APPROVAL		SIZE: A3
	CONSTRUCTION		REVISION

REV. NO	REVISIONS	DRAWN	CHECKED	APPROVED	DATE	REFERENCE DRAWING NO.	REFERENCE DRAWING NAME	SCALE	NTS	PROJECTION
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48	49	50	51	52	53	24				
42	43	44	45	46	47	22				
36	37	38	39	40	41	20				
30	31	32	33	34	35	18				

DATE	BY	SIGN
08-11-2023		
08-11-2023		
08-11-2023		
08-11-2023		

Sub Engineer
 Assistant Engineer
 Executive Engineer
 Municipal Corporation, Durg



NOTE:-
 1. AVERAGE GROUND LEVEL (AGL.) = 316.50 M
 2. FINISHED GROUND LEVEL (FGL.) = 317.00 M
 3. HIGH FLOOD LEVEL (HFL.) = 316.307 M

	DATE	BY	SIGN
DRAWN	12-04-2024		
DESIGNED	12-04-2024		
CHECKED	12-04-2024		
APPROVED	12-04-2024		
SCALE	1:150	PROJECTION :	

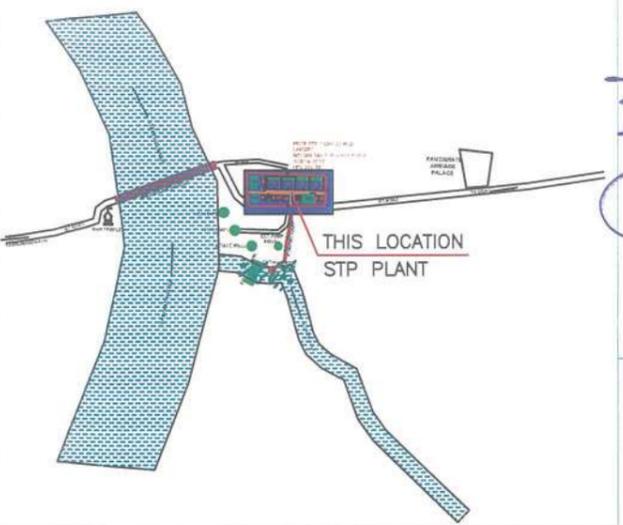
PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
INFORMATION		DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE: A3
SUBMISSION		✓	DRAWING NO. PB-C74875-ABI-01-SUR-003		REVISION
APPROVAL					
CONSTRUCTION					

Sub Engineer
 Assistant Engineer,
 Municipal Corporation
 Executive Engineer,
 Municipal Corporation

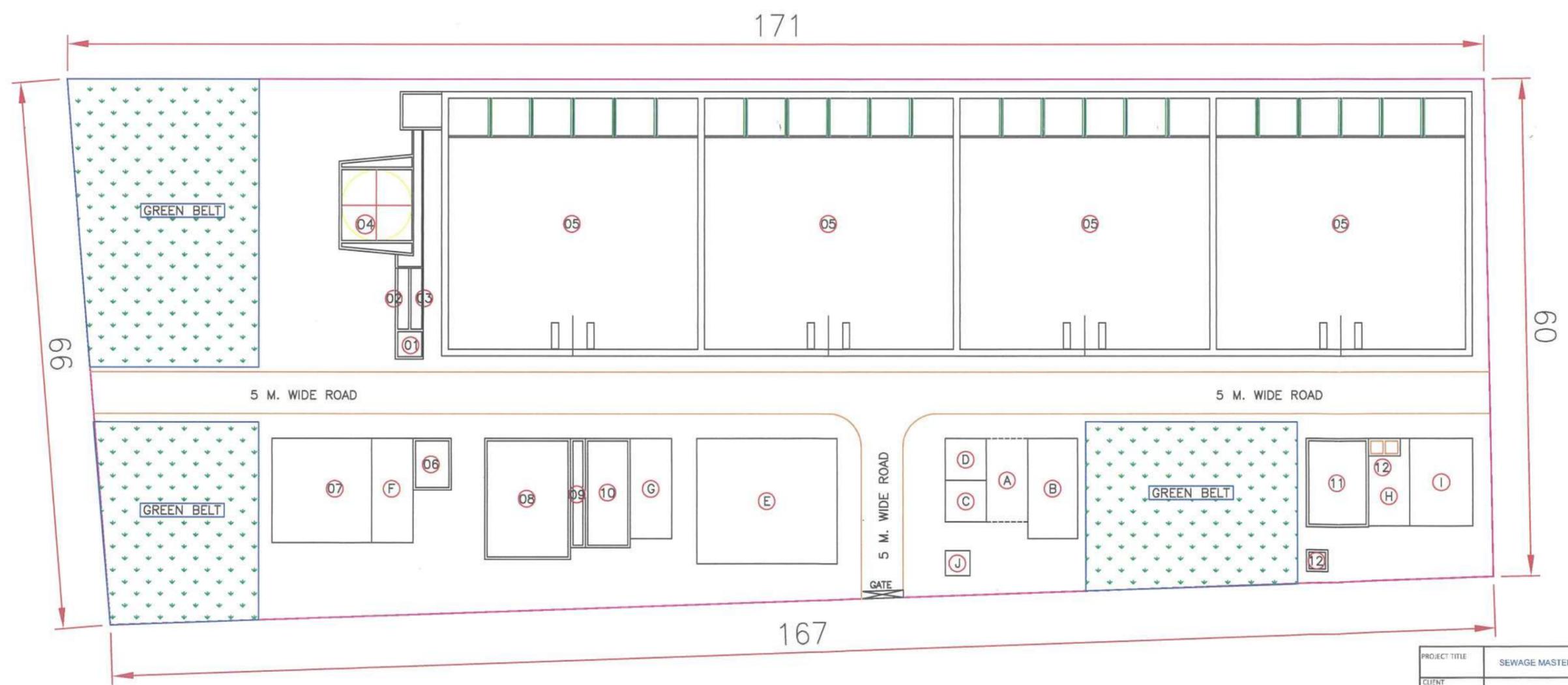


BUILDINGS				
A	TRANSFORMER YARD	10000 x 5000	01	
B	DG ROOM	12000 x 6000 x 4500 HT.	01	
C	HT PANEL ROOM	5000 x 5000 x 4500 HT.	01	
D	METERING ROOM	5000 x 5000 x 4500 HT.	01	
E	SBR AIR BLOWER & ADMIN BUILDING	17000 x 15000 x 10000 HT.	01	G+1
F	CHLORINATION CUM CHLORINE TOONER HOUSE (ABOVE CHLORINE CONTACT TANK)	12500 x 5000 x 4500 HT.	01	
G	CONTROL PANEL ROOM FOR UV & TREATED WATER TRANSFER PUMPS	12500 x 5000 x 4500 HT.	01	
H	CENTRIFUGE FEED PUMP HOUSE	10000 x 5000 x 4500 HT.	01	
I	CENTRIFUGE HOUSE	10000 x 7500 x 9500 HT.	01	G(STILT)+1
J	SECURITY CABIN	3000 x 3000 x 3000 HT.	01	

PROCESS UNIT				
SL.NO.	DESCRIPTION	SIZE/CAPACITY	QTY.	MOC.
01	STILLING CHAMBER	3000 x 2900 x 3000 SWD.	01	RCC
02	FINE SCREEN CHANNEL-MANUAL	7300 x 1300 x 1300 SWD.	01	RCC
03	FINE SCREEN CHANNEL-MECHANICAL	7300 x 1300 x 1300 SWD.	01	RCC
04	GRIT CHAMBER	8500 x 8500 x 1000 SWD.	01	RCC
05	SBR BASINS	30100 x 30100 x 5600 SWD.	04	RCC
06	DISTRIBUTION CHAMBER	SUITABLE	01	RCC
07	CHLORINATION TANK	17000 x 12500 x 3000 SWD.	01	RCC
08	FIBER DISC FILTER	13900 x 9800 x 3800 SWD.	01	RCC
09	UV SYSTEM	12000 x 1200 x 2500 SWD.	01	RCC
10	TREATED WATER TANK	12500 x 4800 x 3500 SWD.	01	RCC
11	SLUDGE SUMP	10000 x 7000 x 3000 SWD.	01	RCC
12	DWPE DOSING TANK	1500 x 1500 x 1500 SWD.	02	RCC
12	CENTRATE SUMP	2000 x 2000 x 2000 SWD.	01	RCC



NOTE :-
1) AREA REQUIRED = 1.057Ha

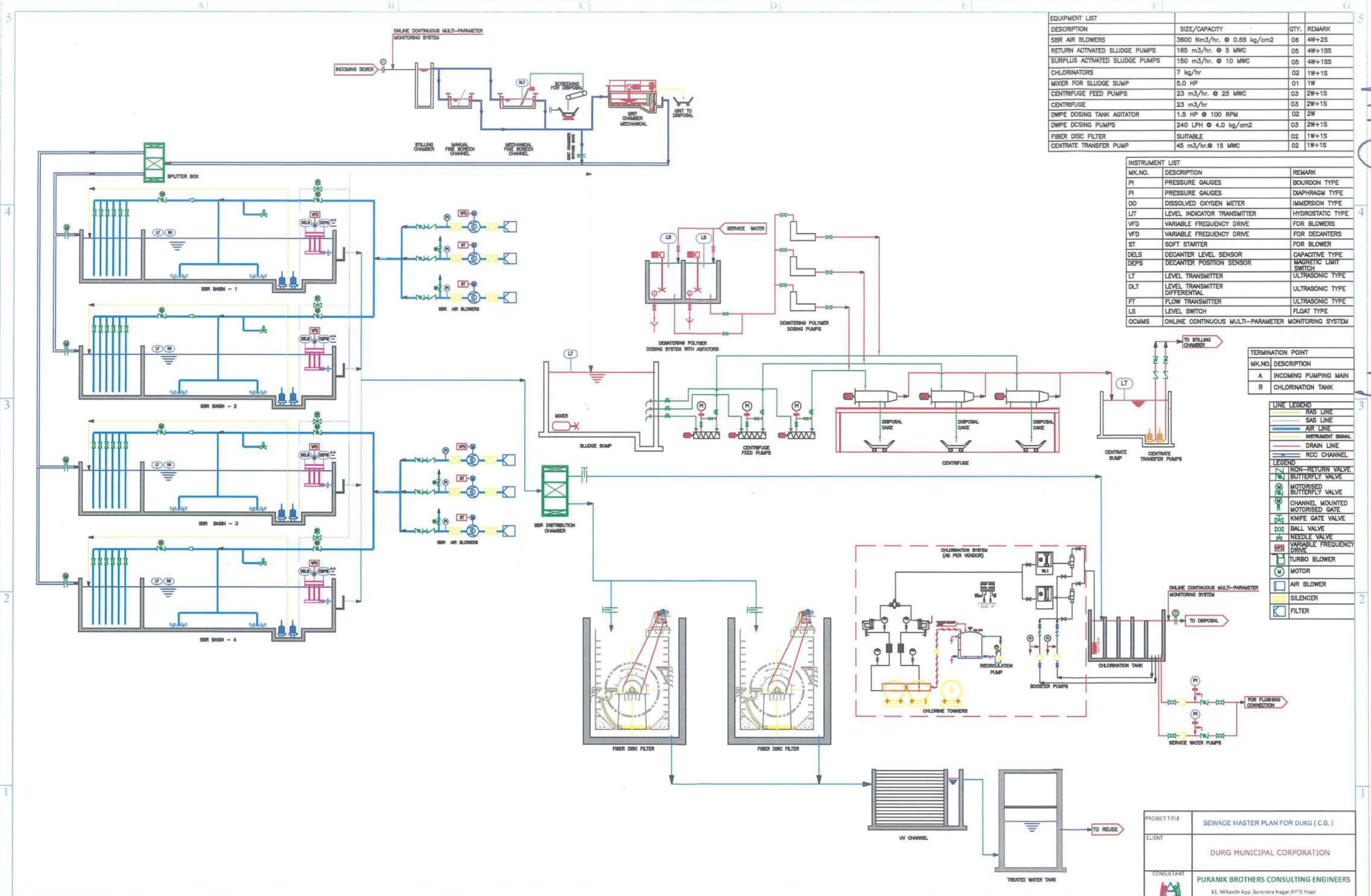


PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)		
CLIENT	DURG MUNICIPAL CORPORATION		
CONSULTANT	PURANIK BROTHERS CONSULTING ENGINEERS F1, Nilkanth App. Surendra Nagar, RPT'S Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com		
DATE	DWG. TITLE		
12.01.2024	30 MLD STP PLANT LAYOUT		
INFORMATION	DWPT - CIVIL	JOB NO. -	SHEET 03 OF 01
SUBMISSION	✓	DRAWING NO. - PB-C14875-AB-01-SUP-003	SCALE
APPROVAL			1:1
CONSTRUCTION			PROJECTION

	DATE	BY	SIGN
DRAWN	12-04-2024		
DESIGNED	12-04-2024		
CHECKED	12-04-2024		
APPROVED	12-04-2024		

REV.NO	REVISIONS	DRAWN	CHECKED	APPROVED	DATE	REFERENCE DRAWING NO	REFERENCE DRAWING NAME

Sub Engineer
 Municipal Corporation Durg
 Assistant Engineer
 Municipal Corporation
 Executive Engineer
 Municipal Corporation



DESCRIPTION	SIZE/CAPACITY	QTY.	REMARK
SBR AIR BLOWERS	3600 Nm ³ /hr. @ 0.68 kg/cm ²	06	4W+2S
RETURN ACTIVATED SLUDGE PUMPS	165 m ³ /hr. @ 5 MWC	05	4W+1SS
SURPLUS ACTIVATED SLUDGE PUMPS	150 m ³ /hr. @ 10 MWC	05	4W+1SS
CHLORINATORS	7 kg/hr	02	1W+1S
MIXER FOR SLUDGE SUMP	5.0 HP	01	1W
CENTRIFUGE FEED PUMPS	23 m ³ /hr. @ 25 MWC	03	2W+1S
CENTRIFUGE	23 m ³ /hr	03	2W+1S
DWPE DOSING TANK AGITATOR	1.5 HP @ 100 RPM	02	2W
DWPE DOSING PUMPS	240 LPH @ 4.0 kg/cm ²	03	2W+1S
FIBER DISC FILTER	SUITABLE	02	1W+1S
CENTRATE TRANSFER PUMP	45 m ³ /hr. @ 15 MWC	02	1W+1S

MK.NO.	DESCRIPTION	REMARK
PI	PRESSURE GAUGES	BOURDON TYPE
PI	PRESSURE GAUGES	DIAPHRAGM TYPE
DO	DISSOLVED OXYGEN METER	IMMERSION TYPE
LIT	LEVEL INDICATOR TRANSMITTER	HYDROSTATIC TYPE
VFD	VARIABLE FREQUENCY DRIVE	FOR BLOWERS
VFD	VARIABLE FREQUENCY DRIVE	FOR DECANTERS
ST	SOFT STARTER	FOR BLOWER
DELS	DECANTER LEVEL SENSOR	CAPACITIVE TYPE
DEPS	DECANTER POSITION SENSOR	MAGNETIC LIMIT SWITCH
LT	LEVEL TRANSMITTER	ULTRASONIC TYPE
DLT	LEVEL TRANSMITTER DIFFERENTIAL	ULTRASONIC TYPE
FT	FLOW TRANSMITTER	ULTRASONIC TYPE
LS	LEVEL SWITCH	FLOAT TYPE
OCMMS	ONLINE CONTINUOUS MULTI-PARAMETER MONITORING SYSTEM	

MK.NO.	DESCRIPTION
A	INCOMING PUMPING MAIN
B	CHLORINATION TANK

LINE LEGEND	
	RAS LINE
	SAS LINE
	AIR LINE
	INSTRUMENT SIGNAL
	DRAIN LINE
	RCC CHANNEL

LEGEND	
	NON-RETURN VALVE
	BUTTERFLY VALVE
	MOTORISED BUTTERFLY VALVE
	CHANNEL MOUNTED MOTORISED GATE
	KNIFE GATE VALVE
	BALL VALVE
	NEEDLE VALVE
	VARIABLE FREQUENCY DRIVE
	TURBO BLOWER
	MOTOR
	AIR BLOWER
	SILENCER
	FILTER

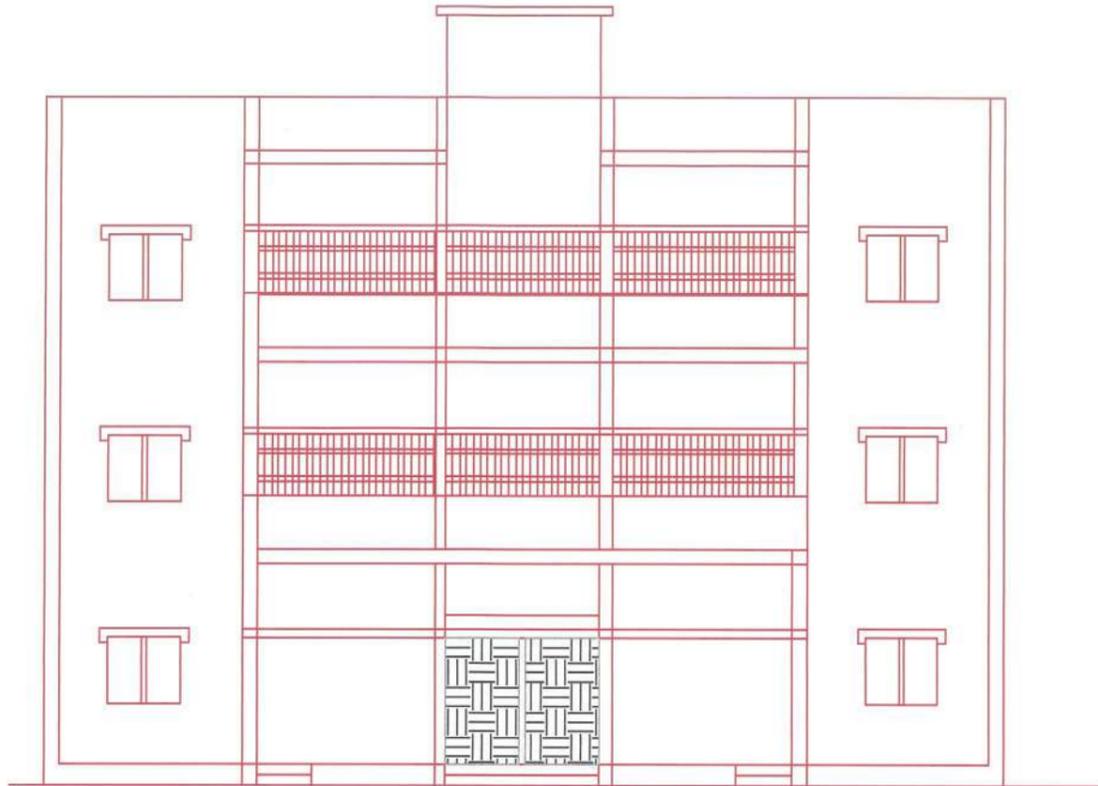
PROJECT TITLE	SEWAGE MASTER PLAN FOR DURG (C.G.)
CLIENT	DURG MUNICIPAL CORPORATION
CONSULTANT	PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RP15 Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com
DATE	12-04-2024
BY	
SIGN	
DRAWN	12-04-2024
DESIGNED	12-04-2024
CHECKED	12-04-2024
APPROVED	12-04-2024
SCALE	NTS
PROJECTION	

REV. NO.	REVISIONS	DRAWN	CHECKED	APPROVED	DATE	REFERENCE DRAWING NO.	REFERENCE DRAWING NAME

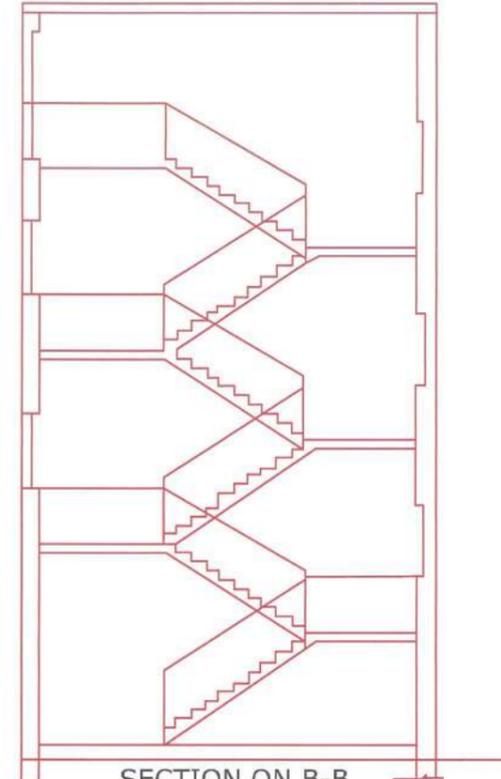
Sub Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation Durg

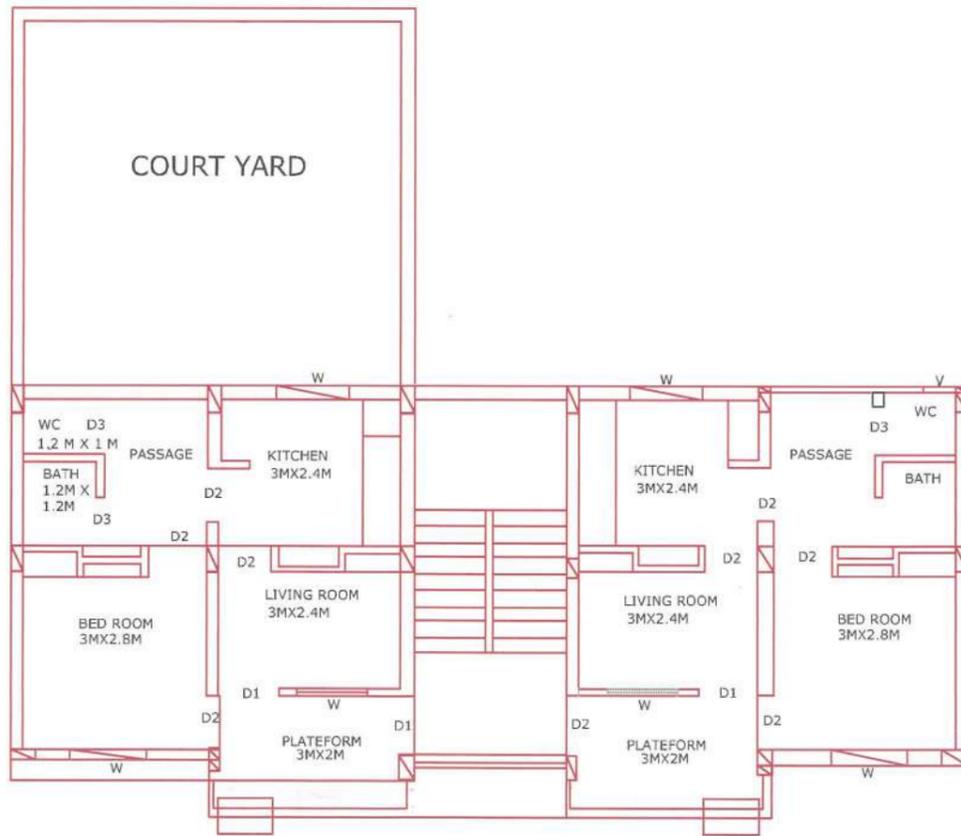
Executive Engineer
Municipal Corporation Durg



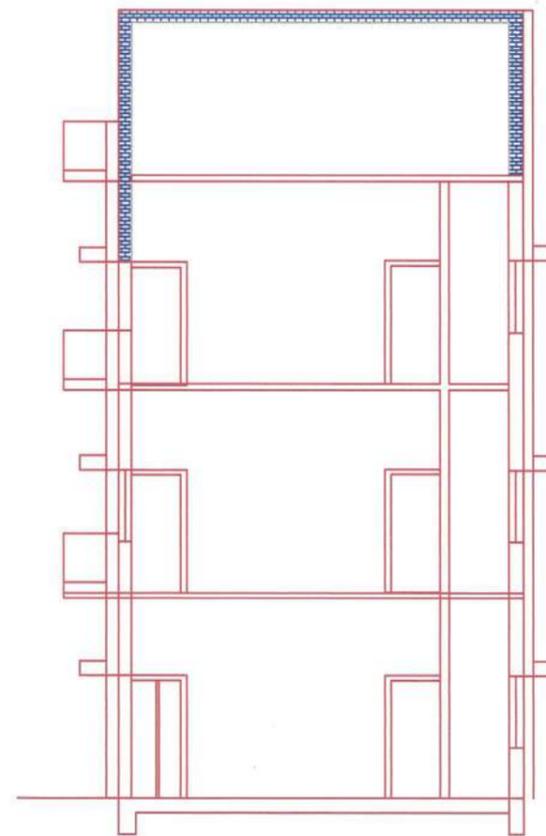
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SECTION ON B-B



GROUND FLOOR PLAN



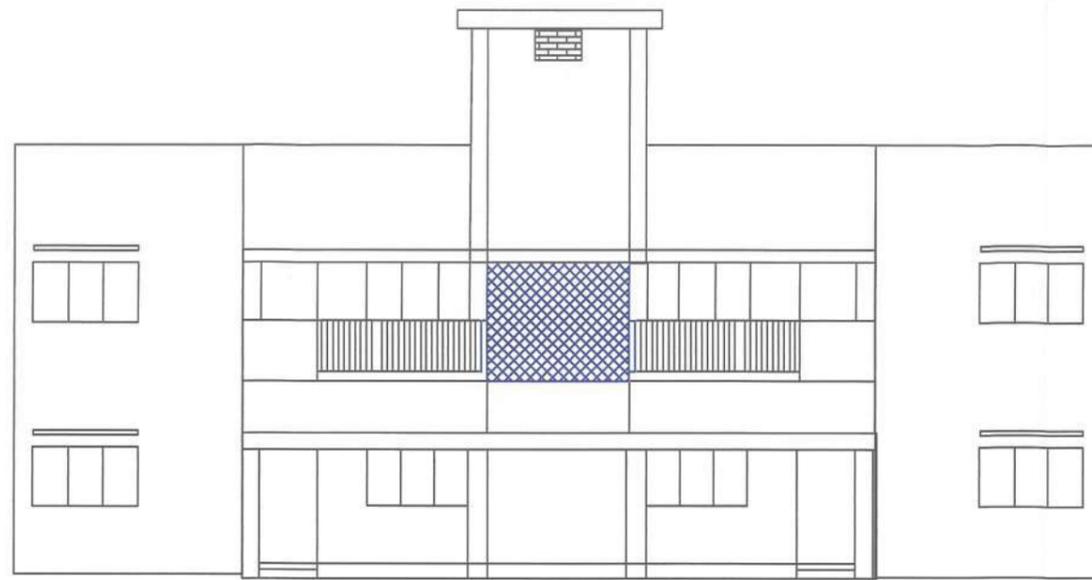
SECTION ON A-A

Executive Engineer
Municipal Corporation Durg

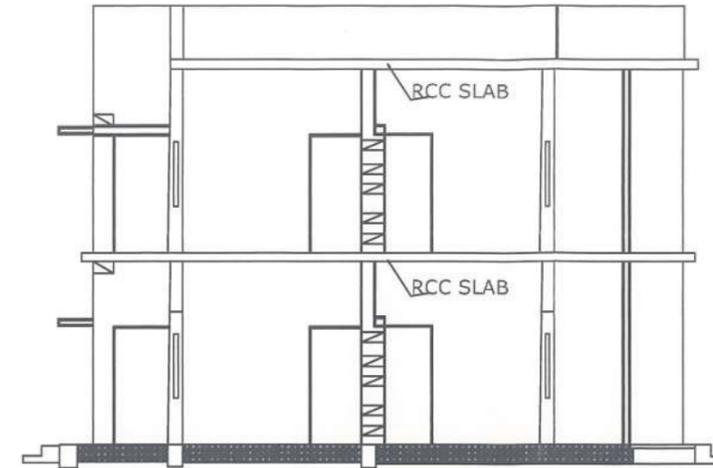
Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

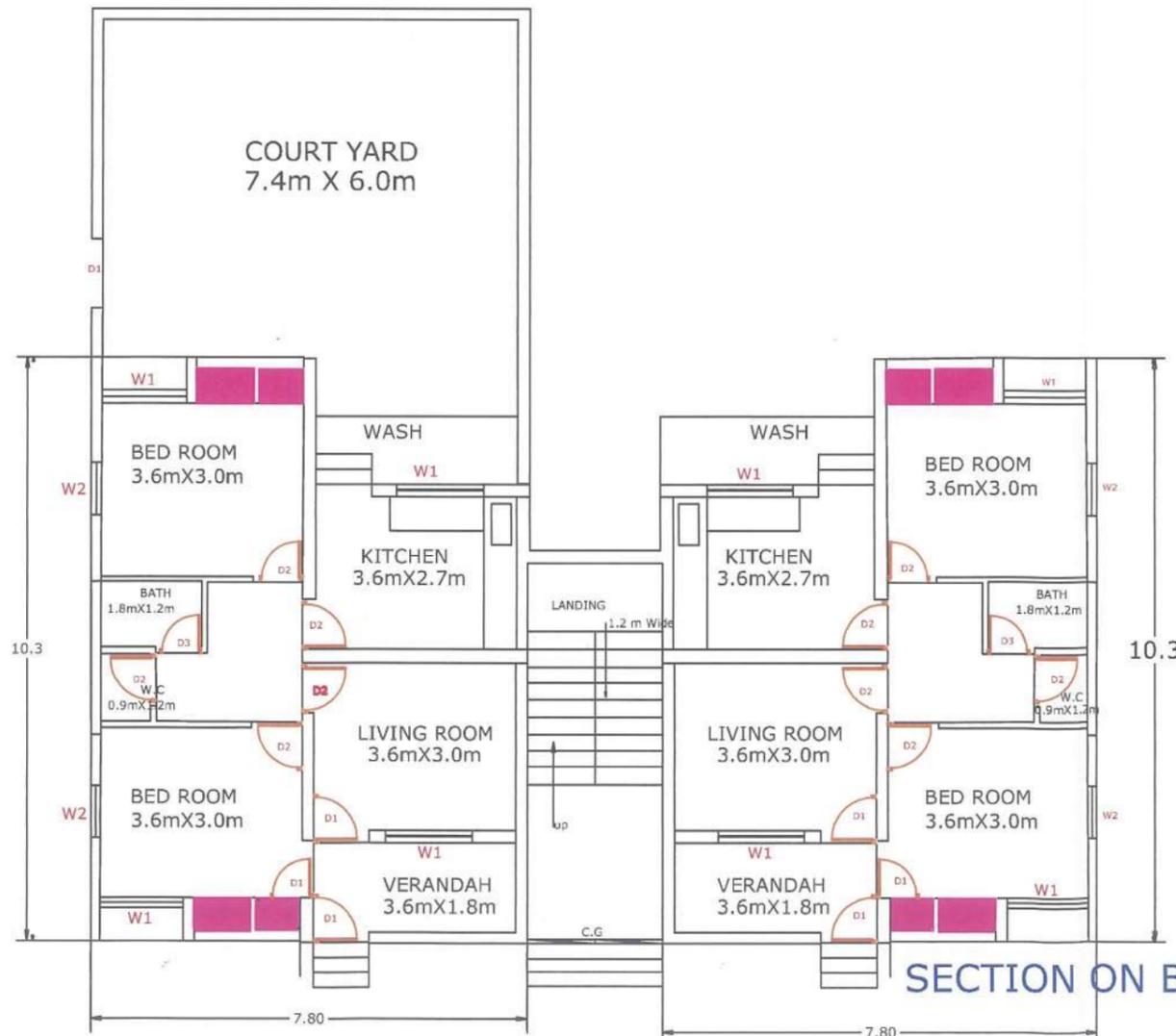
PROJECT TITLE		SEWAGE MASTER PLAN FOR Corporation Durg			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
		NAME		DATE	
		DRAWN		DATE	
		DESIGNED		DATE	
		CHECKED		DATE	
		APPROVED		DATE	
		DWG. TITLE:			
		H TYPE QUARTER			
RELEASED FOR	INFORMATION	DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01	SIZE: A3
	SUBMISSION	✓	DRAWING NO. PB-C74875-ABI-01-SUR-003	REVISION	
	APPROVAL				
	CONSTRUCTION				



FRONT ELEVATION



SECTION OF A-A



G TYPE QUARTER

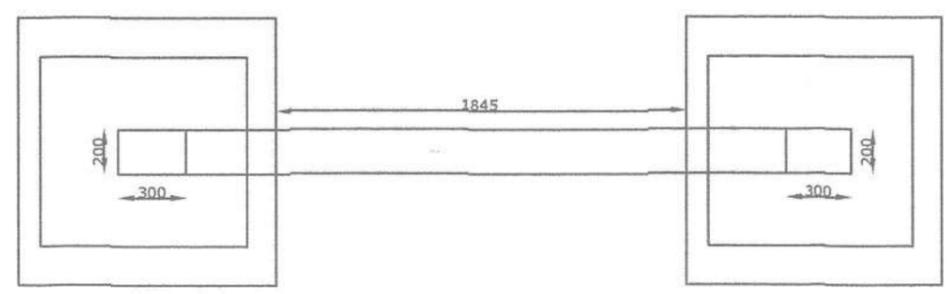
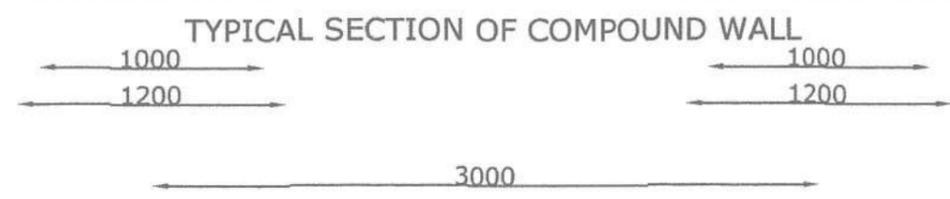
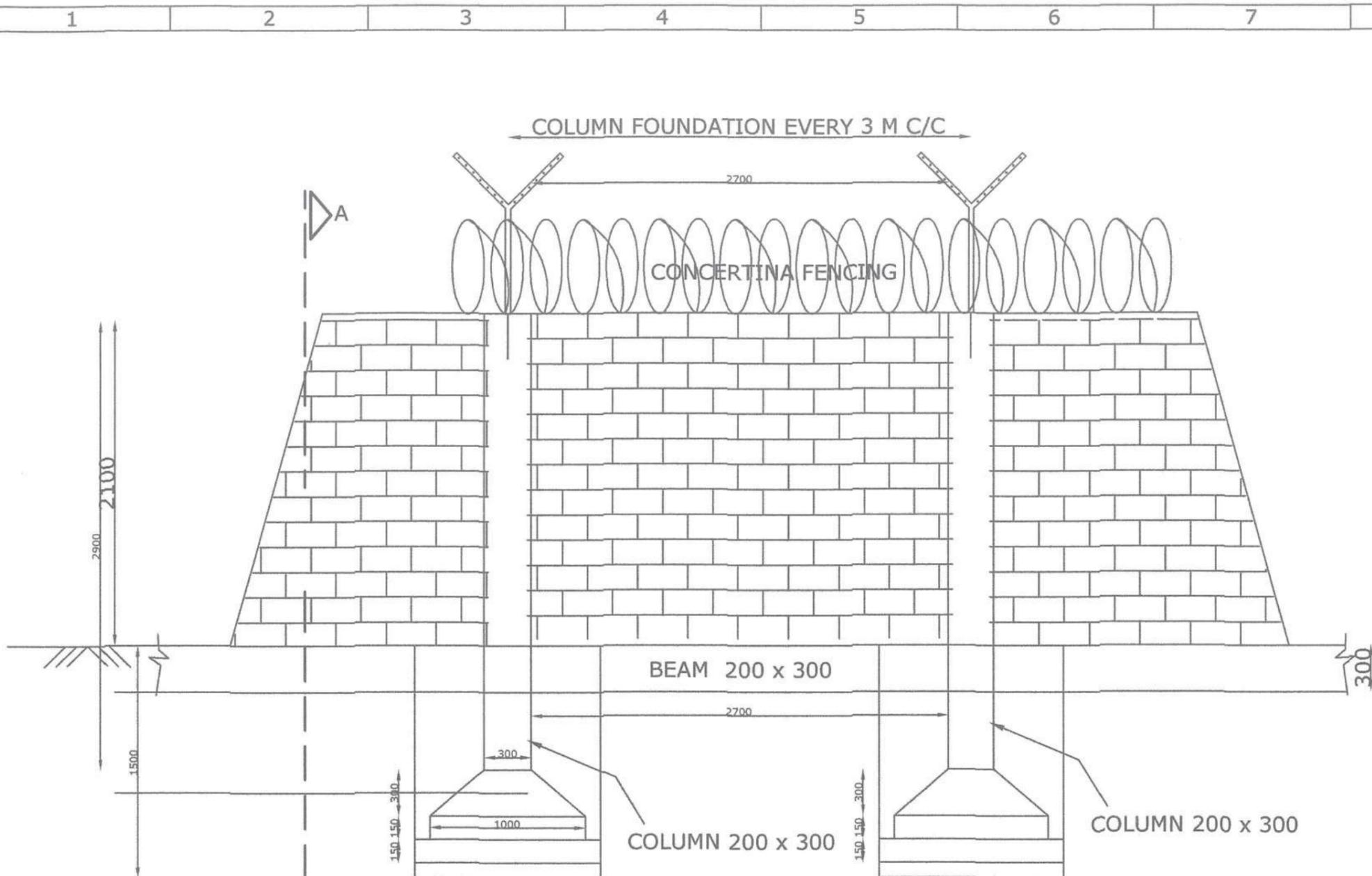
SECTION ON B-B

Executive Engineer
Municipal Corporation Durg

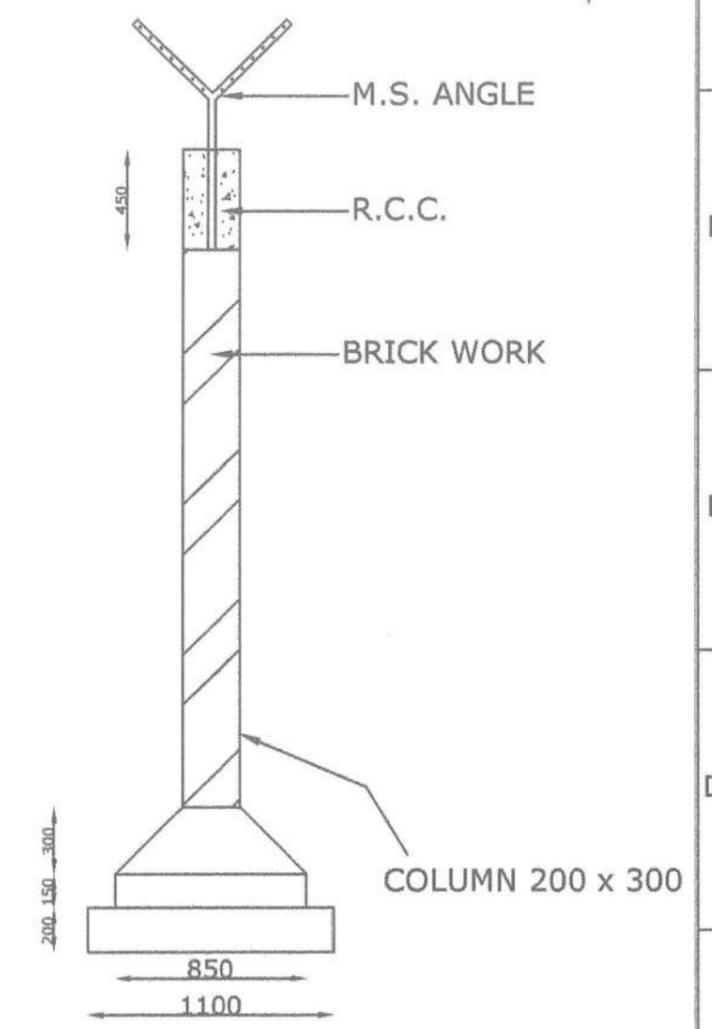
Assistant Engineer
Municipal Corporation
Durg

Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		SEWAGE MASTER PLAN FOR DURG (C.G.)			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		 PURANIK BROTHERS CONSULTING ENGINEERS 61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
		NAME	DATE	DWG. TITLE:	
DRAWN		SM	02.11.23	G TYPE QUARTER	
DESIGNED		ABD	02.11.23		
CHECKED		NB	02.11.23		
APPROVED		RPD	02.11.23		
RELEASED FOR	INFORMATION			DEPT - CIVIL	JOB NO -
	SUBMISSION	✓		SHEET: 01 OF 01	SIZE : A3
	APPROVAL			DRAWING NO. PB-C74875-ABI-01-SUR-003	REVISION
	CONSTRUCTION				0



COMPOUND WALL PLAN



SECTION AT A - A

Executive Engineer
Municipal Corporation Durg

Assistant Engineer
Municipal Corporation Durg

Sub Engineer
Municipal Corporation Durg

PROJECT TITLE		DURG SEWERAGE MASTER PLAN			
CLIENT		DURG MUNICIPAL CORPORATION			
CONSULTANT		PURANIK BROTHERS CONSULTING ENGINEERS			
		61, Nilkanth App. Surendra Nagar, RPTS Road NAGPUR 440015, EMAIL: puranikbrothers@gmail.com			
	NAME	DATE	DWG. TITLE:		
DRAWN	SM	23,05,24	COMPOUND WALL		
DESIGNED	ABD	23,05,24			
CHECKED	NB	23,05,24			
APPROVED	RPD	23,05,24			
RELEASED FOR	INFORMATION		DEPT - CIVIL	JOB NO -	SHEET: 01 OF 01
	SUBMISSION	✓	DRAWING NO. PB-C74875-NBB-01-SUR-002		SIZE: A3
	APPROVAL				REVISION
	CONSTRUCTION				0

DISTRICT WATER AND SANITATION MISSION



Har Ghar Jal
Jal Jeevan Mission

सहित



JEORA -SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

FOR 17 VILLAGES

(Head Works)

BLOCK : DURG

DISTRICT : DURG

Cost of The Project
Rs. 2580.95 Lakhs

Executive Engineer & Member Secretary DWSM
DURG (C.G.)

JEVRA-SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

BLOCK : DURG

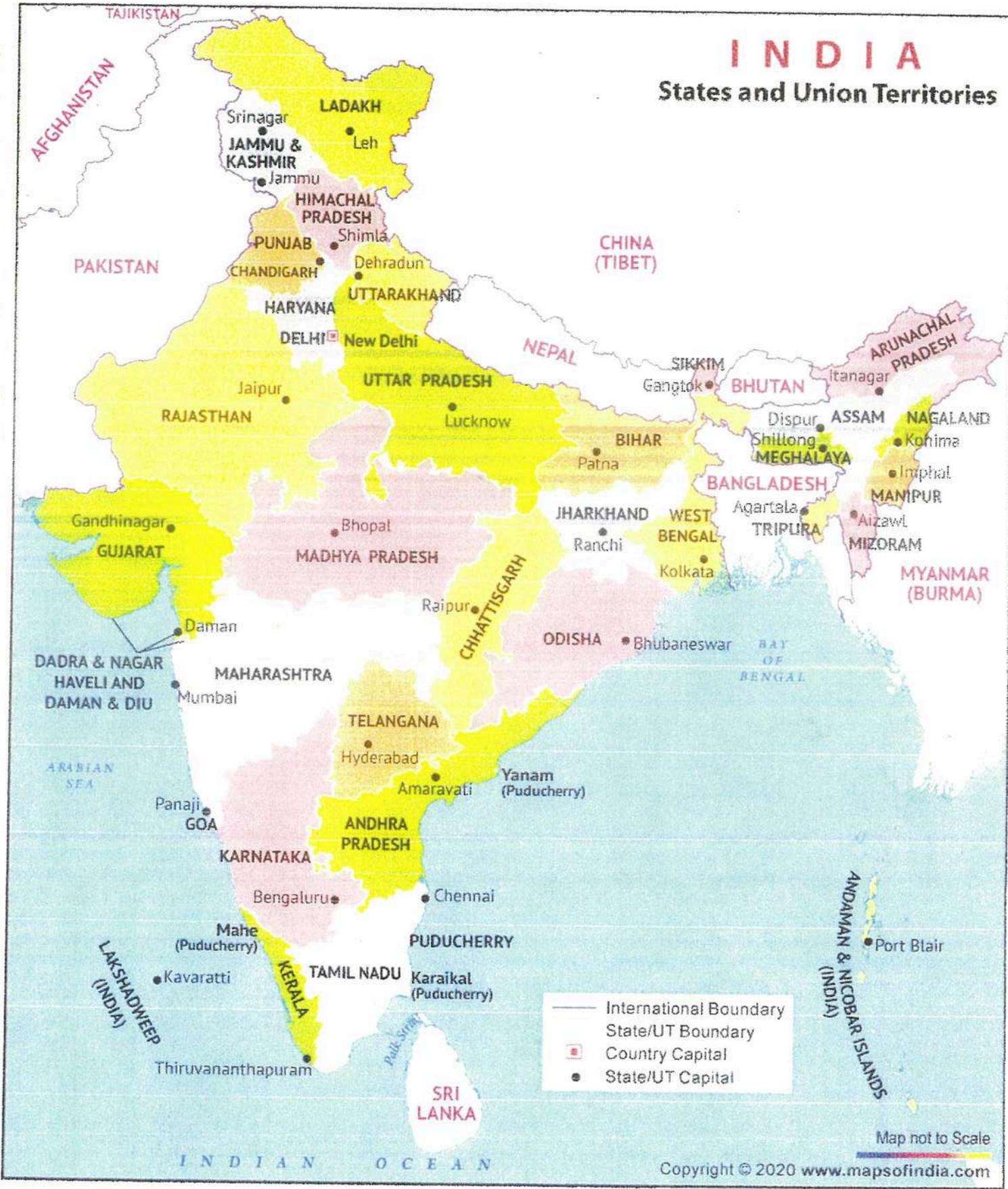
DISTRICT: DURG

INDEX

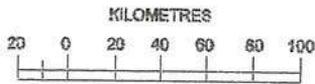
Sr. No.	Description	Page	
		From	To
1	Graphics		
2	Executive Summery	1	2
3	Project at a Glance	3	4
4	Technical Report	5	22
5	Designs	23	58
6	General Abstract	59	60
7	Estimates	61	87
8	Cost of Water	88	88
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10	Financing Pattern	90	90

INDIA

States and Union Territories



**CHHATTISGARH
ADMINISTRATIVE DIVISIONS 2011**



DBD - (Dakshin Bastar Dantewada)
 USBK - Uttar Bastar Kenker
 Ku - Kurud (Chormudya) District Dhamtari

E - BASTAR

BOUNDARIES:

- STATE.....
- DISTRICT.....
- TAHSIL.....

HEADQUARTERS:

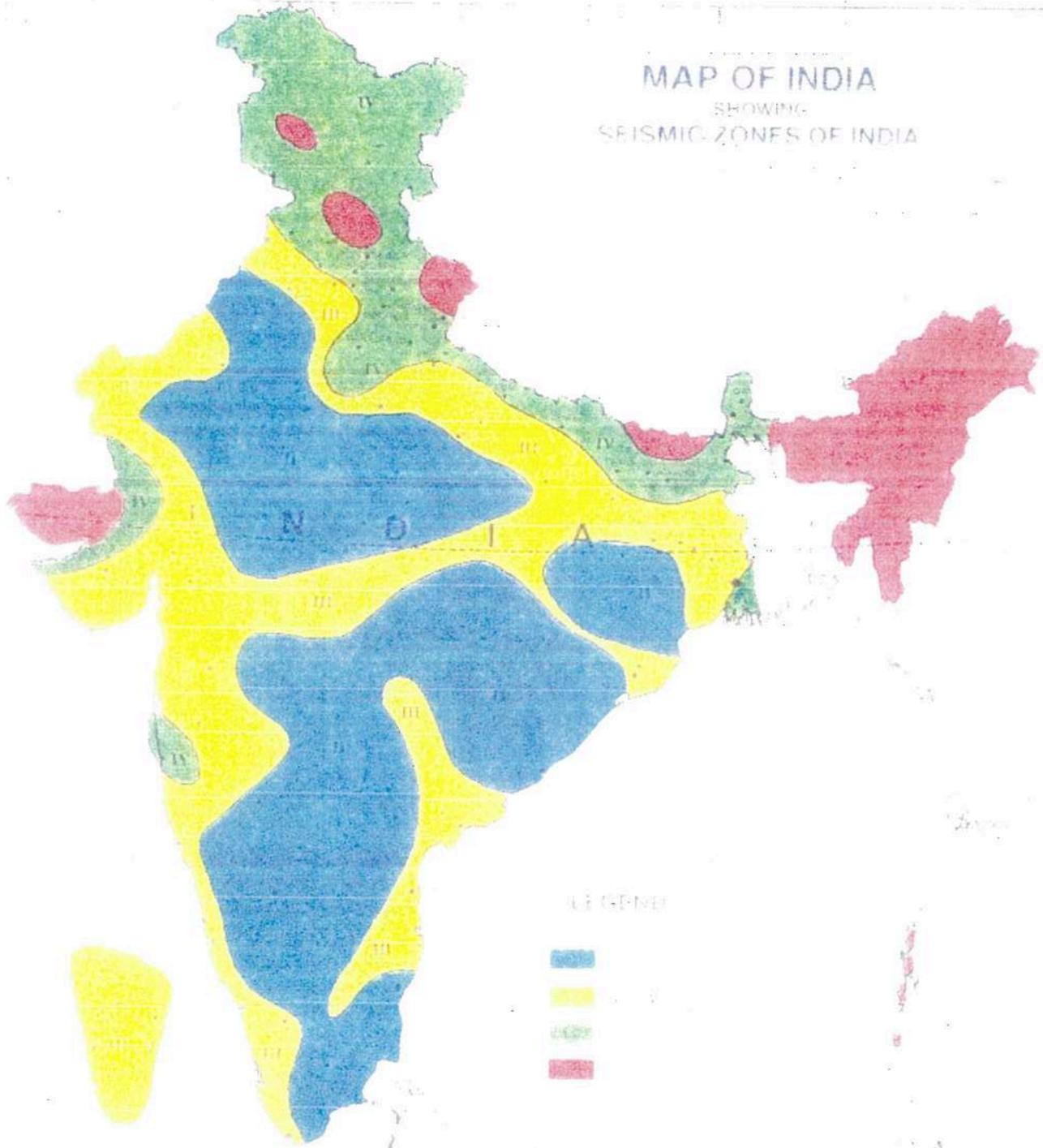
- STATE.....★
- DISTRICT.....●
- TAHSIL.....●

District headquarters are also Tahsil headquarters.

Where the district/tahsil name differs from its headquarters name, the letter is given within brackets.



MAP OF INDIA SHOWING SEISMIC ZONES OF INDIA

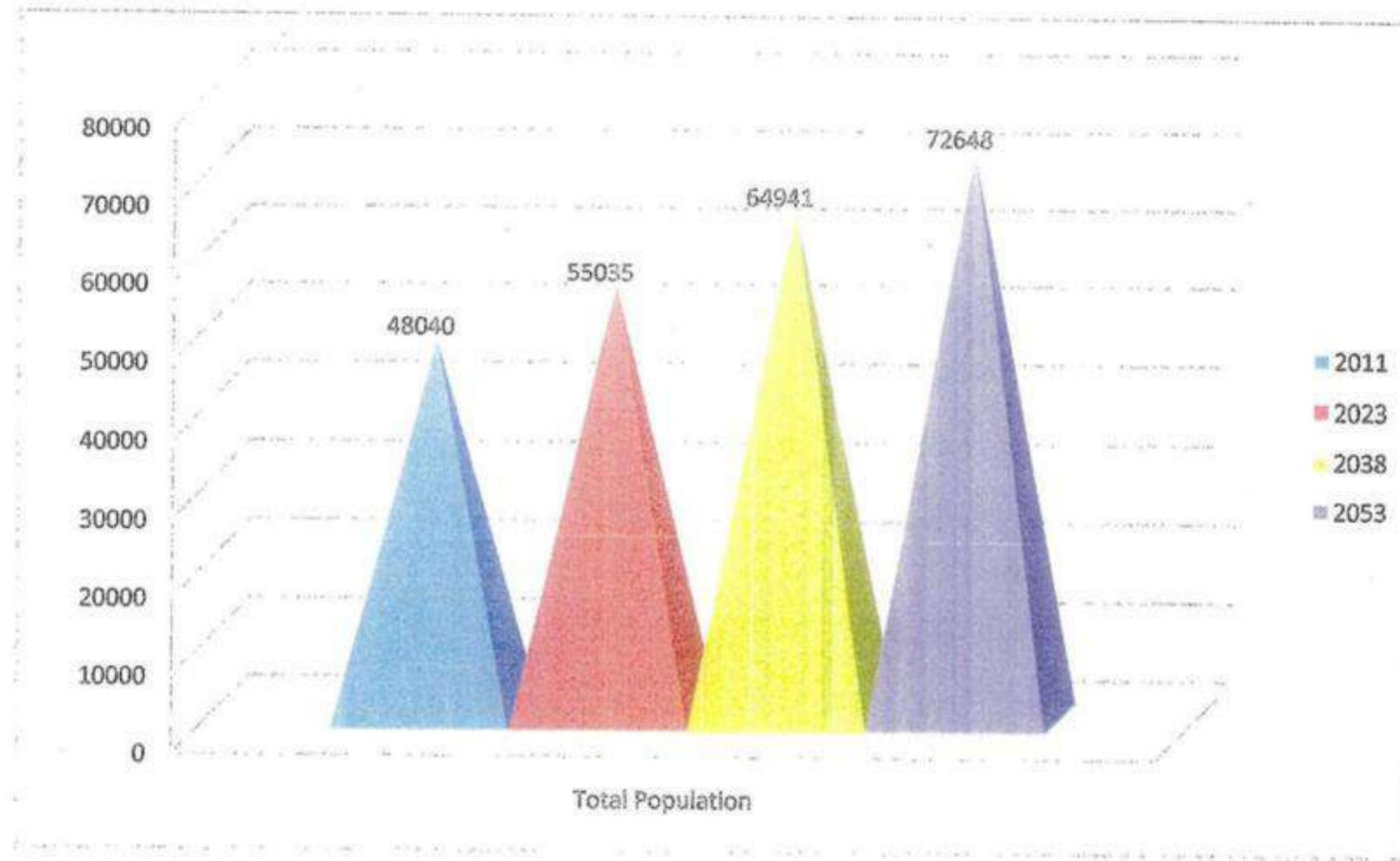


JEORA-SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

BLOCK : DURG

DISTRICT: DURG

Population Forcast (Total & Zonewise)

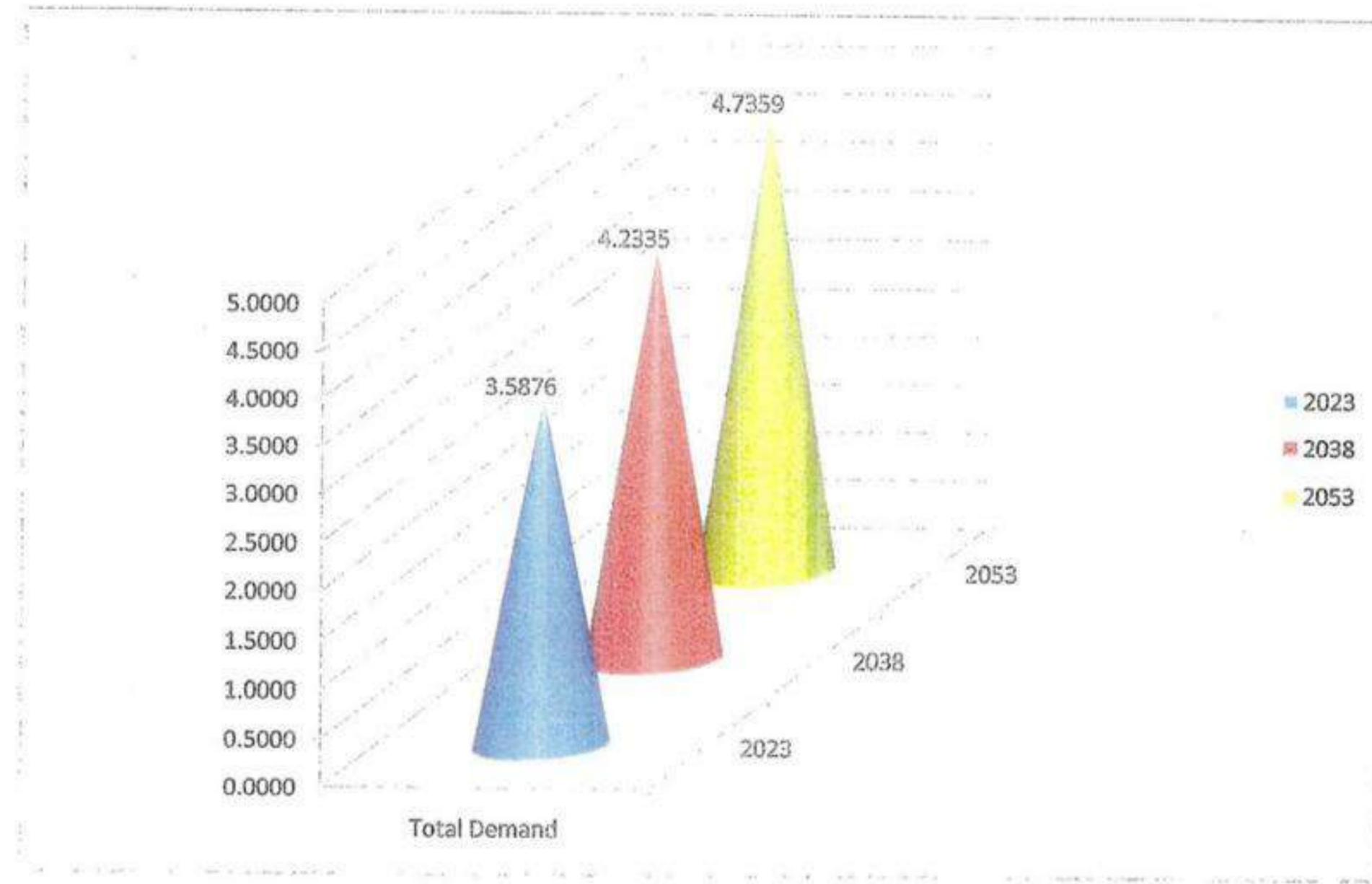


JEORA-SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

BLOCK : DURG

DISTRICT: DURG

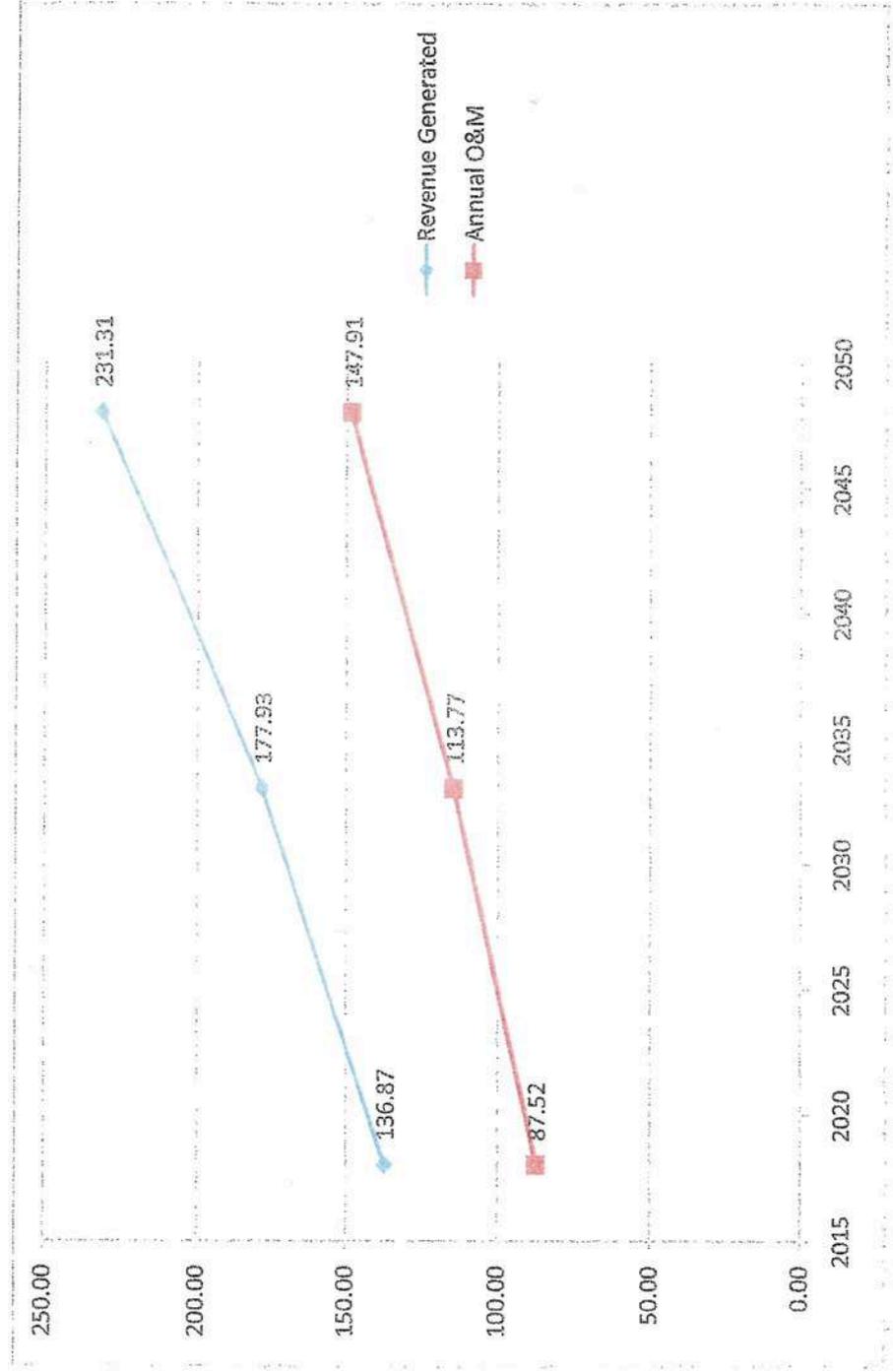
Water Demand (Total & Zonewise)



JEORA-SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

BLOCK : DURG DISTRICT: DURG

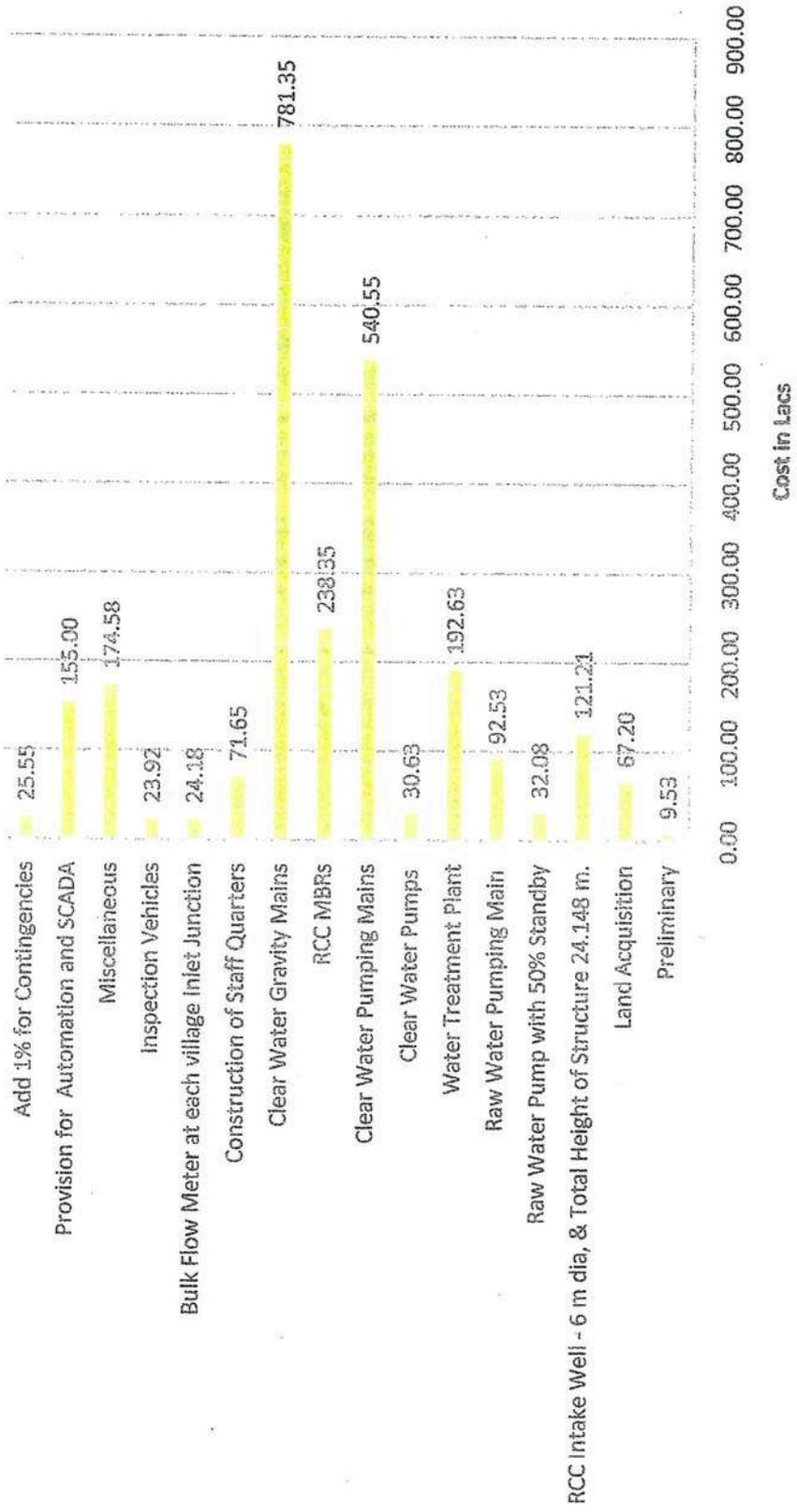
Revenue Generated V/s Annual O & M



JEORA-SIRSA(KHURD)-BHATGAON GROUP WATER SUPPLY SCHEME

BLOCK : DURG DISTRICT: DURG

Componentwise Cost of Estimates



JEORA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

EXECUTIVE SUMMARY

A piped water supply scheme for 17 villages providing adequate quantity of safe drinking water to JEORA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME (Total 17 Villages) of Patan block in Durg district amounting to Rs. 2580.95 lakhs. (Rupees Twenty Five Crore Eighty Lakh Ninety Five Thousand Only) has been enlisted in the State Budget 2019-20 by Government of Chhattisgarh.

Villages in the scheme are of Durg district. Distance from district headquarter Durg is ranging from 25-45 Km.

As per 2011 Census, consolidated population of Scheme was 103075. At present, the habitants are not getting drinking water as specified by MoDWS. Hence, to cater to the specified water demand @ 55 LPCD (including losses 65.19 lpcd) as per MoDWS norms to the entire population of the village, the detailed project report is prepared with the requisite components.

The design period adopted for the proposed GWSS is 30 years as per norms and different components have been designed accordingly.

As per provisions in Manual for preparation of DPR for rural piped water supply scheme on water supply and Treatment, the projected population has been anticipated for the year 2023 i.e on completion of Scheme is 55035 after 15 years in the year 2038 population will be 64941 and after 30 years i.e. in the year 2053 population will be 72648. Ultimate water demand has been worked out to be 4.7359 MLD. Existing anicut Near Village Sirsa Khurd on Shivnath River is considered as Surface Source for the Scheme Water quality of raw water has been tested and found satisfactory for use after treatment for proposed GWSS. Source is adequate to meet ultimate years water demand for source sustainability. Availability of water is confirmed by Executive Engineer, WRD vide letter no. 4858/Tech/2019. Dated 04/09/19.

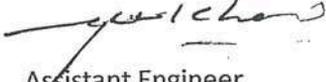
Pumping is proposed for 20 hours which is the average duration of the power supply available in the village. One MBR is proposed at WTP location, The Storage capacity of MBR is calculated for 2 Hours. The storage of water is proposed through Existing & Proposed RCC reservoirs considering 50% storage of total designed demand based on 30 years of design period. The same has been designed to provide sufficient drinking water during the peak demand period and staging has been calculated in hydraulic design assuring a minimum residual head of 7 M at every node to be provided.

Components of proposed GWSS viz brick masonry pump house, overhead service reservoir, pumping main and distribution feeder mains have been designed to cater the ultimate designed population of the village for the next 30 years i.e. 632825. Whereas the pumping sets have been designed to fulfill the water requirement of the village for the next 15 years i.e. for 2038. In the IInd phase of project which will start from 2053, the construction of additional elevated tanks shall be done to meet out the increased demand.

The detailed estimates are prepared as per the PHED, Govt. of Chhattisgarh, latest SOR issued on 1st June 2020. For estimation of building works, latest SOR issued by CG PWD issued on dated upto date Amendments has been followed whereas estimates of some components has been prepared on prevailing market rate or anticipated demand basis.

Need for capacity building of Village of Water and Sanitation Committee (VWSC) to undergo subsequent operation & maintenance of the proposed scheme has been studied and provision has been made in the estimates for IEC requirements of such capacity building of VWSC member for sustainability of scheme. Financial details including capital cost, recovery cost/tariff, income & expenditure statement during operation & maintenance phase has been prepared with potential expenditures and submitted in annexures.

Hence it is investigated that after completion, from Head Works to OHT of respective villages of the scheme shall be operated and maintained by the PHE and OHT to Distribution shall be operated and maintained by the the VWSC/Gram Panchayat. 100% Population will be served by house connections which would generate enough revenue to meet operation and maintenance expenses for VWSC/Gram Panchayat to sustain the O&M work undertaken. The detailed designs for pumps, pumping mains, distribution network are appended in the report.


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

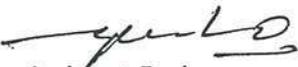
(Total 17 Villages)

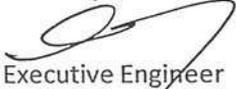
Block : Durg District : Durg

Salient Features of the Project

No.	Description	Details
1	Name of Scheme	JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME
2	Block	Durg
3	District	Durg
4	No. of Village(s) / Habitation(s) under proposed scheme (Enclose Drawing)	17 Nos.
5	Latitude/Longitude of proposed village(s)/ Habitation(s)	
	Left Top Corner - Latitude, Longitude	21°21'42.54"N, 81°15'25.29"E
	Right Bottom Corner - Latitude, Longitude	21°13'12.59"N, 81°23'35.46"E
6	Population of proposed village(s)/ Habitation(s)/ No of Households 2011	
	i. Population	48040
	ii. No. of household	9608
7	Scheme Execution Period	3 Years.
9	Design village(s)/Population / Habitation(s)/ No of Households on expected date of commissioning. Year 2023	
	i. Population	55035
	ii. No. of Households	11007
10	Design village(s)/population / Habitation(s)/ No of Households after 15 years i.e. 2038	
	i. Population	64941
	ii. No. of Households	12988
11	Design village(s)/ population / Habitation(s)/ No of Households after 30 years Year i.e. 2053	
	i. Population	72648
	ii. No. of Households	14530
12	Total Water Demand for all purposes for village/s	
	i. Immediately after completion (MLD) - 2023	3.5876 MLD
	ii. After 15 years(MLD) - 2038	4.2335 MLD
	iii. After 30 years(MLD) - 2053	4.7359 MLD
13	Pipe Water Supply Scheme	Piped Water Supply Scheme
	Pumping Hours	20 Hours.
	Ground Water / Surface Water	Existing anicut Near Village Sirsa Khurd on Shivnath River is considered as Surface Source for the Scheme
14	Intake Structure	RCC Intake Well - 6 m dia, & Total Height of Structure 24.148 m.
15	Raw Water Pumping Machinery	Raw Water Pump with 50% Standby 16 HP V.T. Pump, Having Discharge 114841.035 LPH With a Head 25 m. with 50% standby
16	Raw Water Pumping Mains	300 mm Dia. DI K-9 Pipes From Intake to WTP Total Length 2184 m.
17	Capacity of Water Treatment Plant	4.5 MLD
18	Clear Water Pumping Machinery	11 HP Centrifugal Pump, Having Discharge 105837.5 LPH With a Head 0.75 m. with 50% Standby
19	Clear Water Pumping Mains	From Clear Water Sump to MBR's 350 mm-250mm Dia DI K-9 Pipes Total Length = 12145 m.

No.	Description	Details			
20	RCC MBR's	MBR-1 of Storage Capacity 230 KL having staging Height 30 MBR-2 of Storage Capacity 255 KL having staging Height 30			
21	Gravity Mains	Clear Water Gravity mains from MBR to OHT's of Total Length 31760 m.			
		Diameter (mm)		Length in M	
		100 mm Dia. D.I. K-7 pipes		12249 m.	
		150 mm Dia. D.I. K-7 pipes		9384 m.	
		200 mm Dia. D.I. K-7 pipes		9854 m.	
		250 mm Dia. D.I. K-7 pipes		273 m.	
22	Water Quality Monitoring				
	a) Pre monsoon	Report enclosed			
	b) post monsoon	Report enclosed			
23	Total Estimated Cost	Rs. 2787.59 Lakhs			
24	Per capita cost on present population				
	i. Year 2023	Rs. 5065.12/-			
25	Per capita cost on design population				
	ii. Year 2038	Rs. 4292.5/-			
	iii. Year 2053	Rs. 3837.12/-			
26	Annual O&M cost				
	i. Year 2023	Rs. 52.71 Lakhs			
	ii. Year 2038	Rs. 68.52 Lakhs			
	iii. Year 2053	Rs. 89.08 Lakhs			
27	Per capita cost of O&M				
	i. Year 2023	Rs. 95.78/-			
	ii. Year 2038	Rs. 105.51/-			
	iii. Year 2053	Rs. 122.62/-			
28	Proposed tariff : Domestic / Commercial	No. House Conn		Commercial	
	i. Year 2023	12056		112	
	ii. Year 2038	14143		145	
	iii. Year 2053	16230		189	
29	Proposed Water Supply at different stages -- no of domestic connection/ stand posts	Year 2023	Year 2038	Year 2053	
	i. No of domestic / Commercial connection	12168	14288	16419	
30	Anticipated Revenue at different Stages				
	i. Year 2023	Rs. 136.87 Lakhs			
	ii. Year 2038	Rs. 177.93 Lakhs			
	iii. Year 2053	Rs. 231.31 Lakhs			
31	Agency for O&M	From Head works to OHT by PHED & OHT to Distribution by Gram Panchyat			
32	Amount for awareness generation and Capacity building of	Available in Support component of NRDWP,			
33	Amount for Source sustainability measures			
34	Provision for safe disposal of waste water	Near by natural Nala			


 Assistant Engineer
 Public Health Engineering
 Sub Division Durg (C.G)


 Executive Engineer
 Public Health Engineering Division
 Durg (C.G)

Jewra–Sirsa(Khurd)–Bhatgaon Group Water Supply Scheme

BLOCK : DURG

DISTRICT: DURG

PREFACE

Water constitutes one of the important physical environments of men and has direct bearing on his health. Water is precious to man and is a basic human need. To provide safe, potable and adequate quantity of water for all our rural communities, is the most important task of a welfare state, upon which depends the health and well being of its people, Water provided should meet minimum water quality standard and be readily and conveniently accessible at all times, and in all situation to rural people.

‘Water delivery’ in villagers home through tap connections is an aspiration for women. It brings dignity to them. It empowers them. It brings safety and security to women and girls. It improves ‘ease of living’ and ensures better ‘quality of life’. With these inspirational goals in mind, Prime Minister launched Jal Jeevan Mission (JJM) on 73rd Independence Day i.e. 15 August, 2019 from the ramparts of Red Fort. Jal Jeevan Mission is a time-bound mission-mode programme to ensure every rural household has a Functional Household Tap Connection (FHTC) by 2024 to provide drinking water in adequate quantity (minimum 55 lpcd) of prescribed quality (BIS:10500) on regular basis. The mission is under implementation in partnership with States. The goal is to have ‘Har Ghar Jal’– every house in the village is to be provided with tap connection.

JJM aims to provide functional household tap connections (FHTCs) to every rural household of the country by the year 2024 and thereby ensuring potable water supply in adequate quantity i.e. @ 55 lpcd (Litres per capita per day) of prescribed quality on long-term and regular basis. The programme will benefit all the rural people.

After successfully delivering basic services like cooking gas, road, electricity, housing, health services, banking accounts, the Government is committed now to provide another basic service in the rural areas i.e. ‘Har Ghar Jal’ i.e. every household gets tap connection in its premises, so that the lady of the house does not have to go out to fetch water. FHTC may be planned to be provided in every household with three delivery points (taps), viz. kitchen, washing & bathing area and toilet, to keep water

clean and prevent misuse. Out of the three, only one tap per household will be funded under JJM.

Minister of Jal Shakti is pushing this important agenda of the Union Government to provide 'Har Ghar Jal' and talking to Chief Ministers of States on regular basis. This shows the commitment of Ministry of Jal Shakti to provide basic services for the rural people just like that of urban areas.

Thus well planned water supply is vital element for survival of mankind. with a view to relieve water supply shortage conditions in various habitations of the village, the project is aimed to solve water problem and to meet future demand as well, a scheme amounting to Rs. 2580.95 Lakhs for the projected population of 72648 souls in the design year 2053 has thus been framed to supply drinking water through pipe line in the 19 villages of Patan Block of Durg District under this group water supply scheme.

LOCATION

Situated on the east bank of river Shivrath, District Durg is herald of Chhattisgarh's Industrial Development, Cultural competence, Social harmony and Meaningful use of resources. It is a symbol of status, prestige and glory of Chhattisgarh. History of Durg is like conducive inspiration which is unique mixture of oldness and modernity, culture-rite and entrepreneurship.

Bhilai known as "Mini India" for Industrial development, social harmony and cultural diversity is a twin city of Durg. Establishment of Bhilai steel plant in Durg district had created vast opportunities for industrial progress on one hand and on the other hand durg district become centre of many other productive activities.

TOPOGRAPHY

Topography of the area may be classified as plain and is even. Detailed map enclosed with this scheme includes all habitations of the census village, all built up structures such as human settlements, institutions etc.

TRADE & INDUSTRY

The district is major industrial hub of the state. Bhilai Steel plant and its ancillary industries have impact on the development of the district. Availability of surface water and ground water (some part of the district has made major Agricultural center to this district. Due to Bhilai Steel Plant the education standard of the Durg. Bhilai town has

improved in such a way that this area is also known as “Kota of Chhattisgarh”. Here student from the nearby state like Orrissa, Jharkhand and Bihar come to take coaching of Engineering and Medical Entrance examination.

CLIMATE & RAINFALL

a. Rainfall

The rainfall of the area is dominated by the South West Monsoon, which starts in the middle of June each year and ceases by the end of September or beginning of October. The maximum rainfall of the area recorded in the past is 1210 mm and minimum ever recorded rainfall is 900 mm. About 90% of the annual rainfall takes place during the South West Monsoon i.e. between June to September. Only 8% of the annual rainfall takes place during the Winter Season from October to February and only 2% of the annual rainfall takes place during summer Season. Hence 10% of the rainfall takes place from October to May.

b. Temperature

The records of the IMD observatory data indicate that May is the hottest month during which temperatures rises up to 48° C, December is the coolest month during which the temperature decreases to 13.5° C. The daily mean, maximum and minimum temperatures during the summer (May) are 42.5° C and 28.8° C respectively while during winter (December) it is 27.2 to 13.5° C. The average daily annual normal temperature for the area is about 26° C.

c. Humidity

Relative humidity of air at a given temperature is the percent ration of amount of moisture present in the air to the amount necessary to saturate the air at that temperature. During the driest period i.e. summer season humidity is lowest about 35% and is highest during the South West Monsoon period 85%. The humidity again decreases from October onwards due to rise in temperature and also due to the retreating monsoon. The Relative humidity of air at a given temperature is the percentage ratio of the amount of moisture present in the air to the amount necessary to saturate the air at that temperature.

GEOLOGY

Geographical area of Durg district is 8537 Sq. KM. The District occupies the southwestern part of the Upper –Mahanadi valley and the bordering hills in the south and southwest. Physiographically, the District can be divided into two divisions, viz. the

Chhattisgarh plain and the Southern plateau. The Chhattisgarh plain occupies the largest area in the District.

HYDROLOGY

The district is underlain by Bastar gneiss of Archaean age. Rocks belonging to Chottanagpur gneissic complex overlie these rocks. They are overlain by sedimentary formations of upper Proterozoic known as Chhattisgarh Super Group consisting of limestones, siltstones, shales, sandstone and marlstone. Gondwana group of rocks belonging to carboniferous to lower cretaceous age viz. Sandstone. Siltstone, conglomerate, shales's, coal seams and thin bands of fireclay occur in the area. Recent to sub-recent alluvial deposits and laterite also occur at places in the district. The ground water occurs under phreatic, semi-confined and confined conditions. Ground water movement in them is controlled by the inter granular pore spaces in the shallow weathered zones and joints, fractures and caverns in deeper horizons. Shale beds in Gondwana formation act as confining layers and help to form different aquifer system. The depth to water level varies from 8.42 to 31.58 mbgl during pre-monsoon period and from 3.72 to 16.26 mbgl during post-monsoon period in the shallow aquifers. The long term (decadal) trend analysis of water level indicates that about 7% of the wells in pre monsoon and 14% of the wells in post monsoon period show a significant (20 cm/year) falling trend.

DESING PERIOD (AS PER MODWS GUIDELINES DT 20.02.2013)

All rural households have access to piped water supply in adequate quality with metered tap connection providing safe drinking water, throughout the year, that meets prevalent national drinking water standards, leading to healthy and well nourished children and adults and improved livelihood and education.

To ensure that every rural person has enough safe water for drinking, cooking and other domestic needs as well as livestock throughout the year including during natural disasters. By 2022, every rural person in the country will have access to 70 LPCD within their households premises or at a horizontal or vertical distance of not more than 50 meters from there house holds without barriers of social & financial discrimination. It is recognised that State will adopt their own strategies and phased timeframe to achieve this goal. The following standards of service have been identified depending on communities needs.

- Piped water supply with all metered, households connections (designed for 70 LPCD with appropriated cost ceilings as decided by States taking affordability and social equity in consideration.
- Figures exclude “ Unaccounted for water (UFW)” which should be limited to 15%
- Figures include requirements of water for commercial, institutional & minor industries. However, the bulk supply to such establishments has been assessed separately with proper justification.
- Thus after finalizing the demand, accordingly other components are designed as per the norms. The design period for the components is shown in the table beneath.

Project Components design period as per CPHEEO norms

Sr No.	Items	Design Period in Years
1	Storage by dams	50 Years
2	Infiltration works	30 Years
3	Pumping	30 Years
	Pump house (civil works) Electric motors & pumps	
4	Water treatment units	15 Years
5	Pipe connection to several treatment units & other small appurtenances	30 Years
6	Raw water & Clear water conveying mains	30 Years
7	Clear water reservoirs at head works, balancing tanks and service reservoirs. (overhead or ground level)	15 Years
8	Distribution System	30 Years

DEMOGRAPHIC STUDIES

Demographic study in context to various aspects is essential to forecast a development plan for human settlement will guide over all requirement of water supply scheme. Considering the lag period involved in sanction and construction of the scheme and twenty years thereafter as design period, the data enable to design various

components of the scheme as per requirement of MsDWS guidelines with latest amendments.

POPULATION

Population of the villages as per census 2011 is 11967 souls. Based on this, base year for calculation of various data has been adopted as 2018 and design period have been adopted as 30 years i.e.2048 as per MoDWS guidelines dtd 20.02.2013 for rural PWSS with regard to all the factors governing the future growth and development of the project area. Special factors causing sudden emigration or influx of population have also been foreseen to the extent possible. The stages of project are as under;

Design period	:	30 years
Execution period	:	2 years
Census year	:	2011
Base year	:	2023
Intermediate year	:	2038
Ultimate year	:	2053

The proposed villages are in developing stage. Depending upon the future development and based on the study and past census records starting from year 1981, the designed population calculated by arithmetic, geometric and incremental increase methods are enclosed in Annexures. The estimated population of the villages at various stages is given in following table:

Sr. No.	Name of Village	Population			
		2011	2023	2038	2053
1	BHATGAON	1963	2249	2654	2969
2	SIRSA	6211	7115	8396	9392
3	JEORA	3793	4345	5127	5735
4	KHAPRI (K)	1153	1321	1559	1744
5	KUTELABHATA	1777	2036	2402	2688
6	CHIKHLI	2697	3090	3646	4079
7	KACHANDUR	2597	2975	3511	3927
8	SAMODA	2358	2701	3187	3565
9	DHAUR	4100	4697	5542	6200
10	KHEDAMARA	2512	2878	3396	3799
11	KARANJA BHILAI	3881	4446	5246	5869
12	BASIN	2254	2582	3047	3408
13	ARSNARA	2176	2493	2942	3291

Sr. No.	Name of Village	Population			
		2011	2023	2038	2053
14	RAWELIDIH	1914	2193	2588	2895
15	BOREGAON	2210	2532	2988	3342
16	NANKATTI	5807	6652	7849	8781
17	JHENJHRI	637	730	861	964
		48040	55035	64941	72648

Sr. No.	Name of Village	Population			
		2011	2023	2038	2053
1	Zone I	22549	25832	30482	34099
2	Zone II	25491	29203	34459	38549

Detailed Calculation is given in Population Forecast

WATER DEMAND (DESIGN YEAR 2048)

Based on the population at various stages calculated as above, water requirement at various stages calculated. Water requirement various stages as per latest Strategic Plan 2013 of Ministry of Drinking water and sanitation. Govt. of India, (Draft No. W- 11011/01/2012-W-I) dtd 20.02.2013, considering the per capita supply as 55 LPCD : (As per JJM including losses 65.19 LPCD).

Sr. No.	Name of Village	Total Demand Including Losses in MLD (55 LPCD +15% Losses, i.e. 15% UFW & 5% Firefighting)			Flow in LPS
		2023	2038	2053	2053
1	BHATGAON	0.1466	0.173	0.1935	2.2396
2	SIRSA	0.4638	0.5473	0.6123	7.0869
3	JEORA	0.2833	0.3342	0.3739	4.3276
4	KHAPRI (K)	0.0861	0.1016	0.1137	1.3160
5	KUTELABHATA	0.1327	0.1566	0.1752	2.0278
6	CHIKHLI	0.2014	0.2377	0.2659	3.0776
7	KACHANDUR	0.1939	0.2289	0.2560	2.9630
8	SAMODA	0.1761	0.2078	0.2324	2.6899
9	DHAUR	0.3062	0.3613	0.4042	4.6783
10	KHEDAMARA	0.1876	0.2214	0.2477	2.8669
11	KARANJA BHILAI	0.2898	0.342	0.3826	4.4283
12	BASIN	0.1683	0.1986	0.2222	2.5718
13	ARSNARA	0.1625	0.1918	0.2145	2.4827
14	RAWELIDIH	0.143	0.1687	0.1887	2.1841
15	BOREGAON	0.1651	0.1948	0.2179	2.5220
16	NANKATTI	0.4336	0.5117	0.5724	6.6250
17	JHENJHRI	0.0476	0.0561	0.0628	0.7269
	Total of Zone	3.5876	4.2335	4.7359	54.8144
	YEARLY DEMAND (MM ³)	1.3095	1.5452	1.72860	

Sr. No.	Name of Village	Total Demand Including Losses in MLD			Flow in LPS
		2023	2038	2053	2053
1	Zone I	1.6839	1.9871	2.2229	25.7284
2	Zone II	1.9037	2.2464	2.513	29.086

PRESENT STATUS OF WATER SUPPLY AND SANITATION

Water quality of all the hand pumps has been tested. The quality of water meets the MoDWS norms for drinking purpose. Natural water sources including ponds and open wells are used by the habitants for their requirement of drinking water. Water levels are moderate in these water bodies throughout the year, but possibility of contamination of these water sources always exist. The water supply available through the existing arrangement is not meeting the water requirement of village throughout the year and it is difficult to meet the current water demand of 55LPCD (including line losses) through existing amenities. At present sanitation status of the villages are on growing stage and individual household toilets have been constructed after extensive IEC was done under Total sanitation Campaign. Solid waste and waste water disposal is done individually by the households which is subsequently being supported and managed by VWSC in the village. A formal VWSC are already formed in the villages. There were no major health issues during last 5 years in the village as per department's record caused by water contamination or inadequate sanitation of IHHL Constructed in some houses in villages. In the rest of the families Construction work is under progress.

Primary, Higher secondary school and anganbadi are running in the villages and there location are well marked in the village map. School toilets are already constructed in the school premises.

INSTITUTIONAL SET UP AND DETAILS OF FORMATION OF VWSC

In the villages the VWSC was formed in the year 2011-12 As per the NBA guidelines 03 No. women are member of VWSC. the water supply scheme was discussed with VWSC and survey and design has been done according to their requirement. In initial stage 75% households are willing to take individual tap connection.

IEC activities under TSC were done including various sanitation trainings in the villages in the past, however a provision has been made in the proposed scheme to render more IEC activities and trainings focused at PWSS O&M activities, water security, recharging methods etc. for villagers, VWSC members and gram Panchayat members for effective O&M of the scheme. Resource persons are required to be engaged for this

job in order to strengthen the sustainability potential of the proposed scheme once it is executed.

WATER SAFETY AND SECURITY PLANS

- 1 Villages have Tube wells from where drinking water is being drawn at present.
- 2 It is proposed to undergo testing of water quality at least thrice a year from District Water Testing Laboratory located at – DURG including pre–monsoon and post–monsoon period. Field test kits are also provided at gram Panchayat level for onsite testing of water quality to provide safe drinking water to households. Rainfall data is available at District Meteorological Laboratory and is being analyzed for rainwater availability throughout the year. There is a dedicated pond for cattle water feed.
- 3 VWSC shall be responsible for water sustenance activities including IEC and trainings upto design period of distribution network shall be done by Gram Panchayat of the each village under supervision of VWSC members, the O&M cost shall be realised through water tariff or household connections including State Govt. grants for it. However PHED shall be responsible to render technical guidance and coverage during such O&M activities, as well as O&M of Head Works of Group Scheme also.

DETAILS OF PROPOSED SCHEME COMPONENTS

SURVEY AND DPR PREPARATION

From 21st March 2020 Lock down was imposed in Country, after that carrying out the total station survey or Aerial survey using UAV is just impossible task, in this situation we have used the DEM image (Digital Elevation Model). The demand for digital elevation models is growing with increasing use of GIS and with increasing evidence of improvement in information extracted using elevation data. The incorporation of elevation and terrain data is crucial to many applications, particularly if radar data is being used, to compensate for foreshortening and layer effects and slope induced radiometric effects. Elevation data is used in the production of topographic maps.

The preliminary survey has been carried out from head works to water treatment plant and to other required destinations including taking levels cross sections at nodal and salient points using above technology. Details of the survey have been plotted and layout plan have been prepared. For network of clear water gravity mains and the

distribution network of each village. It is also presumed that during execution of the scheme, if any fundamental changes occur then complete working survey and working designs shall be carried out for checking the hydraulics of the entire network. While surveying the village distribution network, the existing pipe lines laid during the present past are also marked and utilized in the designs.

SOURCE OF THE SCHEME

Choice is being left between ground water and Shivnath River. It is very well known that ground water source are not sustainable source and the project area is also in water quality problem area.

The only available alternative is Shivnath River. Intake well is proposed to be constructed in the upstream of Bhatgaon Anicut in the Shivnath river. This source is techno-economically viable option for the proposed water supply scheme. As such it is capable of safe and potable water in required quantity for the proposed project area after conventional treatment and transmission.

The Raw Water Quality of Shivnath River has been got analysed and found suitable for human consumption after treatment and disinfection.

Taking above option into consideration most technically feasible and economically viable source for the proposed water supply scheme is Shivnath River.

INTAKE WELL

It is proposed to construct RCC Intake well in river bed Shivnath River. It will be of 6 m internal diameter. The Intake well will be provided with sluice valves / gates to take discharge from higher level inlet port during monsoon & from lower level inlet ports after monsoon. The pump house will be of two stories one shall be discharge floor & the other shall be motor floor. The discharge floor shall have head room of 5.0 m & the motor floor shall have a head room of 5.0 m. to accommodate traveling gantry crane girder. Total height of Structure will be 24.148 m.

RAW WATER PUMPS

It is proposed to provide total 3 Nos. Vertical Turbine self, water lubricated Pumps with motors, 2 will run at a time and 1 will be stand by. Each 32 HP pump will have a discharge of 229682.07 LPH against a total head of 25 m. The Programmable Logic

Controller (PLC) & Supervisory Control And Data Acquisition (SCADA) arrangements would be comprised of the following instrumentation and automation

- Electromagnetic Flow Meter
- Flow indicating Totaliser
- Capacitance Type Level Measurement Device
- Float and Board Type Level Measuring System
- Pressure Transmitter
- Temperature Scanners
- Pressure Gauges
- Instrumentation and Control Cable
- Alarm Annunciator
- Digital Indicator in Remote Control desk for Valve Position/Level/Flow and Pressure (Microprocessor Based)

RAW WATER LT CONNECTION :-

As the capacity of pumps is very small hence LT connection without substation will be sufficient. A provision for CSEDCL connection has been made in the estimate.

RAW WATER PUMPING MAIN

The Raw water pumping main of 300 mm diameter DI Class K-9 pipes 2184 m in length is proposed for pumping raw water from proposed Intake well upto WTP including all valves, fittings, appearances, CD works, valve chamber etc. The economical size of raw water pumping main has been worked out based on the principle of techno-economic feasibility and financial viability as detailed for ultimate design period. The minimum and maximum velocity has been considered 0.6m/sec to 2m/sec while designing conveying main. Provision for CC road cutting & relaying has also been made in the estimates.

WATER TREATMENT PLANT

4.5 MLD Conventional Water Treatment Plant is proposed near village Bhatgaon at RL 279.59 m. at a distance 100m from intake well. The civil structures of the plant are to be constructed in such a way that electrical as well as mechanical installations can be done comfortably. The distance from WTP to drainage point is 200 m. The controlling levels of water treatment plant are as follows :

G.L. at WTP site	279.59 m.
Lip of Aeration fountain	283.59 m.
LSL of Clear water sump	276.59 m.

CLEAR WATER PUMPS

It is proposed to provide 3 nos clear water horizontal split casing centrifugal pump sets one of 22 HP of 211675 LPH discharge with head 21 m capacity to fed in 20 hrs. (2 Nos. of pumps will be running at a time and one will be stand bye.)

CLEAR WATER PUMPING MAIN

The Clear water pumping main of 300mm to 200 mm diameter DI Class K-9 pipes 12145 m in length is proposed for pumping clear water from proposed WTP to Two MBR including all valves, fittings, appearances, CD works, valve chamber etc. The economical size of clear water pumping main has been worked out based on the principle of techno-economic feasibility and financial viability as detailed for ultimate design period. The minimum and maximum velocity has been considered 0.6m/sec to 2m/sec while designing conveying main. Provision for CC road cutting & relaying has also been made in the estimates.

MASTER BALANCING RESERVOIR

The Intermediate demand of water in the year 2038 is 4.2353 mld. Calculated storage at 2.0 Hours for above demand is considered to compute the capacity MBR. The capacity of MBR-1 is 230 KL. When the analysis of the cost of total network is done this staging height is giving the most optimum results hence the staging height is kept as 30m for MBR-1, and MBR-2 is 255 KL. When the analysis of the cost of total network is done this staging height is giving the most optimum results hence the staging height is kept as 30m.

GRAVITY MAINS

The hydraulics of the gravity mains have been designed and following Dia.of DI class K-7 pipes are proposed to convey water from MBR to the OHT's of the respective villages. In addition to the designed length, the pipes conveying water up to the village start where the OHT is in another village, are proposed as DI pipes and are deducted

from the length of distribution network. The total length of the gravity main network is 31760 mtr.

Diameter	Zone - I	Zone - II	Dia. Wise Total
100 mm Dia. D.I. K-7 pipes	5706 m.	6543 m.	12249 m.
150 mm Dia. D.I. K-7 pipes	3168 m.	6216 m.	9384 m.
200 mm Dia. D.I. K-7 pipes	2899 m.	6955 m.	9854 m.
250 mm Dia. D.I. K-7 pipes	86 m.	187 m.	273 m.
Zone Wise Total	11859 m.	19901 m.	31760 m.

SERVICE RESERVOIR

The capacity of the overhead tanks has been calculated as per the norms of CPHEEO considering 50% storage capacity of the respective village. The existing OHT are considered by checking the capacities and additional capacity of OHT has been proposed where necessary.

While designing the tank capacity, the calculations have been made considering as availability of 20 hours supply. For supply required after 15 years of 4.2335 MLD, The location and command area of the tank is shown in the enclosed village map. Considering future expansion of village Staging Height is kept minimum 12 m. The table of Existing and Proposed Storage Capacity is given Below.

Sr. No.	Name of Village	Capacity		GL	LSL	FSL	Flow in LPS
		Existing	Proposed				
1	BHATGAON	75000	0	289.967	301.967	306.967	2.2396
2	SIRSA	0	280000	288.521	300.521	305.521	7.0869
3	JEORA	135000	40000	292.155	302.155	307.155	4.3276
				293.000	303.000	308.000	
4	KHAPRI (K)	60000	0	299.154	311.154	316.154	1.316
5	KUTELABHATA	80000	0	297.926	309.926	314.926	2.0278
6	CHIKHLI	110000	0	287.000	299.000	304.000	3.0776
7	KACHANDUR	110000	0	282.300	294.300	299.300	2.963
8	SAMODA	70000	40000	288.811	300.811	305.811	2.6899

Sr. No.	Name of Village	Capacity		GL	LSL	FSL	Flow in LPS
		Existing	Proposed				
				287.386	299.386	304.386	
9	DHAUR	150000	40000	301.235	313.235	318.235	4.6783
				299.461	311.461	316.461	
				299.000	311.000	316.000	
10	KHEDAMARA	100000	0	310.947	322.947	327.947	2.8669
11	KARANJA BHILAI	110000	70000	288.751	300.751	305.751	4.4283
				290.030	302.030	307.030	
12	BASIN	90000	0	293.771	305.771	310.771	2.5718
13	ARSNARA	120000	0	283.210	295.210	300.210	2.4827
14	RAWELIDIH	60000	0	289.964	301.964	306.964	2.1841
15	BOREGAON	120000	0	290.644	302.644	307.644	2.522
16	NANKATTI	150000	110000	282.764	292.764	297.764	6.625
				282.342	292.342	297.342	
17	JHENJHRI	0	40000	279.840	291.840	296.840	0.7269

BRICK MASONRY BOUNDARY WALL

A brick masonry boundary wall of size 25M×25M×1.8M for 3 Nos OHT's, 400 m for WTP & 90 m each for MBR is proposed to be constructed to safeguard the OHT and other major components of the scheme.

TRIAL RUN & IEC ACTIVITIES

Supervision, trial run, testing contingency charges and other civil works have also been calculated to arrive at a landed cost. IEC (Information, Education, Communication activities) shall be performed in a structured way first by the department to PRI's, VWSC, ASHA workers, Anganwadi workers, schools, hospital/PHC and NGO's immediately after completion of the project and will be extended to the habitants of the village subsequently by VWSC/GP's/trained NRDWQMS for sustainable O&M of the scheme Water quality monitoring shall be done through district water testing laboratory which is equipped with all the necessary testing & measuring equipments. Field test kits are also proposed to be distributed to PRI/VWSC unit for instantaneous testing of water.

VWSC's role in subsequent O&M activities include sustainability and safety of source, maintenance of pumps, pipe lines and OHT will be done strictly as per ModWs guidelines; As the proposed scheme has been made self-sustainable where majority of O&M expenses are likely to be met through water tariff, VWSC will look after maintenance of pipelines and operation of the scheme.

COST OF PROJECT

The cost of project is Rs. 2580.95 Lacs

Sr. No.	Particular	Amount (Rs. in Lacs)
1	Preliminary	9.53
2	Land Acquisition	67.20
3	RCC Intake Well – 6 m dia, & Total Height of Structure 24.148 m.	121.21
4	Raw Water Pump with 50% Standby	32.08
5	Raw Water Pumping Main	92.53
6	Water Treatment Plant	192.63
7	Clear Water Pumps	30.63
8	Clear Water Pumping Mains	540.55
9	RCC MBRs	238.35
10	Clear Water Gravity Mains	781.35
11	Construction of Staff Quarters	71.65
12	Bulk Flow Meter at each village Inlet Junction	24.18
13	Inspection Vehicles	23.92
14	Miscellaneous	174.58
	Net cost	2555.39
	Add 1% for Contingencies	25.55
	Gross cost	2580.95

Rupees Twenty Five Crore Eighty Lakh Ninety Five Thousand Only

OPERATION & MAINTENANCE COST

It is one of the most important responsibilities of a water undertaking to properly maintain the transmission and distribution mains in order to prevent waste and provide a constant pressurized flow of potable water to the consumers. It is equally important to prevent damage to the public property which could arise for not properly repairing a defective pipe or other components of PWSS. Proper planning and implementation of remedial measures will avoid will avoid leakages and break downs. The estimated Operation & Maintenance Cost at various stages are calculated, which is as follows:

YEAR	PHED (Rs. In Lacs)	VILLAGE (Rs. In Lacs)
2023	52.71	34.81
2038	68.52	45.25
2053	89.08	58.83

ANTICIPATED REVENUE GENERATED

Annual Revenue anticipated to be generated through Stand Posts & other individual Household connections are calculated in annexure G Which are as follows:

YEAR	Anticipated Revenue (Rs. In Lacs)
2023	136.87
2038	177.93
2053	231.31

COST OF WATER PRODUCTION PER 1000 LITRES OF WATER

YEAR	Cost of Water for 1000 Liters
2023	Rs. 4.02/-
2038	Rs. 4.43/-
2053	Rs. 5.15/-

PER CAPITA COST OF THE SCHEME

YEAR	Per capita Cost
2023	Rs. 4689.65/-
2038	Rs. 3974.30/-
2053	Rs. 3552.68/-

FINANCIAL PROFILE

The scheme will be executed within 2 Year from the grant of sanction. Requirement of funds for the execution of proposed scheme will be as under for the forthcoming financial years under State Budget.

Year	Govt. of India Grants	STATE AID
2021-22	645.24	645.24
2022-23	645.24	645.24
Total	1290.48	1290.48
	2580.95	

WORK EXECUTION

The scheme will be executed by P.H.E Department and subsequently distribution network will be handed over to Gram Panchayat/VWSC for onward operation & maintenance as per guidelines of the Govt. of India, Ministry of Drinking water & Sanitation, New Delhi for rural piped water supply schemes. PHE will take care of Operation & Maintains from Head works to OHT and Gram Panchyat / VWSC will take care of Distribution Network.

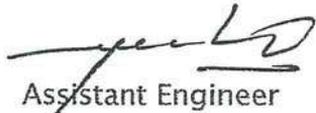
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S.O.R. for water supply issued by E.N.C., P.H.E.D. Raipur, C.G. enforced from 07.02.2013 with all its amendments.

S.O.R. for building work issued by E.N.C., P.W.D. Raipur, CG, enforced from 01.06.2009

Circular No. W- 11011/01/2012-W-I dated 20.02.2013 issued by Ministry of Drinking water and Sanitation New Delhi for rural Piped water supply schemes.

Circular of NRDWP: Movement towards ensuring people's Drinking Water Security in Rural India, Guidelines 2013



Assistant Engineer
Public Health Engineering
Sub-Division -Durg



Executive Engineer
Public Health Engineering
Division - Durg



Chief Engineer
Public Health Engineering Deptt.
Raipur Zone Raipur /C.G.

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

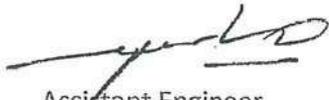
(Total 17 Villages)

Block : Durg District : Durg

ABSTRACT OF POPULATION FORECAST

Sr. No.	Name of Village	Population			
		2011	2023	2038	2053
1	BHATGAON	1963	2249	2654	2969
2	SIRSA	6211	7115	8396	9392
3	JEORA	3793	4345	5127	5735
4	KHAPRI (K)	1153	1321	1559	1744
5	KUTELABHATA	1777	2036	2402	2688
6	CHIKHLI	2697	3090	3646	4079
7	KACHANDUR	2597	2975	3511	3927
8	SAMODA	2358	2701	3187	3565
9	DHAUR	4100	4697	5542	6200
10	KHEDAMARA	2512	2878	3396	3799
11	KARANJA BHILAI	3881	4446	5246	5869
12	BASIN	2254	2582	3047	3408
13	ARSNARA	2176	2493	2942	3291
14	RAWELIDIH	1914	2193	2588	2895
15	BOREGAON	2210	2532	2988	3342
16	NANKATTI	5807	6652	7849	8781
17	JHENJHRI	637	730	861	964
		48040	55035	64941	72648

Sr. No.	Name of Village	Population			
		2011	2023	2038	2053
1	Zone I	22549	25832	30482	34099
2	Zone II	25491	29203	34459	38549


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

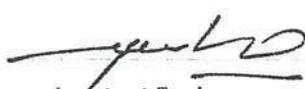
(Total 17 Villages)

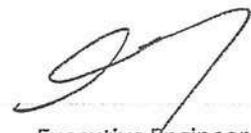
Block : Durg District : Durg

Requirement of water at Consumer's End (MLD)

Sr. No.	Name of Village	Population (Souls)			Daily domestic demand @55 LPCD in MLD			Total demand Including Losses in MLD (55 LPCD + Losses i.e. @65.19.LPCD)		
		2023	2038	2053	2023	2038	2053	2023	2038	2053
1	BHATGAON	2249	2654	2969	0.1237	0.1460	0.1633	0.1466	0.1730	0.1935
2	SIRSA	7115	8396	9392	0.3913	0.4618	0.5166	0.4638	0.5473	0.6123
3	JEORA	4345	5127	5735	0.2390	0.2820	0.3154	0.2833	0.3342	0.3739
4	KHAPRI (K)	1321	1559	1744	0.0727	0.0857	0.0959	0.0861	0.1016	0.1137
5	KUTELABHATA	2036	2402	2688	0.1120	0.1321	0.1478	0.1327	0.1566	0.1752
6	CHIKHLI	3090	3646	4079	0.1700	0.2005	0.2243	0.2014	0.2377	0.2659
7	KACHANDUR	2975	3511	3927	0.1636	0.1931	0.2160	0.1939	0.2289	0.2560
8	SAMODA	2701	3187	3565	0.1486	0.1753	0.1961	0.1761	0.2078	0.2324
9	DHAUR	4697	5542	6200	0.2583	0.3048	0.3410	0.3062	0.3613	0.4042
10	KHEDAMARA	2878	3396	3799	0.1583	0.1868	0.2089	0.1876	0.2214	0.2477
11	KARANJA BHILAI	4446	5246	5869	0.2445	0.2885	0.3228	0.2898	0.3420	0.3826
12	BASIN	2582	3047	3408	0.1420	0.1676	0.1874	0.1683	0.1986	0.2222
13	ARSNARA	2493	2942	3291	0.1371	0.1618	0.1810	0.1625	0.1918	0.2145
14	RAWELIDIH	2193	2588	2895	0.1206	0.1423	0.1592	0.1430	0.1687	0.1887
15	BOREGAON	2532	2988	3342	0.1393	0.1643	0.1838	0.1651	0.1948	0.2179
16	NANKATTI	6652	7849	8781	0.3659	0.4317	0.4830	0.4336	0.5117	0.5724
17	JHENJHRI	730	861	964	0.0402	0.0474	0.0530	0.0476	0.0561	0.0628
TOTAL DEMAND								3.5876	4.2335	4.7359
TOTAL YEARLY DEMAND (Mcum)								1.3095	1.5452	1.7286

Sr. No.	Name of Village	Population (Souls)			Daily domestic demand @55 LPCD in MLD			Total demand Including Losses in MLD (55 LPCD + Losses i.e. @65.19.LPCD)		
		2023	2038	2053	2023	2038	2053	2023	2038	2053
1	Zone I	25832	30482	34099	1.4209	1.6765	1.8754	1.6839	1.9871	2.2229
2	Zone II	29203	34459	38549	1.6062	1.8952	2.1201	1.9037	2.2464	2.5130


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

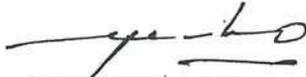
DESIGN OF INTAKE WELL AND OVERHEAD PUMP HOUSE

1 Ultimate stage demand 2053	4.74 MLD
2 Hours of pumping	20 Hrs
3 Rate of pumping	236795.00 Lit/Hr 236.80 m ³ /Hr
4 Capacity of Intake Well for 25 Minitis	0.42 Hour
5 Volume of Intake Well required 236.8 x 0.5	99.46 m ³
6 Considering 6 m dia of Intake Well depth of Intake Well below invert R.L. of Approach channel $99 / \{0.785 \times (\text{Dia})^2\} =$	3.52 m Say 4.00 m
As per the technical criteria for depth upto foundation level	
1. Minimum Submergence of column assembly of VT Pumps	1 m
2. Minimum clearance below column assembly of VT Pumps	0.5 m
3. Depth of silt Deposition Considered	1 m
4. Depth of RCC & PCC taken for foundation of intake Structure	1 m
	Total 3.5 m
	Total Minimum Effective Depth 7.50 m

So provide 6m dia, 7.5 m deep (Minimum effective depth) Intakewell in RCC with overhead RCC double storied pump house. (Height of Discharge Floor 5 m & Motor floor 6m)

Controlling Levels

1 GL of Bank at Intake Well site		278.700 m
2 River Bed Level		272.672 m
3 Highest Flood Level (HFL)		279.092 m
4 Top of Anicut		274.880 m
5 Average GL		275.686 M
6 Lowest Suction level	272.672 - 4	268.672 m
7 Bottom RL of Intake Well	LSL - 2.50 m	266.172 m
8 Discharge Floor RL	Height 5 m	279.200 m
9 Motor floor RL		284.200 m
10 Top RL of pump house	284.2 + 6 + 0.12	290.320 m
11 Total Height		24.148 m
12 Length of Bridge		30.000 m


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

DESIGN OF INLET PORT

1	Daily Demand	4.7359	Mld
2	Total Hrs. Pumping.	20	Hrs.
3	Design Flow	5.68	Mld
4	Intake Work to be design to 2 volume Flow.	9.47	Mld
	Say	9.47	Mld
		0.1096	Cum/Sec.
5	Entrance Velocity Through Orifices Say	13	M/Min
		0.2167	M/Sec
6	Area of holes to be provided in Rose Piece	0.5059	Sqm.

If 25 mm dia orifice at 50mm is proposed for rose piece. Total no. of orifices available in one row for a length of 1.0m will be $1000/50 = 20$ Nos.

Total No.of orifices available 25x25 in one Sq.m area 625 Nos.

Effective area available in one Sq. m area of Rose Piece. 0.3066 Sqm.

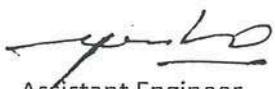
Total area required 0.506 1.6497 Sqm.
0.3066

Provide rose piece of dia 0.50 m.
Length of Rose Piece. 2.00 m.
Area provided in one rose piece 3.14 Sqm.
No. of rose pieces required. 1.649735968 0.5254 Nos.
3.14
Say 1 Nos.

Invert RL of Inlet-port I (Lower) 273.17 m

Invert RL of Inlet-port II (Middle) 274.17 m 274.772 Less than FSL of Anicut

Invert RL of Inlet-port III (Upper) 275.17 m


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)
PUMPING TRANSMISSION MAIN RAW WATER

CALCULATION OF LEAST-COST PIPE SIZE

Design of Economical Size of Raw water Rising Main.

From : Proposed Intake Well

To : Proposed WTP

===== INPUT DATA =====

	Year	Discharge	PIPE DATA			
1) Water requirement :			Diameter	Material	Class	HWC
A. Initial	2023	3.8928 MLD	mm			
B. Intermediate	2038	4.5936 MLD				Rate
C. Ultimate	2053	5.1388 MLD				Rs/m
2) Pumping main	Length	2184.00 meter.	200.00	D.I.	K-9	140
3) Static head for pump	St. Head	14.92 meter	250.00	D.I.	K-9	140
4) Design period	Year	30 year	300.00	D.I.	K-9	140
5) Combined eff. of pump set	Efficiency	70 %	350.00	D.I.	K-9	140
6) Cost of pumping unit	Rs./kW	15000 Rs	400.00	D.I.	K-9	140
7) Interest rate	Interest	12.00 %	450.00	200	K-9	140
8) Life of elec. motors	Years	15 yr.				
9) Energy charges /KWH Unit	per kWh	400.00 paise				
10) Pumping hours for discharge at the end of 15 Years	Pumping Hours	20 hrs				

CALCULATIONS:

	1st 15 years	2nd 15 years
1) Discharge at Start of Period	3.89 mld	4.59 mld
2) Discharge at the end of 15 yrs	4.59 mld	5.14 mld
3) Average Discharge	4.24 mld	4.87 mld
4) Ave.pumping hours during the period	18.47 hrs	18.94 hrs
5) KW required at combined efficiency of pumping set	0.89 * H1	1.00 * H2
6) Ave.annual charges for electrical energy Rs.	26990.23 * KW1	27669.37 * KW2

TABLE 1 - VELOCITY AND HEADLOSSES FOR DIFFERENT PIPE SIZES

Sr. No	Pipe Size in mm.	Frictional Head loss per 1000 m		Velocity in m/s		Total head(m) for including			2184.00 m length		
		1st stage flow	2nd stage flow	1st stage flow	2nd stage flow	14.92 m static head	1st stage flow	2nd stage flow			
						Frictional losses	Other* losses	Total losses H1	Frictional losses	Other* losses	Total losses H2
1	200	17.57	21.62	2.03	2.27	38.37	3.84	57.12	47.22	4.72	66.86
2	250	5.93	7.29	1.30	1.45	12.94	1.29	29.15	15.93	1.59	32.44
3	300	2.44	3.00	0.90	1.01	5.33	0.53	20.77	6.55	0.66	22.13
4	350	1.15	1.42	0.66	0.74	2.51	0.25	17.68	3.09	0.31	18.32
5	400	0.60	0.74	0.51	0.57	1.31	0.13	16.36	1.61	0.16	16.69
6	450	0.34	0.42	0.40	0.45	0.74	0.07	15.73	0.91	0.09	15.92

* Other losses = 10% of frictional loss

TABLE 2 - KILOWATTS & COST OF PUMP SETS REQUIRED FOR DIFFERENT PIPE SIZES AND PIPE COST

Sr. No.	Pipe Size in mm	Class of Pipe	1st stage flow of 4.59 million liters/day				2nd stage flow of 5.14 million liters/day				Cost of pipe per unit length (Rs)	Cost of 2184 meter pipe line THS (Rs)
			H1 Total head in meters	Kw req'd plus % 100 standby	Pump Cost @ Rs 15000.00 per kw	Rs THS	H2 Total head in meters	Kw req'd plus % 100 standby	Pump Cost @ Rs 15000.00 per kw	Rs THS		
1	200	D.I.	57.00	102	1530	67.00	134	2010	2037	4448.808		
2	250	D.I.	29.00	52	780	32.00	64	960	2724	5949.216		
3	300	D.I.	21.00	38	570	22.00	44	660	3461	7558.824		
4	350	D.I.	18.00	32	480	18.00	36	540	4193	9157.512		
5	400	D.I.	16.00	29	435	17.00	34	510	5055	11040.12		
6	450	200	16.00	29	435	16.00	32	480	5986	13073.424		

TABLE 3 - COMPARATIVE STATEMENT OF OVERALL COST OF PUMPING MAIN FOR DIFFERENT PIPE SIZES

Sr. No.	1st stage flow			2nd stage flow			5.14 mld			Grand Total of Capitalised cost for 30 yrs THS (Rs)	Pipe Size in (mm)
	Cost of pump sets	Annual Energy Charges	Capitalised Energy Charges	Cost of pump sets	Annual Energy Charges	Capitalised Energy Charges	Capitalised Total Cost	Annual Energy Charges	Capitalised Total Cost		
	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)		
1	1530	1377	9379	2010	1854	12627	2674	18032	200		
2	780	702	4781	960	885	6028	1277	12787	250		
3	570	513	3494	660	609	4148	878	12501	300		
4	480	432	2942	540	498	3392	718	13298	350		
5	435	391	2663	510	470	3201	678	14816	400		
6	435	391	2663	480	443	3017	639	16810	450		

Suggested Economic Dia is 300

The Economical diameter of Rising main is 300 mm dia DI K-9 pipe, With losses 3m /Km, Hence proposing 300 mm diameter D.I. K-9 pipe having lossess 3 m/Km.



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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

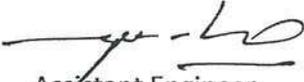
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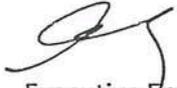
WATER HAMMER CALCULATION AND DESIGN OF RAW WATER PUMPING MAIN

From : Proposed Intake Well To : Proposed WTP

1	Daily Demand	5.139	Mld	
		20	Hrs	
2	Design capacity of Rising Main	6.167	Mld	
		256939.0	Lit/Hr.	
3	Diameter & type of Rising Main	300.00	mm	DI K-9
4	Coefficient of roughness	140.00		
5	Velocity of flow $\frac{Q \text{ (in cum. /Sec)}}{A \text{ (in Sqm.)}}$	1.01	M/Sec.	
	$\frac{256939.0}{3600 \times 1000 \times 0.785(0.3)^2}$			
6	Water Hammer Head			
	H Max = Maximum pressure rise in the closed conduit above the normal pressure in M/sec.			
	H Max $a \times V/g$	121.00	M	
	Where			
	$a = 1425 / [(1 + KD/EC)]^{1/2}$	1173.562	m/sec	
	Where			
	a = Velocity of pressure wave travel in m/sec.			
	K = Bulk modulus of water	2.07 x 10 ⁸	kg/sq m ²	
	D = Class and Dia of pipe.	300.00	mm	DI K-9
	C = Pipe wall thickness	7.7	mm.	
	E = Elasticity modulus of pipe material	1.7 E 10	kg/Sqm.	
	g = Acceleration due to gravity in m/sec ²	9.81	m/sec ²	
	V = Normal velocity before closer in m/sec.	1.01	M/sec.	
	H max $a \times V/g$	120.852	m.	
	Say	121.000	m.	
7	Static Head			
	Lip of A. F. \ F.S.L. Of E.S.R.- Lowest Invert RL	283.59		268.67
		14.917	m	

8	Frictional Head			
	a) Dia, Type and class of Rising Main	Dia 300.00 mm	Type DI	Class K-9
	b) Length of Rising Main		2184.00	m
	c) Value of C		140	
	d) Rate of friction		3.00	m/Km.
	e) Frictional Head		6.554	m.
	f) Add 10% losses for specials.		0.66	m.
	g) Velocity Head.		2	m.
	h) Total Frictional Head (e + f + g)		9.21	m.
	Condition No. 1 (max. Working Pressure)			
	Working Head= [7 + 8(h)]		24.127	Which is less than permissible working pressure 540m.
	Condition No.2 (max. field test Pressure)			
	I) Total Head = [6+7+8 (h)]		145.13	Which is less than 650 meter permissible
	II) Factor X [5+6(h) Field Test Pressure Should be less than 165 meter permissible			
	Where			
9	Factor for PSC =2 for MS / PVC/ AC =1.5			
	As both the conditions are satisfied 300 mm. Dia DI K-9 Pipe is proposed.			


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY

Block : Durg District : Durg

DESIGN OF RAW WATER SUB STATIONS

1. Raw Water Electric Sub Station

By providing 16 HP, 2 no running at a time and One pump stand by

Load for Pumps 32 HP

$KVA = 32 * 0.746 * 1.1 / 0.85 =$ 30.893176 KVA

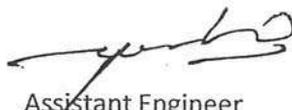
Load for Other Equipments = 10 KVA

Total 40.893176 KVA

The required capacity is less than 50 KVA

Hence no need of Sub-Station

Hence it is proposed to provide HT connectio at intake well site



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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

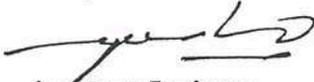
(Total 17 Villages)

Block : Durg District : Durg

DESIGN OF PUMPING MACHIENRY (RAW WATER)

From : Proposed Intake Well To : Proposed WTP

1	Immediate Stage Population. (As per Statement attached)	64941	Souls
2	Rate of Water Supply.	55	LPCD
3	Intermediate stage requirement.	4.594	MLD
4	Rate of pumping.	229682.07	Lit./Hr.
5	Hours of pumping.	20	Hrs.
6	Designed discharge	5.51236979	MLD
7	Lowest suction level.	268.67	M.
8	Lip of A .F./ F.S.L. of ESR =	283.589	M.
9	Static Lift.	14.92	M.
10	Dia, Type and Class of Pipes.	15.00	M
11	Length of Rising main.	300	DI K-9
12	Rate of frictional losses.	2184.00	M.
13	Frictional losses.	3.00	M./Km.
14	Losses through specials.	6.55415707	M.
15	Total frictional losses.	0.65541571	M.
16	Driving head.	7.210	M.
17	Total head	2	M.
18	Efficiency of pumps	24.21	M.
19	BHP required = Discharge x Total Head / (75 x 60 x 60 x 0.7) With 4% over = 229682.07 x 25 x 1.04/ (75 x 60 x 60 x 0.7) loading 31.596475 H. P Say 32 H.P. Provide 16 BHP triplicate set of Vertical Turbine pumps to discharge 114841.04 ltr./Hr. v against total head of 25 m with 50% standby	25.00	m


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

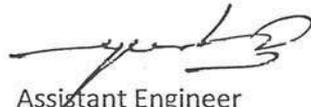
(Total 17 Villages)

Block : Durg District : Durg

CAPACITY CALCULATION OF W.T.P.

			2038	
1	Design population (Intermediate Stage)	:-	137589	Souls
2	Rate of Water Supply	:-	55	LPCD
3	Daily Demand	:-	4.234	ML
4	Hours of Pumping	:-	20	Hours
5	Capacity of WTP Including 4% losses	:-	4.41	MLD
		Say	4.50	MLD
6	G.L. at WTP site		279.589	m
7	Lip of Aeration fountain		283.589	m
8	LSL of Clear water sump		276.589	m

Hence provide conventional rapid sand gravity filter type Water Treatment Plant of 4.5 MLD capacity



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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

PUMPING TRANSMISSION MAIN CLEAR WATER

CALCULATION OF LEAST-COST PIPE SIZE

Design of Economical Size of Clear water Rising Main.

From : Clear Water Sump

To : Prop. MBR-1

===== INPUT DATA =====

1) Water requirement :	Year	Discharge	PIPE DATA				
			Diameter mm	Material	Class	HWC Rate Rs/m	
A. Initial	2023	3.588 MLD	200.00	D.I.	K-9	140	2037.0
B. Intermediate	2038	4.234 MLD	250.00	D.I.	K-9	140	2724.0
C. Ultimate	2053	4.736 MLD	300.00	D.I.	K-9	140	3461.0
2) Pumping main	Length	3136.00 meter	400.00	D.I.	K-9	140	5055.0
3) Static head for pump	St. Head	9.27 meter	450.00	D.I.	K-9	140	5986.0
4) Design period	Year	30 year					
5) Combined eff. of pump set	Efficiency	75 %					
6) Cost of pumping unit	Rs./kW	15000 Rs					
7) Interest rate	Interest	12.00 %					
8) Life of elec. motors	Years	15 yr.					
9) Energy charges /KWH Unit	per kWh	400.00 paise					
10) Pumping hours for discharge at the end of 15 Years	Pumping Hours	20 hrs					

CALCULATIONS:

	1st 15 years	2nd 15 years
1) Discharge at Start of Period	3.59 mld	4.23 mld
2) Discharge at the end of 15 yrs	4.23 mld	4.74 mld
3) Average Discharge	3.91 mld	4.48 mld
4) Ave.pumping hours during the period	18.47 hrs	18.94 hrs
5) KW required at combined	0.77 * H1	0.86 * H2
6) Ave.annual charges for electrical energy Rs.	26990.23 * KW1	27669.37 * KW2

TABLE 1 - VELOCITY AND HEADLOSSES FOR DIFFERENT PIPE SIZES

Sr. No	Pipe Size in mm.	Frictional Head loss per 1000 m		Velocity in m/s		Total head(m) for 3136.00 m length including 9.27 m static head					
		1st stage flow	2nd stage flow	1st stage flow	2nd stage flow	Frictional losses	Other* losses	Total losses H1	Frictional losses	Other* losses	Total losses H2
1	200	15.10	18.59	1.87	2.09	47.36	4.74	61.37	58.29	5.83	73.39
2	250	5.09	6.27	1.20	1.34	15.97	1.60	26.84	19.66	1.97	30.90
3	300	2.10	2.58	0.83	0.93	6.57	0.66	16.50	8.09	0.81	18.17
4	350	0.99	1.22	0.61	0.58	3.10	0.31	12.68	3.82	0.38	13.47
5	400	0.52	0.64	0.47	0.52	1.62	0.16	11.05	1.99	0.20	11.46
6	450	0.29	0.36	0.37	0.41	0.91	0.09	10.27	1.12	0.11	10.51

* Other losses = 10% of frictional loss

TABLE 2 - KILOWATTS & COST OF PUMP SETS REQUIRED FOR DIFFERENT PIPE SIZES AND PIPE COST

Sr. No.	Pipe Size in mm	Class of Pipe	1st stage flow of 4.23 million liters/day			2nd stage flow of 4.74 million liters/day			Cost of pipe per unit length (Rs)	Cost of 3136 meter pipe line THS (Rs)
			H1 Total head in meters	Kw req'd plus 100 standby	Pump Cost @ Rs 15000.00 per kw	H2 Total head in meters	Kw req'd plus 100 standby	Pump Cost @ Rs 15000.00 per kw		
1	200	D.I.	61.00	94	1410	73.00	126	1890	2037	6388.032
2	250	D.I.	27.00	42	630	31.00	53	795	2724	8542.464
3	300	D.I.	17.00	26	390	18.00	31	465	3461	10853.696
4	350	D.I.	13.00	20	300	13.00	22	330	4193	13149.248
5	400	D.I.	11.00	17	255	11.00	19	285	5055	15852.48
6	450	D.I.	10.00	15	225	11.00	19	285	5986	18772.096

Sr. No.	1st stage flow			4.23 mld			2nd stage flow			4.74 mld			Grand Total of Capitalised cost for 30 yrs THS (Rs)	Pipe Size in (mm)
	Cost of pump sets	Annual Energy Charges	Capitalised Energy Charges	Cost of pump sets	Annual Energy Charges	Capitalised Energy Charges	Cost of pump sets	Annual Energy Charges	Capitalised Energy Charges	Capitalised Total Cost	Annual Energy Charges	Capitalised Total Cost		
	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)	THS (Rs)		
1	1410	1269	8643	1890	1743	11871	1890	1743	11871	2514	18955	200		
2	630	567	3862	795	733	4992	795	733	4992	1057	14091	250		
3	390	351	2391	465	429	2922	465	429	2922	619	14254	300		
4	300	270	1839	330	304	2071	330	304	2071	439	15727	350		
5	255	229	1560	285	263	1791	285	263	1791	379	18046	400		
6	225	202	1376	285	263	1791	285	263	1791	379	20752	450		

Suggested Economic Dia is 300

The Economical diameter of Rising main is 250 mm dia DI K-9 pipe, With losses 6.27m /Km,
Hence proposing 300 mm diameter D.I. K-9 pipe having losses 2.58 m/Km.



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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

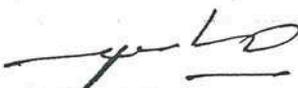
WATER HAMMER CALCULATION AND DESIGN OF CLEAR WATER PUMPING MAIN

From : Clear Water Sump

To : Prop. MBR-1

1	Daily Demand	4.736	Mld		
		20	Hrs		
2	Design capacity of Rising Main	5.683	Mld		
		236795.0	Lit/Hr.		
3	Diameter & type of Rising Main	300.00	mm	DI	K-9
4	Coefficient of roughness	140.00			
5	Velocity of flow $\frac{Q \text{ (in cum. /Sec)}}{A \text{ (in Sqm.)}}$	0.93	M/Sec.		
	$\frac{236795.0}{3600 \times 1000 \times 0.785(0.3)^2}$				
6	Water Hammer Head				
	H Max = Maximum pressure rise in the closed conduit above the normal pressure in M/sec.				
	H Max $a \times V/g$	112.00	M		
	Where				
	$a = 1425 / [(1 + KD/EC)]^{1/2}$	1173.562	m/sec		
	Where				
	a = Velocity of pressure wave travel in m/sec.				
	K = Bulk modulus of water	2.07×10^8	kg/sq m ²		
	D = Class and Dia of pipe.	300.00	mm	DI	K-9
	C = Pipe wall thickness	7.7	mm.		
	E = Elasticity modulus of pipe material	1.7 E 10	kg/Sqm.		
	g = Acceleration due to gravity in m/sec ²	9.81	m/sec ²		
	V = Normal velocity before closer in m/sec.	0.93	M/sec.		
	H max $a \times V/g$	111.377	m.		
		Say 112.000	m.		
7	Static Head				
	Lip of A. F. \ F.S.L. Of E.S.R.- Lowest Invert RL	285.86	276.59	9.271	m

8	Frictional Head			
	a) Dia, Type and class of Rising Main	Dia 300.00 mm	Type DI	Class K-9
	b) Length of Rising Main		3136.00	m
	c) Value of C		140	
	d) Rate of friction		2.58	m/Km.
	e) Frictional Head		8.091	m.
	f) Add 10% losses for specials.		0.81	m.
	g) Velocity Head.		2	m.
	h) Total Frictional Head (e + f +g)		10.90	m.
	Condition No. I (max. Working Pressure)			
	Working Head= [7 + 8(h)]		20.171 Which is less than permissible working pressure 540m.	
	Condition No.2 (max. field test Pressure)			
	I) Total Head = [6+7+8 (h)]		132.17 Which is less than 650 meter permissible	
	II) Factor X [5+6(h) Field Test Pressure Should be less than 165 meter permissible			
	Where			
9	Factor for PSC =2 for MS / PVC/ AC =1.5			
	As both the conditions are satisfied 300 mm. Dia DI K-9 Pipe is proposed.			


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

Block : Durg District : Durg

DESIGN OF PUMPING MACHIENRY (CLEAR WATER)

1	Immediate Stage Population. (As per Statement attached)	64941	Souls
2	Rate of Water Supply.	55	LPCD
3	Intermediate stage requirement. of Pumping	4.234	MLD
4	Rate of pumping.	211675	Lit./Hr.
5	Hours of pumping.	20	Hrs.
6	Designed discharge	5.0802	MLD
7	Lowest suction level.	276.59	M.
8	Lip of A .F./ F.S.L. of ESR =	285.860	M.
9	Static Lift.	9.27	M.
	Say	10.00	M
10	Dia, Type and Class of Pipes. (450 mm to 150 mm)		DI K-9
11	Length of Rising main.	3136.00	M.
12	Rate of frictional losses. As per Pumpaing Mains Design	2.58	M./Km.
13	Frictional losses.	8.091	M.
14	Losses through specials.	0.809	M.
15	Total frictional losses.	8.900	M.
16	Driving head.	2	M.
17	Total head	20.90	M.
	Say	21.00	m
18	Efficiency of pumps	75%	
19	<p>BHP required = Discharge x Total Head / (75 x 60 x 60 x 0.75) Without over = 211675 x 21 x 1 / (75 x 60 x 60 x 0.75) loading 21.951481 H. P Say 22 H.P. Provide 11 BHP triplicate set of Centrifugal pumps to discharge 105837.5 ltr./Hr. against total head of 21 m with 50% standby</p>		


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

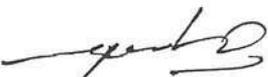
(Total 17 Villages)

Block : Durg District : Durg

CAPACITY CALCULATION OF MBR

1	Design population	2038	:-	64941	Souls
2	Rate of Water Supply		:-	55	LPCD
3	Daily Demand At MBR		:-	2.22	MLD
4	Hours of Pumping		:-	20	Hours
5	Rate of Pumping		:-	111145	LPH
6	Capacity of MBR With 2 Hours detention time		:-	222290	Liters
7	Capacity of Proposed MBR		:-	230000	Liters
8	G.L. at MBR site			291.610 m	
9	LSL of MBR			321.610 m	
10	FSL of MBR			326.610 m	

Hence provide RCC MBR of 2.3 Lakhs liters capacity.



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Branched Water Distribution Network Design Program

GRAVITY MAIN ZONE-1

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

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Title of the Project           : JEVRA ZONE 1
Name of the User              : SWCPL
Number of Pipes               : 21
Number of Nodes               : 22
Number of Commercial Diameters : 20
Peak Design Factor            : 1.2
Minimum Headloss in          m/km : .00005
Maximum Headloss in          m/km : 5
Minimum Residual Pressure    m    : 3
Type of Formula               : Hazen's

```

Pipe Data

```

=====
Pipe  From  To   Length  Diameter  Hazen's  Status
No.   Node  Node    m         mm        Const    (E/P)
-----
  1     1     2     86.00
  2     2     3      5.00
  3     3     4    828.00
  4     4     5    918.00
  5     5     6    812.00
  6     3     7    706.00
  7     7     8    546.00
  8     2     9   1195.00
  9     9    10   1872.00
 10    10    11    827.00
 11     7    12    113.00
 12     8    13     8.00
 13     4    14   1779.00
 14     6    15    12.00
 15     6    16    43.00
 16     9    17    78.00
 17    17    18     7.00
 18    17    19    28.00
 19    11    20    15.00
 20    11    21   602.00
 21    10    22   1377.00
=====

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BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Node Data

Node No.	Peak Factor	Flow lps	Elevation m	Res. Press m	Meet Res. Pres (Y/N)?
1	1.20	0.000	291.61	3.00	
2	1.20	0.000	286.01	3.00	
3	1.20	0.000	286.13	3.00	
4	1.20	0.000	284.01	3.00	
5	1.20	0.000	284.62	3.00	
6	1.20	0.000	286.29	3.00	
7	1.20	0.000	289.53	3.00	
8	1.20	0.000	288.29	3.00	
9	1.20	0.000	289.83	3.00	
10	1.20	0.000	288.02	3.00	
11	1.20	0.000	299.41	3.00	
12	1.20	-2.240	306.97	3.00	
13	1.20	-7.086	305.52	3.00	
14	1.20	-2.963	299.30	3.00	
15	1.20	-0.978	304.39	3.00	
16	1.20	-1.712	303.81	3.00	
17	1.20	0.000	292.91	3.00	
18	1.20	-0.989	308.00	3.00	
19	1.20	-3.338	307.15	3.00	
20	1.20	-1.316	316.15	3.00	
21	1.20	-2.028	314.93	3.00	
22	1.20	-3.078	304.00	3.00	

Reference Node Data

Node No.	Grade Line m
1	321.61

Commercial Diameter Data

Pipe Dia. Int. (mm)	Hazen's Const	Unit Cost Rs /m length
100.0	140.00000	943.00
150.0	140.00000	1324.00

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Commercial Diameter Data cont'd

Pipe Dia. Int. (mm)	Hazen's Const	Unit Cost Rs /m length
200.0	140.00000	1733.00
250.0	140.00000	2284.00
300.0	140.00000	2908.00
350.0	140.00000	3496.00
400.0	140.00000	4237.00
450.0	140.00000	5032.00
500.0	140.00000	6030.00
600.0	140.00000	7862.00
700.0	140.00000	10911.00
750.0	140.00000	12314.00
800.0	140.00000	13822.00
900.0	140.00000	16817.00
1000.0	140.00000	20223.00
1100.0	140.00000	21451.00
1200.0	140.00000	22145.00
1300.0	140.00000	23455.00
1400.0	140.00000	24555.00
1500.0	140.00000	25444.00

Branched Water Distribution Network Design OutPut

Pipe Details

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)	Status (E/P)
1	1	2	30.874	250.0	140.00000	0.13	1.51	86.00	
2	2	3	17.975	200.0	140.00000	0.01	2.00	5.00	
3	3	4	6.784	150.0	140.00000	0.95	1.15	828.00	
4	4	5	3.228	100.0	140.00000	1.91	2.08	918.00	
5	5	6	3.228	100.0	140.00000	1.69	2.08	812.00	
6	3	7	11.191	150.0	140.00000	2.03	2.88	706.00	
7	7	8	8.503	150.0	140.00000	0.95	1.74	546.00	
8	2	9	12.899	200.0	140.00000	1.10	0.92	1195.00	
9	9	10	7.706	150.0	140.00000	0.25	1.43	174.55	
				200.0	140.00000	0.60	0.35	1697.45	
10	10	11	4.013	150.0	140.00000	0.36	0.44	827.00	
11	7	12	2.688	100.0	140.00000	0.17	1.50	113.00	

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Pipe Details cont'd

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)	Status (E/P)
12	8	13	8.503	150.0	140.00000	0.01	1.25	8.00	
13	4	14	3.556	100.0	140.00000	4.43	2.49	1779.00	
14	6	15	1.174	100.0	140.00000	0.00	0.00	12.00	
15	6	16	2.054	100.0	140.00000	0.04	0.93	43.00	
16	9	17	5.192	150.0	140.00000	0.05	0.64	78.00	
17	17	18	1.187	100.0	140.00000	0.00	0.00	7.00	
18	17	19	4.006	100.0	140.00000	0.09	3.21	28.00	
19	11	20	1.579	100.0	140.00000	0.01	0.67	15.00	
20	11	21	2.434	100.0	140.00000	0.74	1.23	602.00	
21	10	22	3.694	100.0	140.00000	3.68	2.67	1377.00	

Node Details

Node No.	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Res Pres. (Y)
1 S	30.874	291.61	321.61	30.00	3.00	
2	0.000	286.01	321.48	35.47	3.00	
3	0.000	286.13	321.47	35.34	3.00	
4	0.000	284.01	320.52	36.51	3.00	
5	0.000	284.62	318.61	33.99	3.00	
6	0.000	286.29	316.92	30.63	3.00	
7	0.000	289.53	319.43	29.90	3.00	
8	0.000	288.29	318.49	30.20	3.00	
9	0.000	289.83	320.37	30.54	3.00	
10	0.000	288.02	319.52	31.50	3.00	
11	0.000	299.41	319.16	19.75	3.00	
12 T	-2.688	306.97	319.26	12.29	3.00	
13 T	-8.503	305.52	318.47	12.95	3.00	
14 T	-3.556	299.30	316.09	16.79	3.00	
15 T	-1.174	304.39	316.92	12.53	3.00	
16 T	-2.054	303.81	316.88	13.07	3.00	
17	0.000	292.91	320.32	27.41	3.00	
18 T	-1.187	308.00	320.32	12.32	3.00	
19 T	-4.006	307.15	320.23	13.08	3.00	
20 T	-1.579	316.15	319.15	3.00	3.00	
21 T	-2.434	314.93	318.42	3.49	3.00	
22 T	-3.694	304.00	315.84	11.84	3.00	

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Cost Summary

Diameter (mm)	Length (m)	Cost (1000 Rs)	Cum. Cost (1000 Rs)
100.0	5706.00	5380.76	5380.76
150.0	3167.55	4193.83	9574.59
200.0	2897.45	5021.29	14595.88
250.0	86.00	196.42	14792.30

Pipe-wise Cost Summary

Pipe No	Diameter (mm)	Length (m)	Cost (1000 Rs)	Cum. Cost (1000 Rs)
1	250.0	86.00	196.42	196.42
2	200.0	5.00	8.66	205.09
3	150.0	828.00	1096.27	1301.36
4	100.0	918.00	865.67	2167.03
5	100.0	812.00	765.72	2932.75
6	150.0	706.00	934.74	3867.50
7	150.0	546.00	722.90	4590.40
8	200.0	1195.00	2070.94	6661.33
9	150.0	174.55	231.10	6892.44
	200.0	1697.45	2941.68	9834.12
10	150.0	827.00	1094.95	10929.07
11	100.0	113.00	106.56	11035.63
12	150.0	8.00	10.59	11046.22
13	100.0	1779.00	1677.60	12723.82
14	100.0	12.00	11.32	12735.13
15	100.0	43.00	40.55	12775.68
16	150.0	78.00	103.27	12878.95
17	100.0	7.00	6.60	12885.55
18	100.0	28.00	26.40	12911.96
19	100.0	15.00	14.15	12926.10
20	100.0	602.00	567.69	13493.79
21	100.0	1377.00	1298.51	14792.30

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

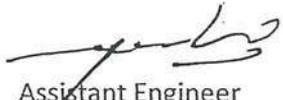
(Total 17 Villages)

Block : Durg District : Durg

CAPACITY CALCULATION OF MBR - 2

1	Design populatio	2038	:-	34459	Souls
2	Rate of Water Supply		:-	55	LPCD
3	Daily Demand MBR for Year 2038		:-	2.51	MLD
4	Hours of Pumping		:-	20	Hours
5	Rate of Pumping		:-	125650	LPH
6	Capacity of MBR With 2 Hours detention time		:-	251300	Liters
7	Capacity of Proposed MBR		:-	255000	Liters
8	G.L. at MBR site			305.20 m	
9	LSL of MBR			335.20 m	
10	FSL of MBR			340.20 m	

Hence provide RCC Clear Water Collection Sump of 2.55 Lakhs liters capacity.


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Branched Water Distribution Network Design Program

GRAVITY MAIN ZONE-2

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Echoing Input Variables

Title of the Project : JEVRA ZONE 2
 Name of the User : SWCPL
 Number of Pipes : 25
 Number of Nodes : 26
 Number of Commercial Diameters : 10
 Peak Design Factor : 1.2
 Minimum Headloss in m/km : .0005
 Maximum Headloss in m/km : 5
 Minimum Residual Pressure m : 3
 Type of Formula : Hazen's

Pipe Data

Pipe No.	From Node	To Node	Length m	Diameter mm	Hazen's Const	Status (E/P)
1	1	2	180.00			
2	2	3	7.00			
3	3	4	32.00			
4	4	5	471.00			
5	5	6	1715.00			
6	3	7	3151.00			
7	7	8	19.00			
8	8	9	1920.00			
9	9	10	1844.00			
10	10	11	2150.00			
11	11	12	337.00			
12	11	13	1196.00			
13	2	14	696.00			
14	4	15	13.00			
15	5	16	52.00			
16	6	17	706.00			
17	6	18	2282.00			
18	7	19	39.00			
19	8	20	42.00			
20	9	21	2414.00			
21	10	22	43.00			
22	12	23	39.00			
23	12	24	505.00			
24	13	25	17.00			
25	13	26	30.00			

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Node Data

Node No.	Peak Factor	Flow lps	Elevation m	Res. Press m	Meet Res. Pres (Y/N)?
1	1.20	0.000	305.20	3.00	
2	1.20	0.000	301.24	3.00	
3	1.20	0.000	301.76	3.00	
4	1.20	0.000	299.71	3.00	
5	1.20	0.000	301.86	3.00	
6	1.20	0.000	307.65	3.00	
7	1.20	0.000	290.00	3.00	
8	1.20	0.000	290.42	3.00	
9	1.20	0.000	286.67	3.00	
10	1.20	0.000	285.52	3.00	
11	1.20	0.000	283.43	3.00	
12	1.20	0.000	291.55	3.00	
13	1.20	0.000	282.15	3.00	
14	1.20	-0.985	316.00	3.00	
15	1.20	-1.231	316.46	3.00	
16	1.20	-2.462	318.23	3.00	
17	1.20	-2.866	327.95	3.00	
18	1.20	-2.571	310.71	3.00	
19	1.20	-1.722	307.03	3.00	
20	1.20	-2.706	305.75	3.00	
21	1.20	-0.727	296.84	3.00	
22	1.20	-2.483	300.21	3.00	
23	1.20	-2.184	306.96	3.00	
24	1.20	-2.522	307.64	3.00	
25	1.20	-2.803	297.34	3.00	
26	1.20	-3.822	297.76	3.00	

Reference Node Data

Node No.	Grade Line m
1	335.20

Commercial Diameter Data

Pipe Dia. Int. (mm)	Hazen's Const	Unit Cost Y /m length
100.0	140.00000	943.00
150.0	140.00000	1324.00
200.0	140.00000	1733.00
250.0	140.00000	2284.00
300.0	140.00000	2908.00
350.0	140.00000	3496.00
400.0	140.00000	4237.00
450.0	140.00000	5032.00
500.0	140.00000	6030.00
600.0	140.00000	7862.00

Branched Water Distribution Network Design Output

Pipe Details

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m.)	Length (m)	Status (E/P)
1	1	2	34.901	250.0	140.00000	0.35	1.94	180.00	
2	2	3	33.719	250.0	140.00000	0.01	1.43	7.00	
3	3	4	10.956	150.0	140.00000	0.09	2.81	32.00	
4	4	5	9.479	150.0	140.00000	1.00	2.12	471.00	
5	5	6	6.524	150.0	140.00000	1.82	1.06	1715.00	
6	3	7	22.763	200.0	140.00000	8.32	2.64	3151.00	
7	7	8	20.696	200.0	140.00000	0.04	2.11	19.00	
8	8	9	17.449	200.0	140.00000	3.10	1.61	1920.00	
9	9	10	16.577	200.0	140.00000	2.71	1.47	1844.00	
10	10	11	13.597	150.0	140.00000	8.80	4.13	2129.21	
				200.0	140.00000	0.02	0.96	20.79	
11	11	12	5.647	150.0	140.00000	0.27	0.80	337.00	
12	11	13	7.950	150.0	140.00000	1.83	1.53	1196.00	
13	2	14	1.182	100.0	140.00000	0.23	0.33	696.00	
14	4	15	1.477	100.0	140.00000	0.01	0.77	13.00	
15	5	16	2.954	100.0	140.00000	0.09	1.73	52.00	
16	6	17	3.439	100.0	140.00000	0.87	2.35	370.23	
				150.0	140.00000	0.11	0.33	335.77	
17	6	18	3.085	100.0	140.00000	4.37	1.91	2282.00	
18	7	19	2.066	100.0	140.00000	0.04	1.03	39.00	

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Pipe Details cont'd

Pipe No.	From Node	To Node	Peak Flow (lps)	Diam (mm)	Hazen's Const	HL (m)	HL/1000 (m)	Length (m)	Status (E/P)
19	8	20	3.247	100.0	140.00000	0.09	2.14	42.00	
20	9	21	0.872	100.0	140.00000	0.45	0.19	2414.00	
21	10	22	2.980	100.0	140.00000	0.08	1.86	43.00	
22	12	23	2.621	100.0	140.00000	0.06	1.54	39.00	
23	12	24	3.026	100.0	140.00000	0.93	1.84	505.00	
24	13	25	3.364	100.0	140.00000	0.04	2.35	17.00	
25	13	26	4.586	100.0	140.00000	0.12	4.00	30.00	

Node Details

Node No.	Peak Flow (lps)	Elevation (m)	H G L (m)	Cal Pres (m)	Spc Pres (m)	Meet Res Pres. (Y)
1 S	34.901	305.20	335.20	30.00	3.00	
2	0.000	301.24	334.85	33.61	3.00	
3	0.000	301.76	334.83	33.07	3.00	
4	0.000	299.71	334.74	35.04	3.00	
5	0.000	301.86	333.75	31.89	3.00	
6	0.000	307.65	331.93	24.28	3.00	
7	0.000	290.00	326.51	36.51	3.00	
8	0.000	290.42	326.47	36.05	3.00	
9	0.000	286.67	323.37	36.70	3.00	
10	0.000	285.52	320.66	35.14	3.00	
11	0.000	283.43	311.85	28.42	3.00	
12	0.000	291.55	311.57	20.02	3.00	
13	0.000	282.15	310.02	27.87	3.00	
14 T	-1.182	316.00	334.62	18.62	3.00	
15 T	-1.477	316.46	334.74	18.28	3.00	
16 T	-2.954	318.23	333.65	15.42	3.00	
17 T	-3.439	327.95	330.95	3.00	3.00	
18 T	-3.085	310.71	327.56	16.85	3.00	
19 T	-2.066	307.03	326.48	19.45	3.00	
20 T	-3.247	305.75	326.38	20.63	3.00	
21 T	-0.872	296.84	322.93	26.09	3.00	
22 T	-2.980	300.21	320.59	20.38	3.00	
23 T	-2.621	306.96	311.52	4.56	3.00	
24 T	-3.026	307.64	310.64	3.00	3.00	
25 T	-3.364	297.34	309.98	12.64	3.00	
26 T	-4.586	297.76	309.90	12.14	3.00	

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

Cost Summary

Diameter (mm)	Length (m)	Cost (1000 Y)	Cum. Cost (1000 Y)
100.0	6542.23	6169.32	6169.32
150.0	6215.98	8229.95	14399.28
200.0	6954.79	12052.66	26451.93
250.0	187.00	427.11	26879.04

Pipe-wise Cost Summary

Pipe No	Diameter (mm)	Length (m)	Cost (1000 Y)	Cum. Cost (1000 Y)
1	250.0	180.00	411.12	411.12
2	250.0	7.00	15.99	427.11
3	150.0	32.00	42.37	469.48
4	150.0	471.00	623.60	1093.08
5	150.0	1715.00	2270.66	3363.74
6	200.0	3151.00	5460.68	8824.42
7	200.0	19.00	32.93	8857.35
8	200.0	1920.00	3327.36	12184.71
9	200.0	1844.00	3195.65	15380.36
10	150.0	2129.21	2819.07	18199.44
	200.0	20.79	36.03	18235.47
11	150.0	337.00	446.19	18681.65
12	150.0	1196.00	1583.50	20265.16
13	100.0	696.00	656.33	20921.49
14	100.0	13.00	12.26	20933.74
15	100.0	52.00	49.04	20982.78
16	100.0	370.23	349.13	21331.91
	150.0	335.77	444.56	21776.47
17	100.0	2282.00	2151.93	23928.39
18	100.0	39.00	36.78	23965.17
19	100.0	42.00	39.61	24004.77
20	100.0	2414.00	2276.40	26281.18
21	100.0	43.00	40.55	26321.72
22	100.0	39.00	36.78	26358.50
23	100.0	505.00	476.21	26834.72
24	100.0	17.00	16.03	26850.75
25	100.0	30.00	28.29	26879.04

BRANCH: Branched Water Distribution Design Program - (C) The World Bank

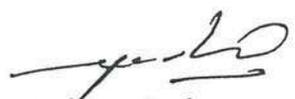
JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

ABSTRACT OF STORAGE CAPACITY OF OHT's

Sr. No.	Village Name	Domestic Demand @ 55 lpcd including				Independent Capacities	Existing Capacity	Final Capacities Adopted
		Present Stage	Intermediate Stage	Capacity of OHT	Adopted Capacity			
		2023	2038	2038	2038			
1	BHATGAON	0.1466	0.1730	86500	86500	86500	75000	0
2	SIRSA	0.4638	0.5473	273650	273650	273650	0	280000
3	JEORA	0.2833	0.3342	167100	167100	167100	135000	40000
4	KHAPRI (K)	0.0861	0.1016	50800	50800	50800	60000	0
5	KUTELABHATA	0.1327	0.1566	78300	78300	78300	80000	0
6	CHIKHLI	0.2014	0.2377	118850	118850	118850	110000	0
7	KACHANDUR	0.1939	0.2289	114450	114450	114450	110000	0
8	SAMODA	0.1761	0.2078	103900	103900	103900	70000	40000
9	DHAUR	0.3062	0.3613	180650	180650	180650	150000	40000
10	KHEDAMARA	0.1876	0.2214	110700	110700	110700	100000	0
11	KARANJA BHILAI	0.2898	0.3420	171000	171000	171000	110000	70000
12	BASIN	0.1683	0.1986	99300	99300	99300	90000	0
13	ARSNARA	0.1625	0.1918	95900	95900	95900	120000	0
14	RAWELIDIH	0.1430	0.1687	84350	84350	84350	60000	0
15	BOREGAON	0.1651	0.1948	97400	97400	97400	120000	0
16	NANKATTI	0.4336	0.5117	255850	255850	255850	150000	110000
17	JHENJHRI	0.0476	0.0561	28050	28050	28050		40000
TOTAL				2088700	2116750	2116750	1540000	620000


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering
Division
Durg (C.G)

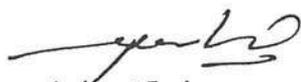
JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

ABSTRACT OF STORAGE CAPACITY OF OHT's

Sr. No.	Name of Village	Capacity		GL	LSL	FSL	Flow in LPS	Flow for Exst. OHT	Flow for Prop. OHT	Staging
		Existing	Proposed							
1	BHATGAON	75000	0	289.967	301.967	306.967	2.2396	2.2396	0	12
2	SIRSA	0	280000	288.521	300.521	305.521	7.0869	0	7.0869	12
3	JEORA	135000	40000	292.155	302.155	307.155	4.3276	3.3384	0.9892	10
				293.000	303.000	308.000				
4	KHAPRI (K)	60000	0	299.154	311.154	316.154	1.316	1.316	0	12
5	KUTELABHATA	80000	0	297.926	309.926	314.926	2.0278	2.0278	0	12
6	CHIKHLI	110000	0	287.000	299.000	304.000	3.0776	3.0776	0	12
7	KACHANDUR	110000	0	282.300	294.300	299.300	2.963	2.963	0	12
8	SAMODA	70000	40000	288.811	300.811	305.811	2.6899	1.7118	0.9781	12
				287.386	299.386	304.386				
9	DHAUR	150000	40000	301.235	313.235	318.235	4.6783	3.6934	0.9849	12
				299.461	311.461	316.461				
				299.000	311.000	316.000				
10	KHEDAMARA	100000	0	310.947	322.947	327.947	2.8669	2.8669	0	12
11	KARANJA BHILAI	110000	70000	288.751	300.751	305.751	4.4283	2.7062	1.7221	12
				290.030	302.030	307.030				
12	BASIN	90000	0	293.771	305.771	310.771	2.5718	2.5718	0	12
13	ARSNARA	120000	0	283.210	295.210	300.210	2.4827	2.4827	0	12
14	RAWELIDIH	60000	0	289.964	301.964	306.964	2.1841	2.1841	0	12
15	BOREGAON	120000	0	290.644	302.644	307.644	2.522	2.522	0	12
16	NANKATTI	150000	110000	282.764	292.764	297.764	6.625	3.8221	2.8029	10
				282.342	292.342	297.342				
17	JHENJHRI	0	40000	279.840	291.840	296.840	0.7269	0	0.7269	12


 Assistant Engineer
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 Public Health Engineering Division
 Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Pumping Mains Data

Pumping Main	From	To	Demand			LSL of Intake Well	GL at OHT/MB	Leaf of Aration Fountain	Length	Diameter	Type	Losses
			2023	2038	2053							
Raw Water	From : Proposed Intake Well	To : Proposed WTP	3.73708	4.4099	4.93323	268.67		283.59	2184	300	D.I. K-9	
Pumping Main	From	To	Demand			LSL of WTP		FSL of OHT/MBR	Length	Diameter	Type	Losses
Clear Water	Clear Water Sump	Prop. MBR-1	3.5876	4.2335	4.7359	276.589	285.86	285.86	3136	300	D.I. K-9	8.0906
	Junction 1	Prop. MBR-1	1.6839	1.9871	2.2229	285.86	291.61	326.61	80	200	D.I. K-9	0.36645
	Junction 1	Prop. MBR-2	1.9037	2.2464	2.513	285.86	305.20	340.20	8929	250	D.I. K-9	17.3141
										12145		8.0906

Abstract of Pumping Mains

Diameter	Length
300	3136
250	8929
200	80
12145	


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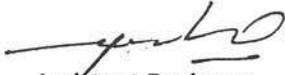
JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Abstract - Gravity Mains

Diameter	Zone I	Zone II	Dia wise Total
100 mm Dia. D.I. K-7 pipes	5706	6543	12249
150 mm Dia. D.I. K-7 pipes	3168	6216	9384
200 mm Dia. D.I. K-7 pipes	2899	6955	9854
250 mm Dia. D.I. K-7 pipes	86	187	273
Zone Wise Total	11859	19901	31760


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

GENERAL ABSTRACT

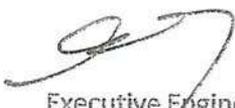
S.R No	Particulars	Amount (Rs. In Lakhs)												
1	Preliminary	9.53												
2	Land Acquisition	67.20												
3	RCC Intake Well - 6 m dia, & Total Height of Structure 24.148 m.	121.21												
4	Raw Water Pump with 50% Standby 16 HP V.T. Pump, Having Discharge 114841.035 LPH With a Head 25 m. with 50% standby	32.08												
5	Raw Water Pumping Main From Intake Point to WTP Site 300 mm Dia D.I. K-9 Pipes, & Length 2184m.	92.53												
6	Water Treatment Plant Capacity 4.5 MLD	192.63												
7	Clear Water Pumps 11 HP Centrifugal Pump, Having Discharge 105837.5 LPH With a Head 0.75 m. with 50% Standby	30.63												
8	Clear Water Pumping Mains From WTP to MBR, of 200mm Dia., Length = 3136 m. <i>(300 To 200 mm. Total = 12145m.) Sub-estimate</i>	540.55												
9	RCC MBRs MBR-1 MBR-2	238.35												
	Capacity in KL 230 KL 255 KL													
10	Clear Water Gravity Mains Total length 31760 m.	781.35												
	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Diameter</th> <th style="width: 30%;">Total</th> </tr> </thead> <tbody> <tr> <td>100 mm Dia. D.I. K-7 pipes</td> <td style="text-align: right;">12249</td> </tr> <tr> <td>150 mm Dia. D.I. K-7 pipes</td> <td style="text-align: right;">9384</td> </tr> <tr> <td>200 mm Dia. D.I. K-7 pipes</td> <td style="text-align: right;">9854</td> </tr> <tr> <td>250 mm Dia. D.I. K-7 pipes</td> <td style="text-align: right;">273</td> </tr> <tr> <td>300 mm Dia. D.I. K-7 pipes</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>	Diameter	Total	100 mm Dia. D.I. K-7 pipes	12249	150 mm Dia. D.I. K-7 pipes	9384	200 mm Dia. D.I. K-7 pipes	9854	250 mm Dia. D.I. K-7 pipes	273	300 mm Dia. D.I. K-7 pipes	0	
Diameter	Total													
100 mm Dia. D.I. K-7 pipes	12249													
150 mm Dia. D.I. K-7 pipes	9384													
200 mm Dia. D.I. K-7 pipes	9854													
250 mm Dia. D.I. K-7 pipes	273													
300 mm Dia. D.I. K-7 pipes	0													
11	Construction of Staff Quarters	71.65												

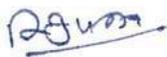
S.R No	Particulars	Amount (Rs. In Lakhs)
12	Bulk Flow Meter at each village Inlet Junction 100 mm 15 Nos. ✓ 150 mm 3 Nos. ✓ 200 mm 1 Nos. ✓	24.18
13	Inspection Vehicles	23.92
14	Miscellaneous Compound Wall, Gates, Approach WBM Road for Intake and WTP Sites, Computer peripherals, Group Mobile Connection and Plantation	174.58
15	Provision for Automation and SCADA GIS enabled server / cloud based SCADA system to monitor and control in real-time operation of various components of the Scheme.	155.00

	Net cost	2555.39
Add 1% for Contingencies		25.55
	Gross cost	2580.95

Rupees Twenty Five Crore Eighty Lakh Ninety Five Thousand Only


Assistant Engineer
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Executive Engineer
Public Health Engineering Division
Durg (C.G)


Superintending Engineer
Public Health Engineering Circle
Durg (C.G)

Estimate No. 90/TS/CE/20-21/Date 28-5-2021

Scheme Technically Sanctioned

For Rs. 2580.95 Lacs

(Rupees Twenty five crore eighty lacs ninety five thousand only.)


Chief Engineer
Public Health Engineering Dept.
Raipur Zone Raipur (C.G.)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

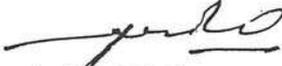
Block : Durg District : Durg

Estimate No. - 1

PRELIMINARY

Estimated Cost Rs. 9.53 Lakhs

S.No.	Item	Quantity	Rate	Amount
	Detailed Survey			
1	Chain and compass survey. (PHE SOR I. No. 1.1 of P. No. 8) (Clear Water Pumping Main and Distribution Network.	46.09 Kms	1038.00 Km	47840.38
2	Levelling Head works.more than 10 but up to 15m interval. (PHE SOR I. No. 1.5(1.5.3) of P. No. 8) (Clear Water Pumping Main and Distribution Network.	46.09 Kms	1038.00 Km	47840.38
3	Fly levelling for fixing temporary bench marks UPTO 15 m interval (PHE SOR I. No. 1.4.1 of P. No. 8)	46.09 Kms	1038.00 Km	47840.38
4	Double levelling for transfer of bench marks above 15 m interval. (I. No. 1.6(1.6.1) of P. No. 8) (Clear Water Pumping Main and Distribution Network.)	11.52 Kms	2076.00 Km	23920.19
1	To carry out survey for item no 1.1 to 1.6 by total station electronic Instrument the rates will be increased by 15% for Computer Engineer, other computer staff, computer stationary & plotting by computer as directed by Engineer-in-Charge & additional 10% for profit of the contractor (PHE SOR I. No. 3.4 of P. No. 7)	30% of Survey Items		50232.40
2	Hydraulic Design through software including necessary stationery auto-cad drawing in hard & soft copy, input and outputs of different components such as			
	• Raw Water Pumping Main	2.18 Kms	8800.00	19184.00
	• Clear Water Pumping Main	12.15 Kms	8800.00	106920.00
	• Gravity Mains	31.76 Kms	8800.00	279488.00
3	Compuation and preparation of DPR having details such as salient features, graphics, technical report, general abstract, detailed cum abstract cost estimates of each components, O&M Cost estimate and revenue realization alongwith drawings etc. complete.	01 Job	200000.00	200000.00
4	Preparation of Various drawings			
	a. Index map	1	5000.00	5000.00
	b. Flow Diagram	1	2000.00	2000.00
	c. Satellite image map	1	20000.00	20000.00
	d. Key Plan	1	5000.00	5000.00
5	Preparation of DPR booklets. (2 Volumes per sets)	10 Sets	12000.00	120000.00
			Add GST @ 18%	145408.39
			Total	953232.79
			Say	Rs. 9.53 Lakhs.


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

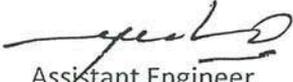
Block : Durg District : Durg

Estimate No. - 2

LAND ACQUISITION

S.R No	Particulars	Estimated Cost Rs.		67.20	Lakhs
		Qty	Rate	Per	Amount (Rs. In Lakhs)
1	Provision for procurement of land for various components of the project like Head works, WTP, raw water pumping main, clear water pumping mains, over head service reservoir and distribution network..				
	For WTP	5	Acres		
	For Intake Well	0.5	Acres		
	For MBR & OHT's Where ever required.	0.5	Acres		
	Total	6		10	60.00

Total Rs. 60.00
By Adding GST @12% 67.20
Say 67.20
Lakhs


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JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 3

RCC Intake Well - 6 m dia, & Total Height of Structure 24.148 m.

Estimated Cost Rs. 121.21 Lakhs

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)	
1	2	3	4	5	6	7	8	9	10	
1	Providing, constructing coffer dam in river basin/dam storages as per type design including excavation, filling the middle portion with B.C. soil (in gunny bags if required). Providing impervious/semipervious materials on both side of B.C. soil (in gunny bags if required) including ramming compacting to the satisfaction of Engineer-in-Charge, till the completion of work including dismantling coffer dam after completion of works and disposing off the materials as directed by the Engineer-in-charge. (PHE SOR I. No. 24.1 of P. No. 268)									
	For construction of coffer dam	x 80 m x (4+12) m / 2 x 5 m				3200.000	540	Cum	17.28	
2	Excavation in general in In soft soil, soft murum, sand, hard murum, sand, hard murum with boulder sin wet or dry condition for Head Works i.e. Intake well, Connecting Pipe, Jack Well, Pump House, Supply Well, etc. for lift 0 to 1.5 M and lead of 150 M including barricading, guarding, disposing off surface excavated stuff within aradius of 0.5 km as directed by Engineer-in-charge, etc. complete excluding refilling. (PHE SOR I. No. 2.33(2.33.1 & 2.33.3) of P. No. 25)									
	For Intake well									
	Lift 0 to 1.5 m	1.00	0.785	17.05	17.05	1.50	342.300	185	Cum	0.63
	Lift 1.5 to 3 m	1.00	0.785	16.05	16.05	1.50	303.330	198	Cum	0.60
	Lift 3 to 4.5 m	1.00	0.785	15.05	15.05	1.50	266.710	211	Cum	0.56

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)	
1	2	3	4	5	6	7	8	9	10	
3	Excavation in general in hard material comprising of soft rock, hard rock, Manjara rock, etc, by blasting/controlled blasting/ chiselling as required in wet or dry condition for Head Works i.e. Intake Well, Connecting Pipe, Jack Well, Pump House, supply Well, etc. for lift 0 to 1.5M and lead of 150M including barricading, guarding, disposing off surplus excavated stuff within a radius of 0.5km as directed by Engineer-in-charge, excluding refilling.									
	Lift 4.5 to 6 m	1.00	0.785	14.05	14.05	0.51	79.65	508	Cum	0.40
	For Bridge Foundation									
	Lift 0 to 1.50 m	5.00	2.000	3.30	3.30	1.50	163.35	508	Cum	0.83
	Lift 1.50 to 3.0 m	5.00	2.000	2.30	2.30	1.50	79.35	546	Cum	0.43
4	Pumping out water caused by springs tidal or river seepage, broken water main or drains and like 2 nos. Pumps of 15 KL/hr discharge run for 8 hr for 90 days (PHE SOR I.No.2.9)	90	8	15	2	21600.00	51	KL	11.016	
5	Providing & laying mechanically mixed cement concrete 20 mm maximum size graded crushed stone excluding cost of centring & shuttering. (PHE SOR I. No. 2.21(2.21.1) of P. No. 21) In plinth and foundation M-20 For intake well foundation For approach bridge columns foundation	1x0.785x8.05x8.05x0.3 m				15.26				
		33 x 2 x 2.3x2.3 x 1^2 x 0.30				12.03				
		Total				27.29	4484	Cum	1.22	
6	Providing and laying Plain/ Reinforcement cement concrete in substructure or complete section including cost of form work staging/bracing and shuttering complete as per drawing and technical specification and as per relevant I.S. Standard (Height above average ground level). (PHE SOR I. No. 2.23 of P. No. 21) R.C.C. M-30 Grade Foundation of intake well Foundation of Bridge Bottom Square Portion Trapezoidal	3.14x 7.75x 1.2 x 0.60 m				17.52				
		4.83 x 2 x 2 x 2 x .45				17.39				
		4.83 x 0.60/3 x((2 x 2 + 0.6 x 0.6				3.03				
						37.94	5425	Cum	2.06	

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)
1	2	3	4	5	6	7	8	9	10
7	Providing and Laying plain/ Reinforcement cement concrete in super structure ring beam Dom, walls, beam etc section including cost of form work staging/bracing and shuttering complete as per drawing and technical specification and as per relevant clauses of I.S. Standard including pumping charges of concrete. (PHE SOR I. No. 2.24 of P. No. 21)								
	Wall from Av GL 275.686 m.								
	Height up to 5m								
	Below GL					$0.785 \times (7.2^2 - 6^2) \times 5$	62.17		
	Above GL					Height of Wall 3.32			
						$0.785 \times (7.2^2 - 6^2) \times 3.32$	41.28		
						$0.785 \times (6.6^2 - 6^2) \times 1.48$	8.78		
	Beam at Discharge floor level					$4 \times 5 \times 0.45 \times 1.6$	14.40		
	Ring beam at pump house					$3.14 \times 6.75 \times 1.6 \times .3$	10.17		
	Floor slab					$(0.785 \times 7.5 \times 7.5 \times 0.25)$	11.04		
	Gallery					$3.14 \times 8.5 \times 1 \times .1$	2.67		
	Approach bridge columns					$4.83 \times 2 \times 0.785 \times 0.50^2 \times$	9.48		
	Cross beams of approach					$4.83 \times 3 \times 3.5 \text{ m} \times 0.30 \times$	9.13		
	Longitudinal Beam for approach					$1 \times 2 \times .5 \times .8 \times 24.148 \text{ m Length}$	19.32		
	Approach bridge slab					$1 \times 24.148 \text{ m} \times 3.5 \text{ m} \times 0.20$	16.90		
	Braces of Approach Bridge Staging					$4.83 \times 2 \times 3 \times 4.5 \times 0.3 \times 0.5$	19.56		
							224.91	6164	13.86
	Height from 5 m to 10 m								
	Below GL					$0.785 \times (7.2^2 - 6^2) \times 1.22$	15.17		
						$0.785 \times (7.75^2 - 6^2) \times 3.78$	71.40		
	Above GL					Height of Wall 3.32			
						$0.785 \times (6.6^2 - 6^2) \times 3.32$	19.70		

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)
1	2	3	4	5	6	7	8	9	10
	Approach bridge columns Ring beam at pump house Floor slab	0.785 x (6.4 ² - 6 ²) x 1.48 6 x 2 x 0.785 x 0.50 ² x 3 3.14 x 6.75 x 1.6 x .3 (0.785 x 7.5 x 7.5 x 0.3				5.76 5.69 10.17 13.25 125.97	6411		8.08
	Height beyond 10 m Height from 10 m to 15 m Below GL Above GL Beam at Discharge floor level Ring beam at pump house Floor slab	0.785 x (7.75 ² - 6 ²) x 1.22 Height of Wall 4.52 0.785 x (6.4 ² - 6 ²) x 4.52 4 x 5 x 0.45 x 1 .6 m 3.14 x 6.75 x 1.6 x .2 (0.785 x 7.5 x 7.5 x 0.12				17.60 14.40 6.78 13.25 52.03	6657		3.46
8	Providing and placing in position cold twisted or un-coated HYSD steel brand hot rolled deformed steel reinforcement for R.C.C.work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. (PHE SOR I. No. 2.25.1(2.25.1.1) of P. No. 23) Sub Structure 0.8% of R.C.C. work M-30 i.e. 440.849044564 Cum x 1% x 7850 Kg					440.85 27685.32	55	Kg	15.23
9	Providing and fixing sliding shutter with M.S. Sheet 1mm thick, frame and diagonal braces of 40x40x6mm angle iron, 3.0mm thick M.S. gusset plates at junctions and corners, 25mm dia pulley, 40x40x6mm angle and T-iron guide at top and bottom respectively including applying a priming coat of red oxide zinc chromate primer (PWD SOR 2015 Item No. 9.11 P.No.80) For entry gate	2 no. x 2.10m x 3.0 m				12.60	3330	Sqm	0.42

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)
1	2	3	4	5	6	7	8	9	10
10	Providing and fixing aluminium work for doors, windows, ventilators and partitions made out of extruded aluminium standard sections (main section with minimum 1.5mm thickness) conforming to IS: 733, IS: 1285mitred and jointed mechanically including aluminium cleats, neoprene weather stripping gasket beveled edge beading, screws duly fixed in wall/ floor with fixing clips or hold fasteners or bolts and nuts as required aluminium sections shall be anodized transparent or dyed to approved shade according to IS: 1868, minimum anodic coating shall be of grade AC-15. (Glazing to be paid for separately: For shutter of doors, windows & ventilators including providing and making provision for fixing of fitting wherever required including the cost of PVC/neoprene gasket required (Fittings shall be paid for separately). (PWD SOR 2015 Item No.9.47.2)								
	Windows	8 nos. x 1.20m x 1.00m				192.00	338	Kg	0.65
11	Steel work is welded in built-up (i) For ventllators (ii) Extended M.S. spindle with wheel for operation of sluice valves.	4 nos. x 0.60m x 0.45m 3 nos. x 1500 Kg.				21.60 4500.00			
						4521.60	71	Kg	3.21
12	Providing and fixing double flanged cast iron (horizontal cast) pipe as per IS : 7181 of 2.75 M length. (PHE SOR I. No. 5.5 of P. No. 55) 400 mm diameter	2 rows x 3 nos. = 6 nos.				6.00	34173	Each	2.05
13	Providing and fixing M.S. sluice gates PN 1.0 in position as per detailed drawing and specification including cost of all materials, labour, operating pedestal, connecting rod, painting with three coats of anti-corrosive paint etc. complete as directed by Engineer-in-charge. (PHE SOR I. No. 24.13)								
		1790				1790.00	91.20	Each	1.63

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)
1	2	3	4	5	6	7	8	9	10
14	<p>Providing, laying and jointing of galvanized Iron(MS) Pipes with specials (such as bends, elbows, tees etc) class light, medium & heavy including testing of joints, cost of pipes, specials and jointing materials all complete. Pipes and sockets Conforming to IS-1239/2004 Part-I & Part-II. (PHE SOR I. No. 9.1 of P. No. 139)</p> <p>25 mm dia medium class For railing at stairs and approach bridge</p>	3 x 3.14 x 12 m = 77m 2 x 3 x 24.148 m				113.04 144.89 257.93	211	m	0.54
15	<p>Providing and fixing in position M.S. ladder 0.50 M wide consisting of 75x10mm M.S. flats as stringers and 16 mm dia M.S. bars in double rows as steps placed at 25 cm/c including cost of material and labour involved, welding, anchoring and applying 3 coat of anti-corrosive paint, etc. complete as directed by Engineer-in-charge. (PHE SOR I. No. 29.5 of P. No. 302)</p> <p>M.S. ladder from discharge floor to roof of pump house.</p>					12.00	2933	m	0.35
16	<p>Providing & fixing inlet ports of dia 6 m each with strainer and operating sluice valve fitted such that can be operated from Discharge floor level</p>					3.00	81000	each	2.43
17	<p>Providing & fixing Grab bucket of capacity 1.00 cum with 15 MB section at discharge floor level & fitted with suitable capacity of electric otor, wire rope for vertical & transversal movement of Grab bucket</p>					1.00	350000	each	3.50
18	<p>Providing & fixing lightening arrestor</p>					1.00	45000	each	0.45
19	<p>Providing and fixing in position C.I./ M.S. steps or 22 mm dia M.S. bar step with proper anchorage etc. and providing and applying 3 coats of anti-corrosive paint etc. complete as directed by Engineer-in-charge. (CG PHE SOR It. No. 24.12)</p>					17.00	360	Rmt	0.06

It. No	Particulars	No.	L	B	H	Quantity	Rate	Per	Amount (Rs. in Lakhs)
1	2	3	4	5	6	7	8	9	10
20	Provision for providing & fixing of 5 T. capacity Gantry crane at pump house including arrangement or movement on Gantry beam for lifting of pumps & motor in pump house during the Brake down					1.00	150000	Tonne	1.500
21	Finishing walls with water proofing cement paint of required shade to give an even shade. On new work (Two or more coats applied @ (PWD SOR 15 I.No. 14.14.1 P. 137-138) 3.14x7.2x309.325 3.14x6x309.325 2x24.148x1.5	6993.22 5827.68 72.44 12893.3				12893.35	41	sqm	5.286
22	Provision for Approach road at Jack well site. Length 100 m (As per Rate Analysis Pg. No. 88)					100.00	2316	Rmt	2.316
23	Providing neoprene bearings on pier cap and abutment for bridge					4.83	15000	each	0.724
24	Provision for approach ramp 10 m length					10.00	30000	each	3.000
25	Providing 30 cm thick hard packed stone pitching with 59% of the individual stones of 30 cm depth including laying, finishing etc. but excluding slope cutting of embankment Including Labour (WRD SOR 2010 I.No.2122b P.No.171)		2	24.15	10	482.96	339	sqm	1.64
26	Transportation of pitching stone lead 30 km (313.8) Boulder, laterite, rubble, pitching stones, and excavated hard rock 115% of metal transportation rate (WRD SOR 2010 I.No.2903(3) P.No.236)					300.00	361	cum	1.083
27	Collection of pitching stone, size 28 to 32cm and not less than 0.024 cum (without dressing)- (WRD SOR 2010 I.No.513 P.No.43)					300.00	566	cum	1.698

TOTA 108.22

By Adding GST @12% 121.21

Say 121.21

(Rupees One Crore Twenty One Lakh Twenty One Thousand Only)


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 4

RAW WATER PUMPING MACHINERY AT INTAKEWELL

ABSTRACT

Estimated Cost Rs. 32.08 Lakhs

Quantity	Items	Rate	Unit	Amount
	ITEM No. 1 Providing, erecting & giving test & trial of Centrifugal pumpset directly coupled motor with allied equipments as under			
	1) Centrifugal pumps with motor			
	2) Foundation			
	3) Pipes, with specials			
	4) Dismanteling joints			
	5) Sluice valve, reflux valve			
	6) Starter			
	7) L.T. Panel board incorporating ammeter voltmeter, switches, starter, earth leakage circuit brakers, single phasing preventer water level guard, capacitor etc.			
	8) Cable			
	9) Earthing			
	10) Pressure gauging			
	11) Tools, Spares and lifting arrangement			
	12) Lighting in pump house			
	13) H.T. Sub-station with transformer			
	14) EOT Crane			
48 BHP	16.0 Bhp - 3 Nos Rates is taken from Group water Supply Scheme Chowki rates is approved by SE PHED Durg Circle vide letter no. 6883 dt.12-12-2013 (Enclosed)	0.28 Lakhs	BHP	13.51
	ITEM No. 2 Add 1% for third party inspection 1% of It.1			0.14
Job	ITEM No. 3 Add for C.S.E.D.C.L. express feeder connection & other charges.	15.00 Lakhs		15.00
	Net Cost			28.65
	Gross Total			28.65
	By Adding GST @12%			32.08
	Say Rs.			32.08


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 5

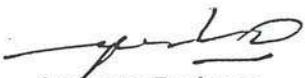
RAW WATER PUMPING MAIN

Estimated Cost Rs. 92.53 Lakhs

S.NO	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Dia. Length Width Depth mm m m m 300 2184.00 0.7 0.689 (CG PHE USOR P.225 It.No. 18.15)	1053.3432	161.00	Cum	169588.26
2	Earth work in excavation for pipe trench in Hard soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Dia. Length Width Depth mm m m m 300 2184.00 0.9 0.494 (CG PHE USOR P.226 It.No.18.16)	971.0064	213.00	Cum	206824.36
3	Earth work in excavation for pipe trench in Laterite soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. Dia. Length Width Depth mm m m m 300 2184.00 0.9 0.13 (CG PHE USOR P.226 It.No.18.17)	255.528	308.00	Cum	78702.62
4	Pumping out water caused by springs, tides or river seepage, broken water mains or drains. (CG PHE USOR P.227 It.No.18.21)	200	57.00	KL	11400.00
5	Providing, laying & jointing following socket & spigot centrifugally cast(spun) Ductile iron pressure pipes with inside cement motor lining (class K - 9) conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joint as per IS : 5382/85 300 mm dia D.I pipe class K - 9 (CG PHE USOR P.54 It.No.4.3)	2184	2724.00	Mtr	5949216.00
6	Add 15 % for DI Specials				892382.40
7	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Total Quantity of Excavation Deduct volume of pipe Deduct volume of WBM Road Cutting 20x1.2x.2	2279.8776 154.30 82.00			

S.NO	PARTICULARS	QUANTITY	RATE	PER	AMOUNT
8	In walls and superstructure up to 4 meter. height above plinth (with 20mm nominal graded metal) excluding the cost of centring shuttering. For thrust blocks 22 no. x 1.0 x 1.5 x 1 (CG PHE USOR P.229 It.No.18.41.2.2)	33	4849.00	Cum	160017.00
9	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/ccost of binding wire and wastage. Sub structure 33 x (1/100) x 7850 (CG PHE USOR P.230It.No.18.44)	2590.5	56.00	per Kg	145068.00
10	Construction of Brick masonry valve chamber with 20 cm thick wall in 1:6 C.M. with 12mm thick 1:4 Cement Plaster and base course 10 cm. thick in M-15. Inside Dimensions 110x80x100cm M-20 RCC chamber cover size 130x100cmx120cm including cost of materials, labour etc.complete. Size 1.2m x 1.2m, depth 1.2 M with c (CG PHE USOR P.235It.No.18.79)	5	6323.00	each	31615.00
11	Demolishing R.C.C. work manually / by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 m lead as per direction of engineer-in- charge. 328 m (CG PHE USOR P.228It.No.18.30)	82	1105.00	Cum	90610.00
12	Restoring of CC Roads Providing & laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering & shuttering. In Plinth & foundation 1:2:4 328 m (CG PHE USOR P.2298It.No.18.41.1.2)	82	4774.00	Cum	391468.00

Total 8261767.79
 Add GST @ 12% 991412.13
 Say 92.53
 Lakhs


 Assistant Engineer
 Public Health Engineering
 Sub Division Durg (C.G)


 Executive Engineer
 Public Health Engineering Division
 Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

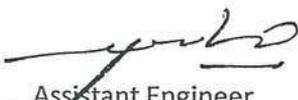
Block : Durg District : Durg

Estimate No. - 7

CLEAR WATER PUMPING MACHINERY AT WTP

ABSTRACT

Quantity	Items	Estimated Cost Rs.	30.63	Lakhs
		Rate	Unit	Amount
	ITEM No. 1 Providing, erecting & giving test & trial of Centrifugal pumpset directly coupled motor with allied equipments as under			
	1) Centrifugal pumps with motor			
	2) Foundation			
	3) Pipes, with specials			
	4) Dismantling joints			
	5) Sluice valve, reflux valve			
	6) Starter			
	7) L.T. Panel board incorporating ammeter voltmeter, switches, starter, earth leakage circuit breakers, single phasing preventer water level guard, capacitor etc.			
	8) Cable			
	9) Earthing			
	10) Pressure gauging			
	11) Tools, Spares and lifting arrangement			
	12) Lighting in pump house			
	13) H.T. Sub-station with transformer			
	14) EOT Crane			
33	11.00 Bhp - 3 Nos i.e 50% Standby Rates is taken from Group water Supply Scheme Chowki. Rates is approved by SE PHED Durg Circle vide letter no. 6883 dt.12-12-2013 (enclosed)	0.37 Lakhs	BHP	12.22
BHP	ITEM No. 2 Add 1% for third party inspection 1% of It.1			0.12
Job	ITEM No. 3 Add for C.S.E.D.C.L. express feeder connection & other charges.	15.00 lakhs		15.00
	Net Cost			27.35
	By Adding GST @12%			30.63
	Say Rs.			30.63 Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 8

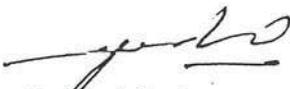
CLEAR WATER PUMPING MAIN

Estimated Cost Rs.540.55Lakhs

S. NO.	PARTICULARS	QTY	RATE	PER	AMOUNT																															
1	Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering, ramming and disposal of excavated earth lead up to 50m and lift up to 1.5m, disposal earth to be levelled, neatly dressed. <table style="width: 100%; margin-left: 20px;"> <tr> <td style="text-align: center;">Dia</td> <td style="text-align: center;">L</td> <td style="text-align: center;">D</td> <td style="text-align: center;">W</td> <td></td> <td></td> </tr> <tr> <td>300mm dia D.I pipe class K - 9</td> <td style="text-align: center;">3136</td> <td style="text-align: center;">0.689</td> <td style="text-align: center;">0.70</td> <td style="text-align: right;">1512.50</td> <td></td> </tr> <tr> <td>250mm dia D.I pipe class K - 9</td> <td style="text-align: center;">8929</td> <td style="text-align: center;">0.663</td> <td style="text-align: center;">0.65</td> <td style="text-align: right;">3845.06</td> <td></td> </tr> <tr> <td>200mm dia D.I pipe class K - 9</td> <td style="text-align: center;">80</td> <td style="text-align: center;">0.636</td> <td style="text-align: center;">0.60</td> <td style="text-align: right;">31.00</td> <td></td> </tr> <tr> <td>(CG PHE USOR P.225 It.No. 18.15)</td> <td style="text-align: center;">12145</td> <td></td> <td></td> <td style="text-align: right;">5388.56</td> <td></td> </tr> </table>	Dia	L	D	W			300mm dia D.I pipe class K - 9	3136	0.689	0.70	1512.50		250mm dia D.I pipe class K - 9	8929	0.663	0.65	3845.06		200mm dia D.I pipe class K - 9	80	0.636	0.60	31.00		(CG PHE USOR P.225 It.No. 18.15)	12145			5388.56						
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			308	Cum	314452.60																															
4	Pumping out water caused by springs, tides or river seepage, broken water mains. (CG PHE USOR P.227 It.No.18.21)	1200	57	KL	68400.00																															
5	Providing, laying & jointing following socket & spigot centrifugally cast(spun) Ductile iron pressure pipes with inside cement mortar lining (class K - 9) conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joint as per IS : 5382/85 <table style="width: 100%; margin-left: 20px;"> <tr> <td>300mm dia D.I pipe class K - 9 ✓</td> <td style="text-align: right;">3136.00</td> <td style="text-align: right;">3461</td> <td style="text-align: center;">Mtr</td> <td style="text-align: right;">10853696.00</td> </tr> <tr> <td>250mm dia D.I pipe class K - 9 ✓</td> <td style="text-align: right;">8929.00</td> <td style="text-align: right;">2724</td> <td style="text-align: center;">Mtr</td> <td style="text-align: right;">24322596.00</td> </tr> <tr> <td>200mm dia D.I pipe class K - 9 ✓</td> <td style="text-align: right;">80.00</td> <td style="text-align: right;">2037</td> <td style="text-align: center;">Mtr</td> <td style="text-align: right;">162960.00</td> </tr> <tr> <td>(CG PHE SOR P.74 It.No. 6.3 as per amendment)</td> <td style="text-align: right;">12145.00</td> <td></td> <td></td> <td></td> </tr> </table>	300mm dia D.I pipe class K - 9 ✓	3136.00	3461	Mtr	10853696.00	250mm dia D.I pipe class K - 9 ✓	8929.00	2724	Mtr	24322596.00	200mm dia D.I pipe class K - 9 ✓	80.00	2037	Mtr	162960.00	(CG PHE SOR P.74 It.No. 6.3 as per amendment)	12145.00																		
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6	Add 15% for DI Specials				5300887.80																															
7	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Quantity of Excavation Deduct volume of pipe & Moorum Quantity Deduct Volume of Pipe Deduct Volume of Concrete (CG PHE USOR P.227 It.No.18.22)	10273.51 659.64 237.73 9376.14			618825.41																															
			66	Cum																																

S. NO.	PARTICULARS	QTY	RATE	PER	AMOUNT
8	Providing & laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering & shuttering. 243 x 0.6 x 0.15 122 x 1 x .15 (CG PHE USOR P.229 It.No.18.41.1.1)	21.87 18.30 40.17	4182	Cum	167990.94
9	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone excluding cost of centring & shuttering. Superstructure. for Encasing pipe in road crossings 243 m x 0.6 x 0.6 Less pipe volume of 250mm pipe Net Quantity of Concrete For thrust blocks 122 Nos. 1 1 (CG PHE USOR P.230 It.No.18.431.1)	87.48 11.92 75.56 122 197.56	4867	Cum	961524.52
10	Providing and placing in position cold twisted steel and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/ccost of binding wire and wastage. Sub structure 197.56 x (.5/100)*7850 (CG PHE USOR P.230It.No.18.44)	7754.23	56	per Kg	434236.88
11	Construction of Brick masonry valve chamber with 20 cm thick wall in 1:6 C.M. with 12mm thick 1:4 Cement Plaster and base course 10 cm. thick in M-15. Inside Dimensions 110x80x100cm M-20 RCC chamber cover size 130x100cmx120cm including cost of materials, labour etc.complete. Size 1.2m x 1.2m, depth 1.2 M with cover (CG PHE USOR P.235It.No.18.79)	24	6323	each	151752.00
12	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead. 547 m (CG PHE USOR P.228It.No.18.30)	547	1105.00	Cum	604435.00
13	Restoring of CC Roads Providing & laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering & shuttering. In Plinth & foundation 1:2:4 (CG PHE USOR P.2298It.No.18.41.1.2)	547	4774	Cum	2611378.00

Total 48263725.31
Add GST @ 12% 5791647.04
Say 540.55
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 9

Construction of MBR

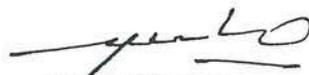
Estimated Cost - Rs. 238.35 Lakhs

S. No.	Items of work	Total Quantity	Base Quantity	Fix Rate of Base Quantity	Additional Quantity	Rate for Additional Quantity	Total Amount
(1)	(2)	(3)	(4)	(5)	(6)	(5)	(5)
1	<p>Designing (structurally & aesthetically), and constructing RCC MBR of following capacity with RCC staging consisting of columns, internal and external bracings spaced vertically as per staging of the ESR. including excavation in all types of strata, foundation concrete, cement plaster with water proofing compound to the inside face of the container including refilling & disposing off the surplus stuff within a lead of 50 meters, all labour and material charges including lowering, laying, erecting, hoisting and jointing of pipe assembly of inlet, outlet, scour, over flow and by pass arrangements as per departmental design, providing and fixing accessories such as M. S. Ladder, C.I. manhole frame and covers water level indicators, lightening conductor, G.I. pipe railing around walk way and top slab, providing spiral staircase from ground level to roof level, M.S. grill gate of 2 mtr. height with locking arrangement of approved design B.B. masonry chambers for all valves, ventilating shafts, providing and applying three coats of cement paint to the structure including roof slab epoxy painting to internal surface & antitermite treatment for underground parts of the structure and giving satisfactory water tightness test as per I.S. code, The job to include painting the name of the scheme and other details on the reservoir as per the</p> <p>For MBR</p> <p>(iii) Add for Staging 10 to 30 m</p> <p>(i) 10 to 16 m = 6 x 2 = 12%</p> <p>(ii) 16 to 20 m = 4 x 3 = 12%</p> <p>(iii) 20 to 30m = 10 x 4 = 40%</p> <p>Total Cost of MBR</p> <p>For MBR -2</p> <p>(iii) Add for Staging 10 to 30 m</p> <p>(i) 10 to 16 m = 6 x 2 = 12%</p> <p>(ii) 16 to 20 m = 4 x 3 = 12%</p> <p>(iii) 20 to 30m = 10 x 4 = 40%</p> <p>Total Cost of MBR</p> <p style="text-align: right;">Total Cost MBR</p>	230000	200000	2689401	30000	8.93	2957301
							354876.12
							354876.12
							12420664.2
							16087717.4
		255000	250000	3136130	5000	6.15	3166880
							380025.6
							380025.6
							1266752
							5193683.2
							21281400.6

By Adding GST @12% 23835168.7

Say 238.35

Lakhs


 Assistant Engineer
 Public Health Engineering
 Sub Division Durg (C.G)


 Executive Engineer
 Public Health Engineering Division
 Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 10

CLEAR WATER GRAVITY MAINS

Estimated Cost Rs. 781.35 Lakhs

S.NO.	PARTICULARS	QTY	RATE	PER	AMOUNT																															
1	Excavation: Earth work in excavation for pipe trench in ordinary soil areas including dressing, watering and ramming and disposal of excavated earth lead up to 50 meters and lift up to 1.5m, disposal earth to be levelled, neatly dressed. <table style="width: 100%; margin-left: 20px;"> <thead> <tr> <th style="text-align: center;">Dia</th> <th style="text-align: center;">Length</th> <th style="text-align: center;">Depth</th> <th style="text-align: center;">Width</th> <th></th> </tr> </thead> <tbody> <tr> <td>250mm dia D.I pipe class K - 7</td> <td style="text-align: center;">273</td> <td style="text-align: center;">0.66</td> <td style="text-align: center;">0.65</td> <td style="text-align: right;">118.00</td> </tr> <tr> <td>200mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9854</td> <td style="text-align: center;">0.64</td> <td style="text-align: center;">0.60</td> <td style="text-align: right;">3761.00</td> </tr> <tr> <td>150mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9384</td> <td style="text-align: center;">0.61</td> <td style="text-align: center;">0.55</td> <td style="text-align: right;">3146.00</td> </tr> <tr> <td>100mm dia D.I pipe class K - 7</td> <td style="text-align: center;">12249</td> <td style="text-align: center;">0.58</td> <td style="text-align: center;">0.50</td> <td style="text-align: right;">3571.00</td> </tr> <tr> <td colspan="4">(CG PHE USOR P.225 It.No. 18.15)</td> <td style="text-align: right;">10596</td> </tr> </tbody> </table>	Dia	Length	Depth	Width		250mm dia D.I pipe class K - 7	273	0.66	0.65	118.00	200mm dia D.I pipe class K - 7	9854	0.64	0.60	3761.00	150mm dia D.I pipe class K - 7	9384	0.61	0.55	3146.00	100mm dia D.I pipe class K - 7	12249	0.58	0.50	3571.00	(CG PHE USOR P.225 It.No. 18.15)				10596					
Dia	Length	Depth	Width																																	
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(CG PHE USOR P.225 It.No. 18.15)				10596																																
			161.00	Cum	1705956.00																															
2	Earth work in Excavation for pipe trench in Hard Soil areas including dressing, watering and ramming and disposal of Excavated earth lead up to 50 meters and lift up to 1.5m, disposal earth to be levelled, neatly dressed. <table style="width: 100%; margin-left: 20px;"> <thead> <tr> <th style="text-align: center;">Dia</th> <th style="text-align: center;">Length</th> <th style="text-align: center;">Depth</th> <th style="text-align: center;">Width</th> <th></th> </tr> </thead> <tbody> <tr> <td>250mm dia D.I pipe class K - 7</td> <td style="text-align: center;">273</td> <td style="text-align: center;">0.48</td> <td style="text-align: center;">0.65</td> <td style="text-align: right;">85.00</td> </tr> <tr> <td>200mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9854</td> <td style="text-align: center;">0.46</td> <td style="text-align: center;">0.60</td> <td style="text-align: right;">2697.00</td> </tr> <tr> <td>150mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9384</td> <td style="text-align: center;">0.44</td> <td style="text-align: center;">0.55</td> <td style="text-align: right;">2256.00</td> </tr> <tr> <td>100mm dia D.I pipe class K - 7</td> <td style="text-align: center;">12249</td> <td style="text-align: center;">0.42</td> <td style="text-align: center;">0.50</td> <td style="text-align: right;">2561.00</td> </tr> <tr> <td colspan="4">(CG PHE USOR P.226 It.No.18.16)</td> <td style="text-align: right;">7599</td> </tr> </tbody> </table>	Dia	Length	Depth	Width		250mm dia D.I pipe class K - 7	273	0.48	0.65	85.00	200mm dia D.I pipe class K - 7	9854	0.46	0.60	2697.00	150mm dia D.I pipe class K - 7	9384	0.44	0.55	2256.00	100mm dia D.I pipe class K - 7	12249	0.42	0.50	2561.00	(CG PHE USOR P.226 It.No.18.16)				7599					
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(CG PHE USOR P.226 It.No.18.16)				7599																																
			213.00	Cum	1618587.00																															
3	Earth work in excavation for pipe trench in all kinds of soft rock in areas i/c dressing, watering and ramming and disposal of excavated earth lead upto 50 meters & lift upto 1.5m, disposal earth to be leveled, neatly dressed , including dismantling of CC Road. <table style="width: 100%; margin-left: 20px;"> <thead> <tr> <th style="text-align: center;">Dia</th> <th style="text-align: center;">Length</th> <th style="text-align: center;">Depth</th> <th style="text-align: center;">Width</th> <th></th> </tr> </thead> <tbody> <tr> <td>250mm dia D.I pipe class K - 7</td> <td style="text-align: center;">273</td> <td style="text-align: center;">0.50</td> <td style="text-align: center;">0.65</td> <td style="text-align: right;">89.00</td> </tr> <tr> <td>200mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9854</td> <td style="text-align: center;">0.48</td> <td style="text-align: center;">0.60</td> <td style="text-align: right;">2838.00</td> </tr> <tr> <td>150mm dia D.I pipe class K - 7</td> <td style="text-align: center;">9384</td> <td style="text-align: center;">0.46</td> <td style="text-align: center;">0.55</td> <td style="text-align: right;">2375.00</td> </tr> <tr> <td>100mm dia D.I pipe class K - 7</td> <td style="text-align: center;">12249</td> <td style="text-align: center;">0.44</td> <td style="text-align: center;">0.50</td> <td style="text-align: right;">2695.00</td> </tr> <tr> <td colspan="4">(CG PHE USOR P.226 It.No.18.17)</td> <td style="text-align: right;">7997.00</td> </tr> </tbody> </table>	Dia	Length	Depth	Width		250mm dia D.I pipe class K - 7	273	0.50	0.65	89.00	200mm dia D.I pipe class K - 7	9854	0.48	0.60	2838.00	150mm dia D.I pipe class K - 7	9384	0.46	0.55	2375.00	100mm dia D.I pipe class K - 7	12249	0.44	0.50	2695.00	(CG PHE USOR P.226 It.No.18.17)				7997.00					
Dia	Length	Depth	Width																																	
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			308.00	Cum	2463076.00																															
4	Pumping out water caused by springs, tides or river seepage, broken water mains or drains. (CG PHE USOR P.227 It.No.18.21)	10000	57.00	KL	570000.00																															
5	Providing, laying and jointing socket & spigot centrifugally cast (Spun) Ductile Iron pressure pipes with inside cement mortar lining (class K-7) Conforming to IS 8329/2000 with suitable Rubber Gasket (Push on) joints as per IS:5382/85 including testing of joint (laying Conforming to IS 12288 : 1987)																																			
	250mm dia D.I pipe class K - 7 ✓ 200mm dia D.I pipe class K - 7 ✓ 150mm dia D.I pipe class K - 7 ✓ 100mm dia D.I pipe class K - 7 ✓ (CG PHE SOR P.73 It.No. 6.1)	273.00 ✓ 9854.00 ✓ 9384.00 ✓ 12249.00 ✓ 31760	2284 1733 1324 943	Mtr Mtr Mtr Mtr	623532.00 17076982.00 12424416.00 11550807.00																															
6	Add 15% for Specials				6251360.55																															

S.NO.	PARTICULARS	QTY	RATE	PER	AMOUNT
7	Filling available excavated earth in trenches, plinth sides of foundation in layers not exceeding 20cm. in depth including consolidation of each layer by ramming watering, lead up to 50m and lift up to 1.5m in all kinds of soils Total Quantity of Excavation Deduct volume of pipe & moorum Quantity excluding centering, shuttering and (CG PHE USOR P.227 It.No.18.22)	26192.00 584.71 25607.29	66.00	Cum	1690081.19
8	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone excluding cost of centring & shuttering. 635 x 0.6 x 0.15 64 x 1 x .15 Less pipe volum of 250mm pipe (CG PHE USOR P.229 It.No.18.41.1.1)	57.15 9.60 66.75	4182.00	Cum	279148.50
9	Providing & laying mechanically mixed cement concrete 20mm maximum size graded crushed stone excluding cost of centring & shuttering. for Encasing pipe in road crossings 635 m x 0.6 x 0.6	228.6			
	Less pipe volume of 250mm pipe Net Quantity of Concrete For thrust blocks 64 Nos. 1 1	31.15 197.45 64	4867.00	Cum	1272477.15
10	Providing and placing in position cold twisted or un-coated HYSD steel bar and hot rolled deformed steel reinforcement for R.C.C. work i/c cutting, bending, binding etc. complete i/c cost of binding wire and wastage. 261.45 x (2/100)*7850 (CG PHE USOR P.230It.No.18.44)	41047.65	56.00	per Kg	2298668.40
11	Construction of Brick masonry valve chamber with 20 cm thick wall in 1:6 C.M. with 12mm thick 1:4 Cement Plaster and base course 10 cm. thick in M-15. Inside Dimensions 110x80x100cm M-20 RCC chamber cover size 130x100cmx120cm including cost of materials, labour etc.complete. Size 1.2m x 1.2m, depth 1.2 M with cover (CG PHE USOR P.235It.No.18.79)	64	6323.0	each	404672.00
12	Demolishing C.C./R.C.C. work by mechanical means including stacking of serviceable material and disposal of unserviceable material with in 50m, lead. 2382.95 m (CG PHE USOR P.228It.No.18.30)	1621.67	1105.00	Cum	1791945.35
13	Restoring of CC Roads Providing & laying mechanically mixed cement concrete 20mm nominal size graded crushed stone excluding cost of centering & shuttering. In Plinth & foundation 1:2:4 (CG PHE USOR P.2298It.No.18.41.1.2)	1621.67	4774.00	Cum	7741852.58

Total 69763561.72
Add GST @ 12% 8371627.41
Say 781.35
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

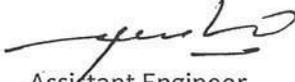
Estimate No. - 11

Construction of Staff Quarters

Estimated Cost Rs. 71.65 Lakhs

S.NO.	PARTICULARS	QUANTITY	RATE in Lakhs	PER	AMOUNT
1	Construction of I Type Staff Quarter at WTP Site including necessary excavation, RCC work, Brick Work, Plastering, Painting and all other allied works.				
	I Type	4	10.59	Each	42.37
	H Type	1	12.32	Each	12.32
	G Tye	1	16.96	Each	16.96

Total 71.65
Say 71.65
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 12

BULK FLOW METERS

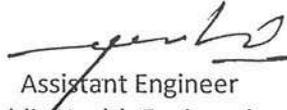
Estimated Cost Rs. 24.18 Lakhs

Diameter	Description	Quantity	Rate	Total
	Providing, installing and giving satisfactory field testing offlanged ends Bulkwater meter with fig-250 cast iron body, class "B" confirming to IS :2373 os as per ISO - 4064, marked to read in metric system, along with manufacturer's test and gurantee certificate including cost of all materials and lobour with EEC mark, without remote reading facility) as per ISO 4064			
100 mm		15	122842.00	1842630
150 mm		3	134255.00	402765
200 mm		1	171631.00	171631

Total 2417026

Say 24.18

Lakhs



Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)



Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Estimate No. - 13

INSPECTION VEHICLES

Estimated Cost Rs. 23.92 Lakhs

S.No	Particulars	Qty	Rate	Per	Amount (Rs. in Lakhs)
1	Jeep (Diesel) for inspecting officers	1.00	16.00	Each	16.00
2	Hiring of vehicles for inspecting officers to visit investigation sites including cost of POL for two years. (1 Vehicle x 12 months @ 1600/- Per day x 30 days)=5.76 Lakhs	1.00	7.92	per Each	7.92
	Total				23.92

Say Rs. 23.92
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME**(Total 17 Villages)**

Block : Durg District : Durg

Estimate No. - 14

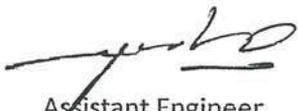
MISCELLANEOUS

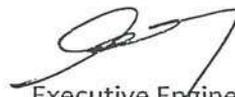
Estimated Cost Rs. 174.58 Lakhs

S.R No	Particulars	Qty	Rate	Per	Amount (Rs. In Lakhs)
1	Provision for fencing along with Brick masonry as required at the locations of components electric sub station. 25m x 25m for 31 villages OHSR's, WTP & Head works i.e. 100 Rmt x (50 no. OTH's + WTP + Head Works) Provision for Gates with at Tube Wells,	2200	4262	per Mtr.	93.76
2	OHT's. Levelling works, cleaning, moorum bedding etc complete. Provision for Computers, peripherals &	22	15000		3.30
3	Furniture and other Misc items like telephone connection, internet etc.				3.50
4	WBM approach road of Length 200 m				10.44
5	Provision for plantation around OHT and Head works site. including landscaping and beautification of construction site Providing and fixing M.S. flat iron tree guard 60cm dia. and 2m height above ground level formed of 4 nos. 25x6mm and 8 nos. 25x3mm vertical M.S. flats riveted to 3 nos. 25x6mm M.S. flat iron rings in two halves, bolted together with 8mm dia. and 30mm long bolts including painting two coats with paint of approved brand and manufacture over a coat of priming, complete in all respects. CG PWD Building SOR 2015 Pg. No. 206 It. No. 22.16 Plants of Regular varieties of 5 Ft. Height including Transport	200	2362	Each	4.72
	Digging holes in ordinary soil and refilling the same with the excavated earth mixed with manure Holes 1.2 m dia and 1.2 m deep.	200	150	Each	0.30
		200	274	Each	0.55
6	Provision for Construction of Raw Water Sub Station including Providing and installation of 100 KVA/33/0.415 KV with 100% stand by arrangement with all cables, Panel Board, capacitor Bank, all the required equipments/ accessories, including construction of civil works, spare and tools for 2 years running and maintenance, line erection charges etc. complete. At Intake Site				25.00

S.R No	Particulars	Qty	Rate	Per	Amount (Rs. In Lakhs)
7	Provision for Consurction of Clear Water Sub Station including Providing and installation of 200 KVA/33/0.415 KV with 100% stand bye arrangement with all cables, Panel Board, capacitar Bank, all the required equipments/ accessories, including construction of civil works, spare and tools for two years running and maintenance, line errection charges etc. complete. at Water Treatment Plant Site				33.00

174.58
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

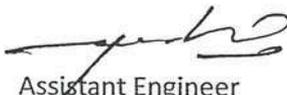
Estimate No. - 15

Provision for Automation and SCADA

Estimated Cost Rs. 155 Lakhs

S.R No	Particulars	Unit	Amount (Rs. In Lakhs)
1	GIS enabled server / cloud based SCADA system to monitor and control in real-time operation of various equipment at Intake Well and WTPs (2 MLD and 4 MLD). Suitable instrumentation along with local RTU/PLC based controls will be provided at Intake Well to include status of pumps, level of water, pressure and flowrate of water in discharge line, energy consumption. This data will be displayed locally and transmitted to SCADA through GSM based telemetry. At each WTP, PLC based control system will be provided for automated filtration and backwash cycles, operation of all electrically driven equipment such as valves pumps, blowers, mixers, etc. Online Analyzers will be provided for pH and Turbidity of Raw Water as well as pH, Turbidity and Residual Free Chlorine of Clear Water. Clear Water pumps will be automated similar to raw water pumps. The Clear Water sump level will be measured continuously and reported to SCADA. The entire water balance from Intake to Clear Water Sump will be depicted In SCADA. The SCADA will, apart from graphical process views, data readouts, alarms and trends, feature information dashboards and reports for user guidance to achieve optimum utilization of plant and equipment.	LS	155.00

155.00
Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

ANNUAL MAINTENANCE COST ESTIMATE

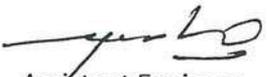
S. No.	Particulars	Amount (Rs. in lakhs)
1	Raw Water Charges Raw Water Charges to WRD 4233.50 @ .44/- * 365 Demand of Intermediate Stage is 4.23 MLD	6.80
	Sub - Total (A) :	6.80
2	SINKING FUND : Annual installments towards sinking fund for the cost of R.W. & clear water pump to be replaced after 15 years with the rate of interest of 12.0% with factor 0.026824 on Rs. 62.72 \ instalment = 0.026824 x 62.72	1.68
	Sub - Total (B) :	1.68
3.	ENERGY CHARGES : a. Annual electrical energy charges for running pumping sets at for raw water (for 4.23 MLD MLD proposed) Raw Water Energy Charges = 32 HP x 0.746 x 20 Hrs. x 365 Days x Rs. 4.0 Clear Water Energy Charges = 65 HP x 0.746 x 20 Hrs. x 365 Days x Rs. 4.0	6.97 14.16
	Sub - Total (C) :	14.16
4.	CONSUMPTION OF CHEMICALS : (i) Annual alum consumption at the rate of 2.5 mg/l for ten months and @ 50 mg/l for two month for 3.63MLD 3.31 tons @ Rs.4500 per M.T. (ii) Chlorine consumption @ 2.50 mg/l for 4.23 MLD @ Rs. 15000/- per M.T. for 3.86 ton (iii) Laboratory maintenance cost (iv) Lime consumption 10 mg/l for 4.23 MLD for 2 months = 2.54 MT @ Rs.5000/M.T.	0.71 0.58 0.12 0.13
	Sub - Total (D) :	1.54

5	ESTABLISHMENT : (As per Appendix 13.1 (Page No. 682, CPHEEO manual)		
	1. Assistant Engineer (1- Civil)	40000	0
	2. Sub Engineers	30000	0
	3. Pump Operators		
	i) Raw water	3 6000	2.16
	ii) Clear Water	3 6000	2.16
	4. Helpers (Distribution)	6000	0
	Fitters (Distribution)	10000	0
	5 Raw water Rising Mains		
	Helper (2 for Every 8 Km)	2 6000	1.44
	Fitters (1 for every 8 Km)	1 10000	1.2
	6. WTP & Clear Water Pump	3 6000	2.16
	7. Clear Water Riasing Mains / Gravity Mains		
	Helper (One for every 8 Km)	12.00 6000	8.64
	Fitters (1 for every 8 Km)	6 10000	7.2
	8. Electrician	2 10000	2.4
	9. Watchman	6 6000	4.32
	Sub - Total (E) :		31.68
6.	MAINTENANCE :		
	a. Civil works @ 1% of Rs.	623.84 Lakhs	6.24
	b. Pipe line @ 0.5% of Rs.	633.08 Lakhs	3.17
	c. Elec. & Mech. @ 3% of Rs.	62.72 Lakhs	1.88
	Sub - Total (F) :		11.29
7	Group Mobile Connection for All Member considered in Staff Patern		
	Total No. of Employees	38 @300 Per Connect Lakhs	1.368
	Grand total (A+B+C+D+E+F) :		68.52
	SAY Rs.		68.52
	The Cost of Maintenance will be done by PHE and will be given as an aid by the Govt. and		Lakhs

Annual Maintenance Cost Estimate for the Year 2023 Rs. 52.71 Lakhs

Annual Maintenance Cost Estimate for the Year 2038 Rs. 68.52 Lakhs

Annual Maintenance Cost Estimate for the Year 2053 Rs. 89.08 Lakhs


Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)

Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Cost of Water

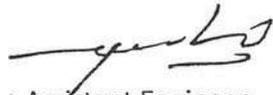
Say Rs. 68.52 Lakhs

Cost of production of water per 1000 litres

$$\text{Year 2023} = \frac{52.71 \times 10^5 \times 10^3}{365.24 \times 3.59 \times 10^6} = 4.02$$

$$\text{Year 2038} = \frac{68.52 \times 10^5 \times 10^3}{365.24 \times 4.23 \times 10^6} = 4.43$$

$$\text{Year 2053} = \frac{89.08 \times 10^5 \times 10^3}{365.24 \times 4.74 \times 10^6} = 5.15$$



Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)



Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

REVENUE REALISATION

No.	Name of Village	Population 2053	Village Wise O&M Cost	No. of Connections	Domestic Rate	No. of Institutional Connection	Institutional Rate	Revenue Collected From Domestic Connections	Revenue Collected From Commercial Connections	Total Revenue	Village wise Profit Profit
1	BHATGAON	2969	184916.14	594	100	6	200	712800	14400	727200	542283.86
2	SIRSA	9392	584955.33	1879	100	19	200	2254800	45600	2300400	1715444.67
3	JEORA	5735	357188.97	1147	100	11	200	1376400	26400	1402800	1045611.03
4	KHAPRI (K)	1744	108620.33	349	100	3	200	418800	7200	426000	317379.67
5	KUTELABHATA	2688	167414.82	538	100	5	200	645600	12000	657600	490185.18
6	CHIKHLI	4079	254049.49	816	100	8	200	979200	19200	998400	744350.51
7	KACHANDUR	3927	244582.58	786	100	8	200	943200	19200	962400	717817.42
8	SAMODA	3565	222036.39	713	100	7	200	855600	16800	872400	650363.61
9	DHAUR	6200	386150.24	1240	100	12	200	1488000	28800	1516800	1130649.76
10	KHEDAMARA	3799	236610.45	760	100	8	200	912000	19200	931200	694589.55
11	KARANDA BHILAI	5869	365534.8	1174	100	12	200	1408800	28800	1437600	1072065.20
12	BASIN	3408	212258.07	682	100	7	200	818400	16800	835200	622941.93
13	ARSNARA	3291	204971.04	659	100	7	200	790800	16800	807600	602628.96
14	RAWELIDIH	2895	180307.25	579	100	6	200	694800	14400	709200	528892.75
15	BOREGAON	3342	208147.44	669	100	7	200	802800	16800	819600	611452.56
16	NANKATTI	8781	546900.85	1757	100	18	200	2108400	43200	2151600	1604699.15
17	JHENJHRI	964	60040.14	193	100	2	200	231600	4800	236400	176359.86
Total O & M Expenditure		72648	4524684.33	14535		145		Total Revenue Collected		17792400.00	13267715.67

Revenue Collected
Revenue Realisation

177.93 Lakhs
136.87 Lakhs
177.93 Lakhs
2038
2053
231.31 Lakhs

Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)

Executive Engineer
Public Health Engineering Division
Durg (C.G)

JEVARA-SIRSAKHURD-BHATGAON GROUP WATER SUPPLY SCHEME

(Total 17 Villages)

Block : Durg District : Durg

Financial Patern

Sr No.	Description of Item	Amount Rs. In Lakhs
1	Total Cost of The Project	2580.95
	Total	2580.95

Year	Govt. of India Grants	STATE AID
2021-22	645.24	645.24
2022-23	645.24	645.24
Total	1290.48	1290.48
	2580.95	

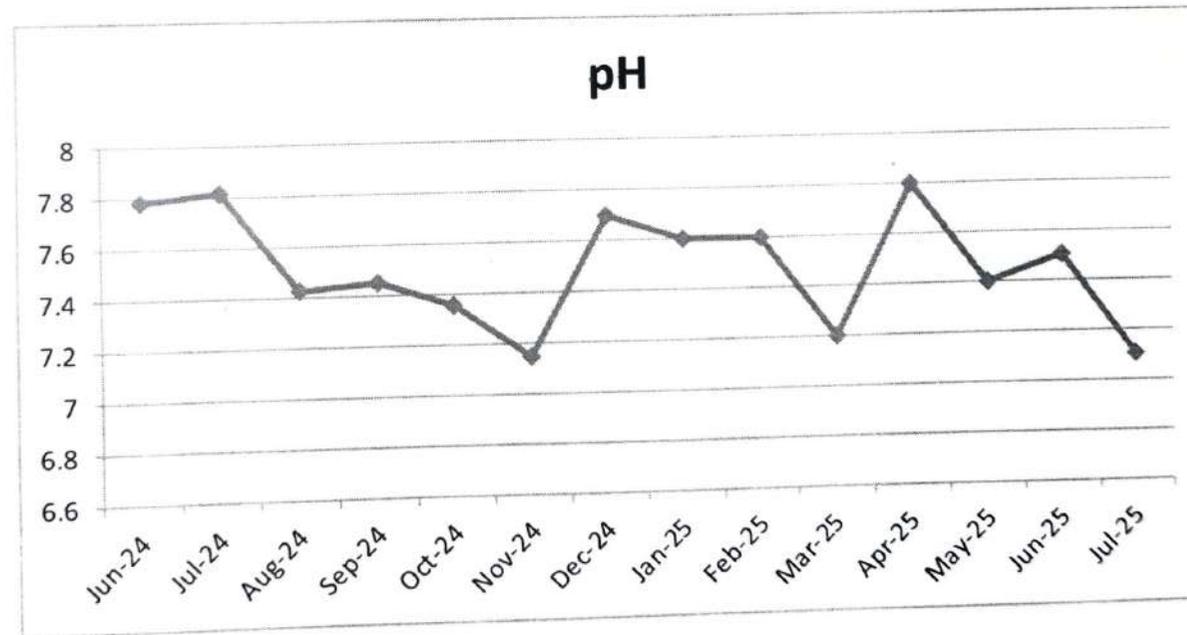

Assistant Engineer
Public Health Engineering
Sub Division Durg (C.G)


Executive Engineer
Public Health Engineering Division
Durg(C.G)

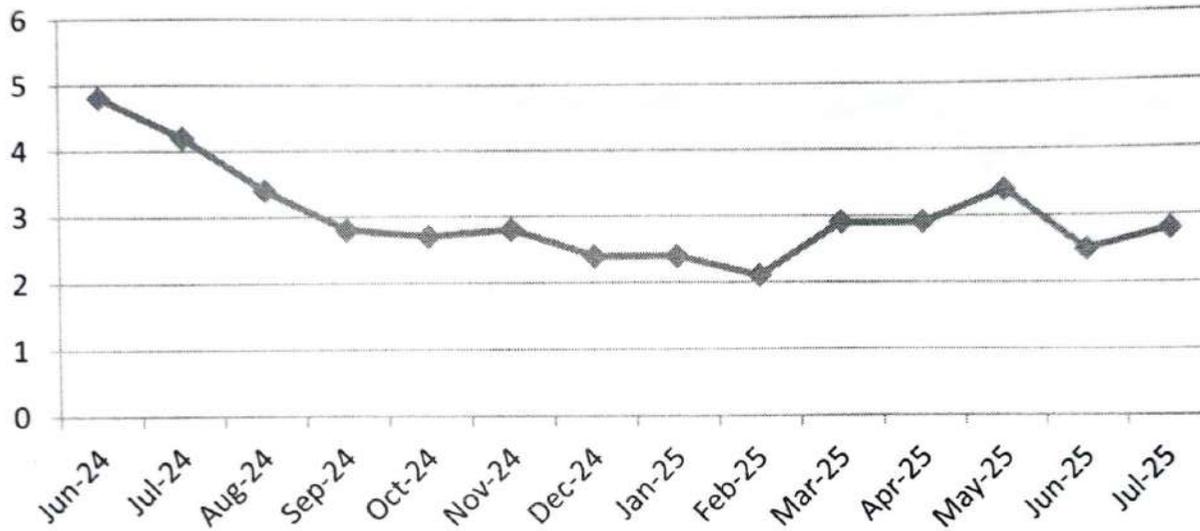
8. Water quality Assessment

River Sheonath at Village Jhenjhri, Distt.-Durg, A/C of Samoda Nallah

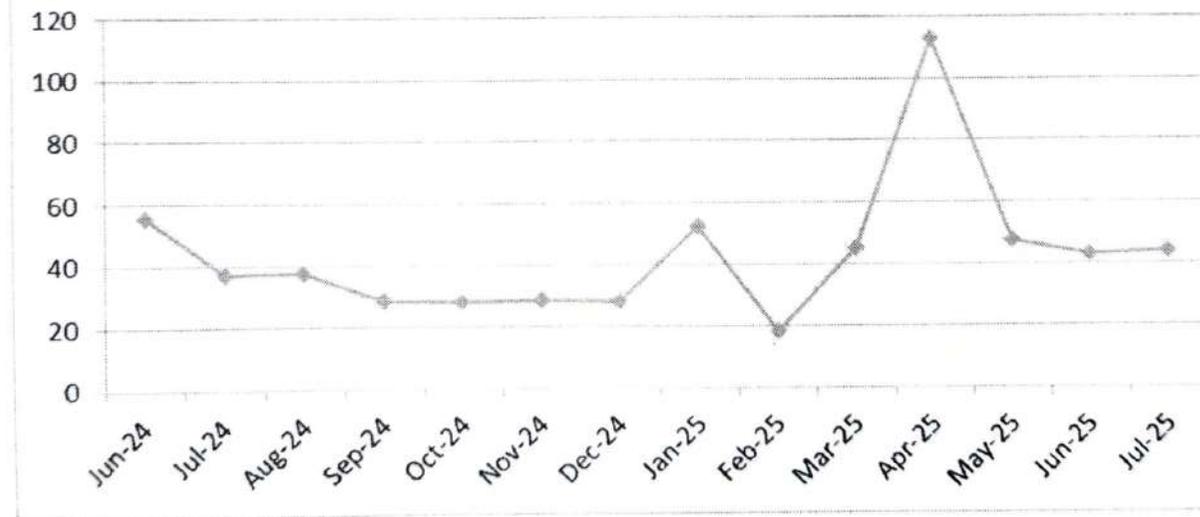
S. No.	Parameters	Unit	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25
1	pH	-	7.78	7.81	7.42	7.45	7.35	7.14	7.69	7.6	7.6	7.2	7.8	7.4	7.5	7.1
2	B.O.D	Mg/L	4.8	4.2	3.4	2.8	2.7	2.8	2.4	2.4	2.1	2.9	2.9	3.4	2.5	2.8
3	C.O.D	Mg/L	55.44	37.28	37.6	28.56	27.96	28.8	28.2	52.32	18.4	45	112.8	47.57	43	43.8
4	Dissolved Oxygen	Mg/L	5.8	5.4	6	7.2	6.9	6.4	6.2	6.4	6.4	6.1	6.5	5.2	5.5	6.2



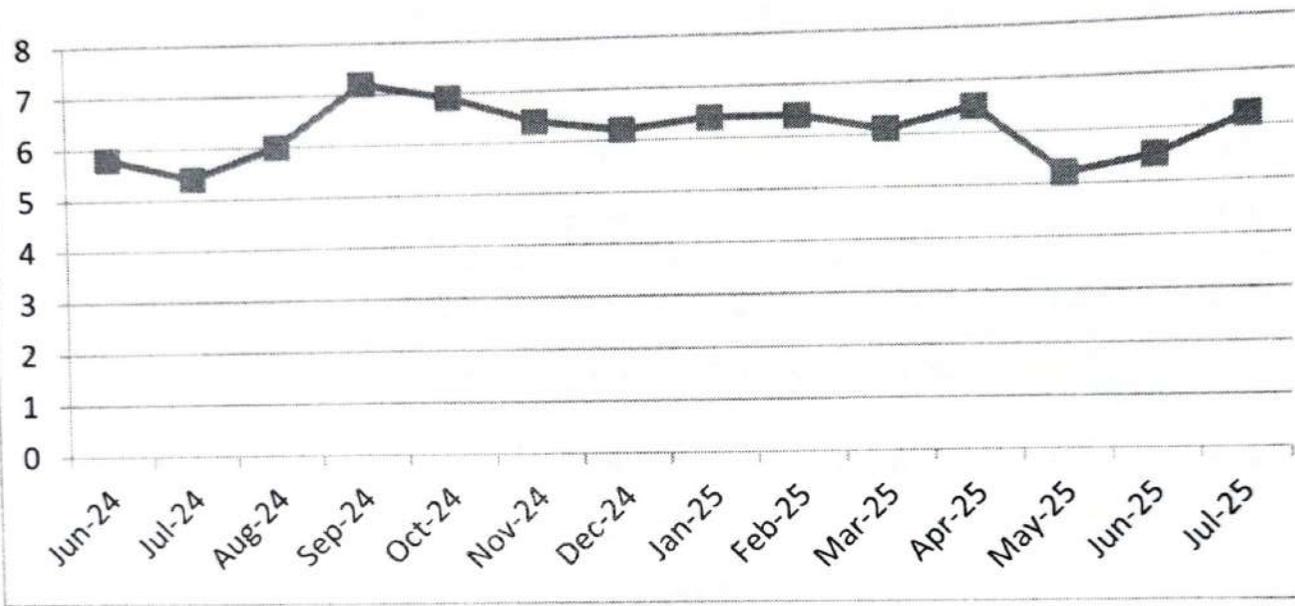
B.O.D



C.O.D

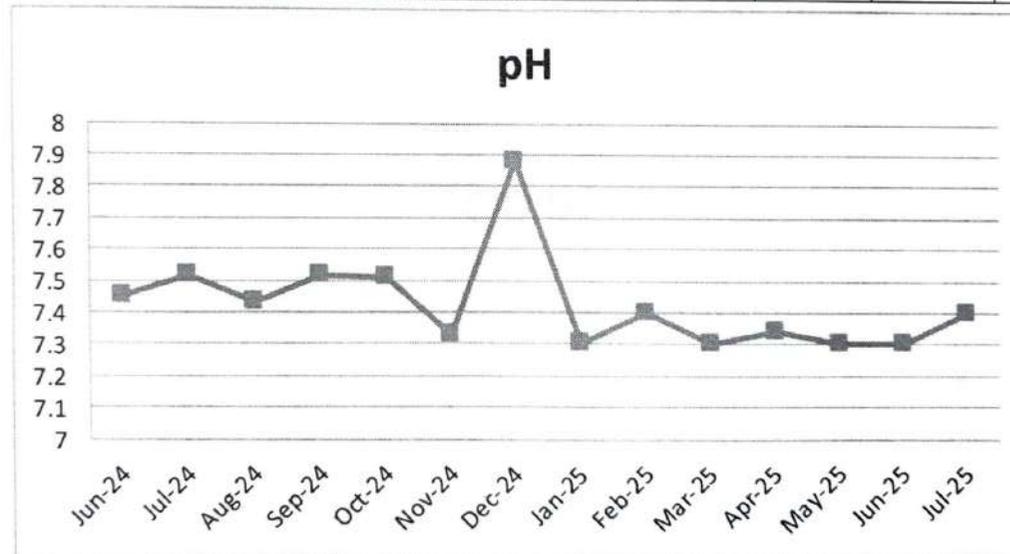


Dissolved Oxygen

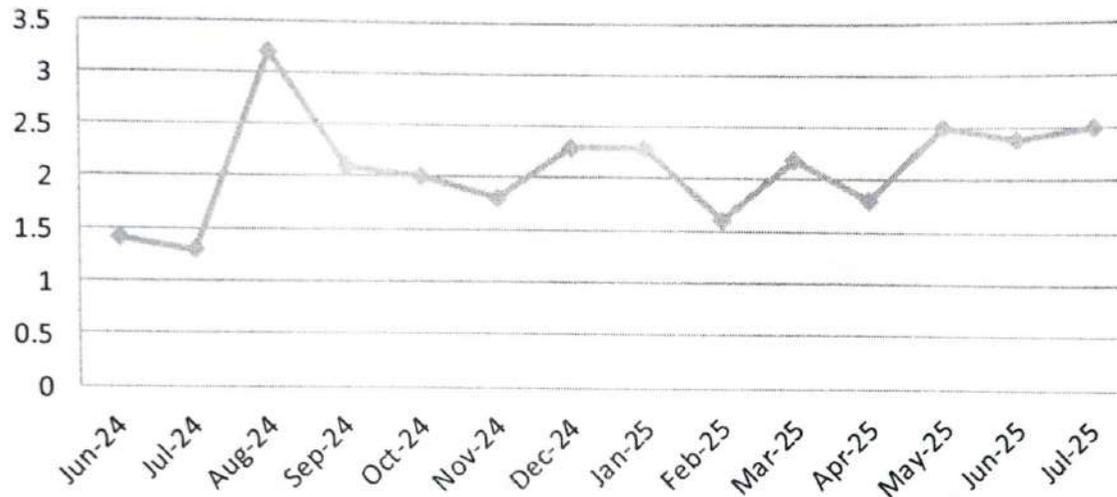


River Sheonath at Durg, (Intake well Point), Distt.- Durg.

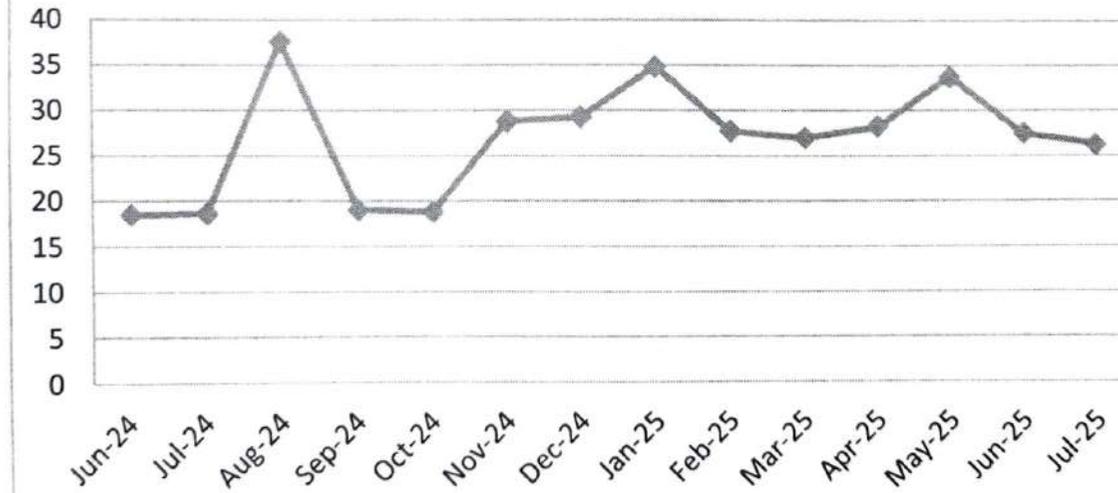
S.No.	Characteristics	Unit	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25
1	pH	pH Units	7.45	7.52	7.43	7.52	7.51	7.33	7.88	7.3	7.4	7.3	7.34	7.3	7.3	7.4
2	B.O.D	Mg/L	1.4	1.3	3.2	2.1	2	1.8	2.3	2.3	1.6	2.2	1.8	2.5	2.4	2.5
3	C.O.D	Mg/L	18.48	18.64	37.6	19.04	18.8	28.8	29.28	34.88	27.72	27	28.2	33.76	27.48	26.28
4	Dissolved Oxygen	Mg/L	7.4	7.4	6.8	7.6	7.6	6.8	6.7	6.3	6.4	6.4	6.8	7.2	5.8	6.6

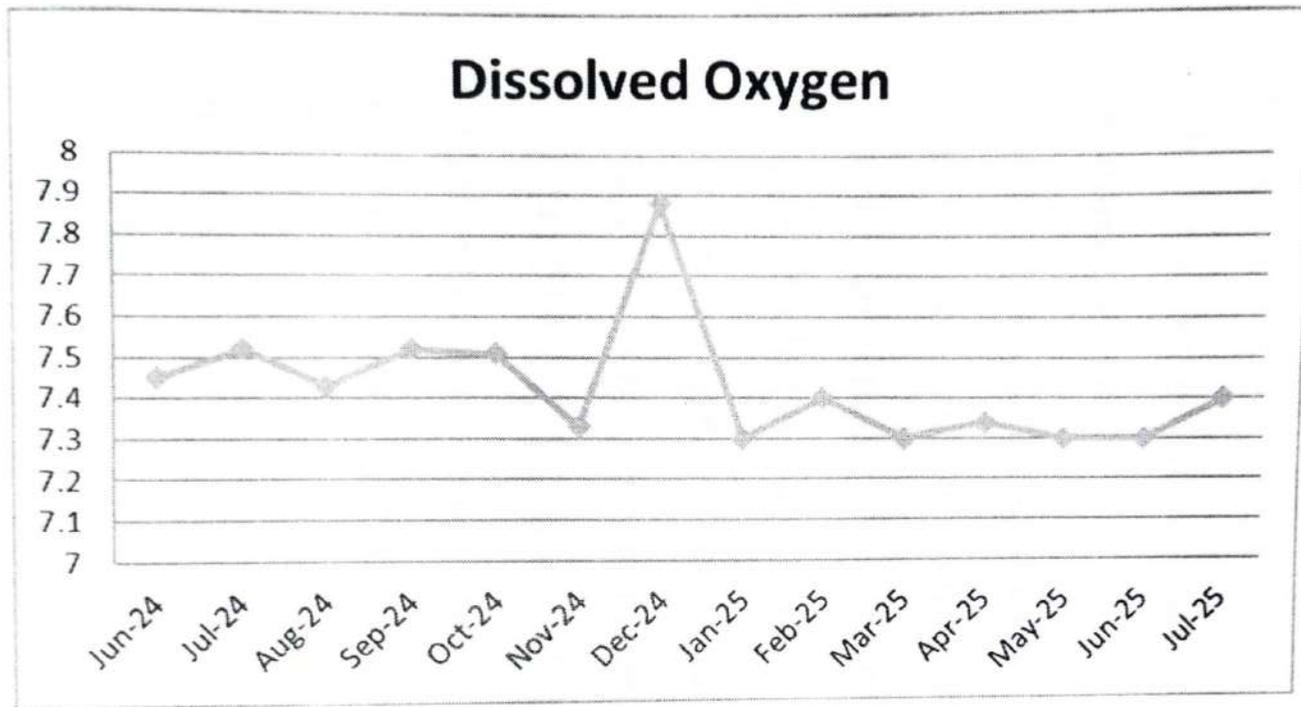


B.O.D



C.O.D





Current status of water quality:-



Nagpura | 29 August 2025 at 5:53 pm



GPS Map Camera



Google

Durg, Chhattisgarh, India
67m9+3xg, Durg, Chhattisgarh 491001, India
Lat 21.233194° Long 81.26985°
29/08/2025 05:46 PM GMT +05:30



 **GPS Map Camera**

Durg, Chhattisgarh, India

67m9+3xg, Durg, Chhattisgarh 491001, India

Lat 21.233177° Long 81.269947°

29/08/2025 05:45 PM GMT +05:30



Google



 **GPS Map Camera**

Durg, Chhattisgarh, India

67m9+3xg, Durg, Chhattisgarh 491001, India

Lat 21.233177° Long 81.269947°

29/08/2025 05:45 PM GMT +05:30



Google

Analysis No. - 223



REGIONAL OFFICE
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD
5/32 Bungalow, Bhilai, Distt. - Durg (C.G.)

SAMPLE COLLECTED FROM : River Sheonath at Village Urla-Belodi, Distt.- Durg.			
DESCRIPTION OF SAMPLE : Urla Belodi Anicut			
DATE OF COLLECTION		DATE OF RECEIVE	DATE OF ANALYSIS
29.08.2025		29.08.2025	29.08.2025
SAMPLE COLLECTED BY : S.K. Gajendra (Chemist) In Presence of Regional Officer & Member of CPCB Bhopal.			
ANALYSED BY : S.K. Gajendra (Chemist)			
REFERENCE : -			
S.No.	Characteristics	Unit	Results
01.	Temperature	⁰ C	24.0
02.	Appearance	-	Clear
03.	Odour	Threshold No.	Odourless
04.	pH	pH Units	6.9
05.	Specific Conductivity	Micro Mhos	438.0
06.	Total Solid (T.S.)	Mg/L	340.0
07.	Dissolved Solids (D.S.)	Mg/L	306.0
08.	Suspended Solids (S.S)	Mg/L	34.0
09.	Ammonical Nitrogen (as NH ₃ -N)	Mg/L	0.57
10.	Nitrate Nitrogen (as NO ₃)	Mg/L	0.69
11.	Nitrite Nitrogen (asNO ₂)	Mg/L	0.49
12.	Phosphate (as PO ₄)	Mg/L	1.9
13.	Chloride (as Cl)	Mg/L	32.0
14.	Sulphate (as SO ₄)	Mg/L	24.0
15.	Dissolved Oxygen (D.O.)	Mg/L	7.1
16.	B O D (3 days at 27 ⁰ C)	Mg/L	2.5
17.	C O D	Mg/L	52.56
18.	Total Alkalinity	Mg/L	58.0
19.	Total Hardness	Mg/L	72.0
20.	Calcium Hardness	Mg/L	40.0
21.	Magnesium Hardness	Mg/L	32.0
22.	Calcium	Mg/L	16.0
23.	Magnesium	Mg/L	7.80
24.	Total Coliform	MPN/100ml	430

S=Slight, H=Highly, B=Blackish, T= Turbid, O.L.= Odourless, Unpl.=Unpleasant, S.Smell=Slight Smell
Remarks : Parameters Results Indicate Exceeding the Prescribed Board Standards.


Chemist


Junior Scientist


Regional Officer



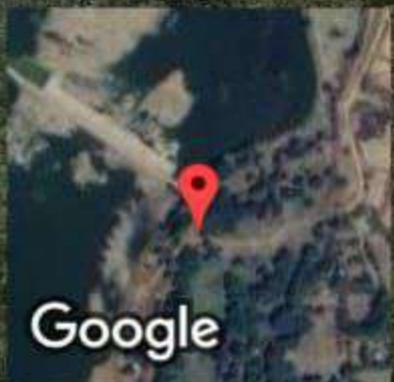
 **GPS Map Camera**

Sirsa Khurd, Chhattisgarh, India

Sirsa Khurd, Chhattisgarh 491001, India

Lat 21.263672° Long 81.285725°

29/08/2025 04:13 PM GMT +05:30



Google



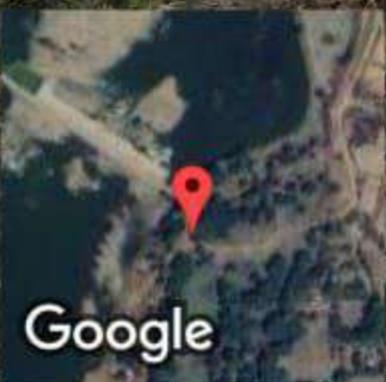
 GPS Map Camera

Sirsa Khurd, Chhattisgarh, India

Sirsa Khurd, Chhattisgarh 491001, India

Lat 21.2637° Long 81.285738°

29/08/2025 04:30 PM GMT +05:30



Google

Analysis No. -222



REGIONAL OFFICE
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD
 5/32 Bunglow, Bhilai, Distt. - Durg (C.G.)

SAMPLE COLLECTED FROM : River Sheonath at Village Bhatgaon, Durg, Distt.- Durg.			
DESCRIPTION OF SAMPLE : Bhatgaon Anicut Water			
DATE OF COLLECTION		DATE OF RECEIVE	DATE OF ANALYSIS
29.08.2025		29.08.2025	29.08.2025
SAMPLE COLLECTED BY : S.K. Gajendra (Chemist) In Presence of Regional Officer & Member of CPCB Bhopal.			
ANALYSED BY : S.K. Gajendra (Chemist)			
REFERENCE : -			
S.No.	Characteristics	Unit	Results
01.	Temperature	^o C	24.0
02.	Appearance	-	Clear
03.	Odour	Threshold No.	Odourless
04.	pH	pH Units	6.8
05.	Specific Conductivity	Micro Mhos	447.0
06.	Total Solid (T.S.)	Mg/L	338.0
07.	Dissolved Solids (D.S.)	Mg/L	305.0
08.	Suspended Solids (S.S)	Mg/L	33.0
09.	Ammonical Nitrogen (as NH ₃ -N)	Mg/L	0.59
10.	Nitrate Nitrogen (as NO ₃)	Mg/L	0.71
11.	Nitrite Nitrogen (asNO ₂)	Mg/L	0.51
12.	Phosphate (as PO ₄)	Mg/L	1.9
13.	Chloride (as Cl)	Mg/L	36.0
14.	Sulphate (as SO ₄)	Mg/L	25.0
15.	Dissolved Oxygen (D.O.)	Mg/L	7.3
16.	B O D (3 days at 27 ^o C)	Mg/L	2.3
17.	C O D	Mg/L	43.8
18.	Total Alkalinity	Mg/L	50.0
19.	Total Hardness	Mg/L	66.0
20.	Calcium Hardness	Mg/L	36.0
21.	Magnesium Hardness	Mg/L	30.0
22.	Calcium	Mg/L	14.4
23.	Magnesium	Mg/L	7.32
24.	Total Coliform	MPN/100ml	350

S=Slight, H=Highly, B=Blackish, T= Turbid, O.L.= Odourless, Unpl.=Unpleasant, S.Smell=Slight Smell
 Remarks : Parameters Results Indicate Exceeding the Prescribed Board Standards.


 Chemist

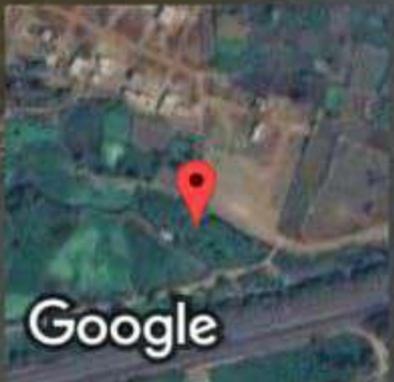

 Junior Scientist


 Regional Officer



 GPS Map Camera

Baghera, Chhattisgarh, India
674c+r4q, Baghera, Chhattisgarh 491001, India
Lat 21.205594° Long 81.271006°
29/08/2025 05:19 PM GMT +05:30





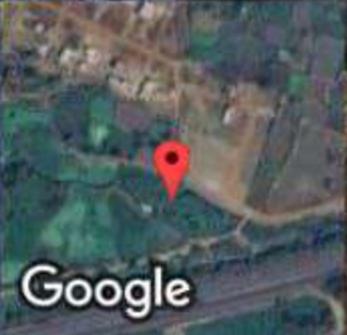
 GPS Map Camera

Baghera, Chhattisgarh, India

674c+r4q, Baghera, Chhattisgarh 491001, India

Lat 21.205598° Long 81.270994°

29/08/2025 05:20 PM GMT +05:30



Google

Analysis No. - 224



REGIONAL OFFICE
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD
5/32 Bunglow, Bhilai, Distt. - Durg (C.G.)

SAMPLE COLLECTED FROM : Shankra Nallah at Village Urla, Distt.- Durg.			
DESCRIPTION OF SAMPLE : Urla Belodi Anicut			
DATE OF COLLECTION		DATE OF RECEIVE	DATE OF ANALYSIS
29.08.2025		29.08.2025	29.08.2025
SAMPLE COLLECTED BY : S.K. Gajendra (Chemist) In Presence of Regional Officer.			
ANALYSED BY : S.K. Gajendra (Chemist)			
REFERENCE : -			
01.	Temperature	⁰ C	24.2
02.	Appearance	-	Clear
03.	Odour	Threshold No.	Odourless
04.	pH	pH Units	6.8
05.	Total Solid (T.S.)	Mg/L	330.0
06.	Dissolved Solids (D.S.)	Mg/L	282.0
07.	Suspended Solids (S.S)	Mg/L	48.0
08.	Chloride (as Cl)	Mg/L	68.0
09.	B O D (3 days at 27 ⁰ C)	Mg/L	26.0
10.	C O D	Mg/L	280.32
11.	Total Alkalinity	Mg/L	62.0

S=Slight, H=Highly, B=Blackish, T= Turbid, O.L.= Odourless, Unpl.=Unpleasant, S.Smell=Slight Smell
Remarks : Parameters Results Indicate Exceeding the Prescribed Board Standards.


Chemist


Junior Scientist


Regional Officer