

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

O.A NO. 912/2022

IN THE MATTER OF:

MANAV SEWA SANSTHAN & ANR.

...APPLICANTS

VERSUS

UNION OF INDIA & ORS.

...RESPONDENTS

INDEX

SR. NO.	PARTICULARS	PAGE NO.
1.	RESPONSE TO THE JOINT INSPECTION REPORT DATED 30.12.2023 FILED BY JOINT COMMITTEE CONSTITUTED BY THIS HON'BLE TRIBUNAL, ON BEHALF OF RESPONDENT NO. 4, BALRAMPUR CHINI MILLS LTD. THROUGH SUBHASHISH GHOSH ITS AUTHORIZED OFFICER ALONG WITH AFFIDAVIT.	1-9
2.	APPENDIX-A (COLLY) Copies of photographs evidencing development of green belt by the Answering Respondent Industry.	10-27
3.	APPENDIX-B (COLLY) Copies of photographs evidencing colour coding of pipes.	28-39
4.	APPENDIX-C Copy of the report submitted by FICCI.	40-142
5.	APPENDIX-D Copy of the analysis report conducted by Uttar Pradesh Pollution Control Board.	143-148
6.	Proof of Service.	149

THROUGH

  
A.R. TAKKAR, SHRIYA TAKKAR, BHARGAVA RAVIKUMAR, KAPIL BAKSHI,

  
MANAN TAKKAR, HIMANI BHADAURIA, PRINCE SHARMA  
ADVOCATES  
M/s ARTLO

# A25/12, DEODAR MARG, DLF PHASE -1,  
GURGAON - 122002

PLACE: GURUGRAM  
DATE- 02.02.2024

EMAIL: [SHRIYATAKKAR@ARTLO.IN](mailto:SHRIYATAKKAR@ARTLO.IN)  
MOB.9582209633

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

O.A NO. 912/2022

IN THE MATTER OF:

MANAV SEWA SANSTHAN AND ANR.

...APPLICANTS

VERSUS

UNION OF INDIA & ORS.

...RESPONDENTS

**Response to the Joint Inspection Report dated 30.12.2023 filed by Joint Committee constituted by this Hon'ble Tribunal, on behalf of Respondent No. 4, Balrampur Chini Mills Ltd. through Subhashish Ghosh its Authorized Officer.**

1. That the instant response is being filed to the Joint Inspection Report dated 30.12.2023 filed by Joint Committee constituted by this Hon'ble Tribunal. That the Joint Committee in the aforesaid report has drawn certain recommendations and observations pertaining to the Chemical Division as well as the Sugar Division of the Answering Respondent Industry herein and the Answering Respondent Industry in this response is reverting to the said recommendations/ observations.
2. That the Joint Committee comprising of officials from Central Pollution Control Board, Delhi, Ministry of Environment, Forest & Climate Change, Uttar Pradesh Pollution Control Board, Lucknow, Uttar Pradesh Pollution Control Board Regional Officer, Basti, and, SDM, Balrampur in compliance of orders dated 27.03.2023, 08.08.2023 and 02.11.2023 passed by this Hon'ble Tribunal in the present case, visited the premises of the Answering Respondent Industry on 30.12.2023 to carry out the site inspection.
3. That the Joint Committee in its Report dated 30.12.2023 at internal page no. 25 of 57 has noted the following recommendations pertaining to the Chemical Division/Distillery Division of the Answering Respondent Industry:

- a) *"The unit shall obtain valid NOC from UPGWD for abstraction of groundwater.*
- b) *Since the unit is having common STP for treatment of domestic sewage generated from both sugar & distillery units. Hence, unit shall get the CTO amended accordingly.*
- c) *Unit shall restrict its lagoon capacity to storage of 7 days of concentrated spent wash and stop practice of storing raw spent wash in the lagoon.*
- d) *Unit shall develop adequate green belt within the industry premises in order to ensure compliance of Consent condition.*
- e) *Unit shall ensure colour coding on pipelines in order to differentiate between freshwater and treated water lines."*
4. That the Answering Respondent Industry with respect to the aforesaid recommendations pertaining to the Chemical Division/ Distillery Division submits that:
- a) That the Answering Respondent Industry upon expiry of the previous consent, had applied for grant of NOC from UPGWD vide online application dated 02.11.2023 and the said application was duly accepted by the department. That joint team comprising of members of Irrigation Department i.e. the Nodal Agency, Jal Nigam, PWD and UPPCB had visited the Answering Respondent Industry for inspection on 16.01.2024 as per procedural requirement for grant of NOC. That the NOC is yet to be received from UPGWD.
- b) That the location of the residential blocks of the Chemical Division as well as Sugar Division is the same and thus, Answering Respondent Industry had set up a common STP for treatment of domestic sewage generated by residential blocks of Chemical Division as well as Sugar Division. That the Answering Respondent Industry had duly informed the Uttar Pradesh Pollution Control Board regarding the STP for treatment of domestic sewage being common as the residential blocks for both the Chemical as well as Sugar Division are located at

the same location and the same has been acknowledged by Uttar Pradesh Pollution Control Board. That the Answering Respondent Industry has been granted Consent to Operate on regular basis by the competent authorities and as per the suggestion of the Joint Committee the Answering Respondent Industry has requested the Uttar Pradesh Pollution Control Board to include the said fact clearly in the Consent to Operate.

- c) That as per specific condition 18 of the Consent to Operate dated 17.11.2022 (Annexed as Annexure-A1 at page no. 602-607 of the Joint Inspection Report dated 30.12.2023) granted by the Uttar Pradesh Pollution Control Board to the Chemical Division of the Answering Respondent Industry it is stated that the Answering Respondent Industry can store upto 7 days of spent wash in the Lagoon and not 7 days of concentrated spent wash as concentrated spent wash goes to the boiler. That specific condition 18 of the Consent to Operate dated 17.11.2022 is reproduced herein below for the convenience of this Hon'ble Tribunal:

*"18. Maximum 07 days Spent Wash shall be stored in the Lagoon and ensured to send monthly reports regarding spent wash storage and the details of water level in each lagoon constructed in industry."*

It is pertinent to mention herein that the Lagoon is under continuous surveillance by Uttar Pradesh Pollution Control Board through PTZ camera installed on it.

- d) That the Answering Respondent Industry has planted large number of trees in the last one year in addition to adequate plantation already existing within the premises of the Respondent Industry. The Answering Respondent Industry has developed parks within the premises at various locations. Further, the Answering Respondent Industry has also participated in various initiatives supporting plantation of trees and protection of trees existing. Copies of photographs evidencing development of green belt by the Answering Respondent Industry are attached herewith as **APPENDIX-A (COLLY.)**.

- e) That the color-coding of pipelines in order to differentiate between freshwater and treated water partially existed since long and for the rest, work had commenced a while ago thus, majority of the pipe lines have already been colour coded and the remaining pipelines will also be colour coded soon. Copies of photographs evidencing colour coding of pipes are attached herewith as **APPENDIX-B (COLLY.)**.
5. That the Joint Committee in its Report dated 30.12.2023 at internal page no. 35 and 36 of 57 has noted the following recommendations pertaining to the Sugar Division of the Answering Respondent Industry:
- a) *"The unit shall apply for amended CTO as the domestic sewage generation within the unit premises is more than the permitted discharge capacity. Also amendments may be applied for permission to operate common STP for both Sugar & Distillery Divisions of the Unit.*
  - b) *The Unit shall maintain regular logbook for RO reject fed into CPU of Distillery division.*
  - c) *The unit shall carry out detailed water audit of entire plant specially with respect to domestic water consumption.*
  - d) *The unit shall operate its ETP properly so as to comply with the notified discharge norms after tertiary treatment prior to discharge into drain.*
  - e) *The Unit shall get its CCA amended accordingly as it is diverting BRS reject, RO reject from CPU & ETP into Distillery.*
  - f) *Unit shall ensure colour coding of pipeline in ETP & process area.*
  - g) *The unit shall develop adequate green belt as per the conditions of CCA."*
6. That the Answering Respondent Industry with respect to the aforesaid recommendations pertaining to the Sugar Division of the Answering Respondent Industry submits that:
- a) That the permissible limit of domestic discharge as per the Consent to Operate dated 24.12.2021 (Annexed as Annexure-A1 at page no. 627-631 of the Joint Inspection Report dated 30.12.2023) granted by

the Uttar Pradesh Pollution Control Board to the Sugar Division of the Answering Respondent Industry is 120 KLD and Consent to Operate dated 17.11.2022 (Annexed as Annexure-A1 at page no. 602-607 of the Joint Inspection Report dated 30.12.2023) granted by the Uttar Pradesh Pollution Control Board to the Chemical Division is 48 KLD, thus total domestic discharge permitted is 168KLD and the discharge as observed by the Joint Committee in its Joint Inspection Report is 119.85 KLD, thus the discharge is well within prescribed limits. It is reiterated that the location of the residential blocks of the Chemical Division as well as Sugar Division is the same and thus, Answering Respondent Industry had set up a common STP for treatment of domestic sewage generated by residential blocks of Chemical Division as well as Sugar Division. That the Answering Respondent Industry had duly informed the Uttar Pradesh Pollution Control Board regarding the STP for treatment of domestic sewage being common as the residential blocks for both the Chemical as well as Sugar Division are located at the same location and the same has been acknowledged by Uttar Pradesh Pollution Control Board.

- b) That the RO reject water is being utilized in wet scrubbers of boilers and is thus not being fed into the CPU of the Distillery Division/Chemical Division.
- c) That the Answering Respondent Industry has been granted permission to extract 6,32,480 KLD of water annually (Annexed as Annexure-A4 at page no. 640-655 of the Joint Inspection Report dated 30.12.2023) by the Ground Water Department. It is pertinent to mention herein that no bifurcation has been made with regards to extraction for domestic or industrial purposes and the fee for water extraction is duly paid as per prescribed industrial extraction rate. That the water extracted is not only used for industrial purposes or for domestic purposes but also for recreational purposes such as activities held in the club area regularly for the officers and workers, the Respondent Industry also holds drive to make drinking water available to general public at the gate of the Industry throughout summer season, further water is also consumed by activities held at the 3 temples located within the premises of the Respondent Industry etc.. That water is not only consumed by the officials, workers and residents residing and

working within the premises of the Respondent Industry, but also approximately by 800-1000 truck drivers, conductors, cleaners as well as about 1000 cane farmers and their animals as they visit the Respondent Industry everyday to supply cane/raw material etc. in and out of the Respondent Industry. That the Answering Respondent Industry has time and again conducted third party water audits and the last audit was undertaken during the crushing season 2022-23 in February 2023 by FICCI. A copy of the report submitted by FICCI is attached herewith as **APPENDIX-C**.

- d) That the ETP of the Answering Respondent Industry has been functioning properly and the treated trade effluents are being discharged after effective tertiary treatment. That the Answering Respondent Industry had even requested the Uttar Pradesh Pollution Control Board for conducting on cost sampling of secondary clarifier and auto filtration. That Uttar Pradesh Pollution Control Board has conducted the sampling of secondary clarifier and auto filtration, and the analysis report of the same is attached herewith as **APPENDIX-D**.
- e) That the BRS reject as well as RO reject is not being discharged anywhere. That the nominal quantity of BRS reject, which is below 21 KLD is being sent to the distillery division to mitigate it by burning it in incineration boiler and the same is undertaken keeping in mind its benefits in order to protect the environment. It is reiterated that RO reject water is being utilized in wet scrubbers of boilers and is not being fed into the CPU of the Distillery Division/Chemical Division.
- f) It is reiterated that the color-coding of pipelines in ETP and process area, had commenced a while ago thus, majority of the pipe lines have already been colour coded and the remaining pipelines will also be colour coded soon. Copies of photographs evidencing colour coding of pipes are already attached herewith as Appendix-B (Colly.).
- g) That the Answering Respondent Industry has developed green belt spread throughout the premises of the Respondent Industry and, the Respondent Industry is further developing and maintaining the green

belt regularly. Copies of photographs evidencing development of green belt by the Answering Respondent Industry are already attached herewith as Appendix-A (Colly.).

It is therefore most respectfully prayed that this Hon'ble Tribunal in order to provide substantial justice in the matter may kindly be pleased to take on record the facts stated in the body of this response along with annexures and be further pleased to discharge the Answering Respondent Industry from this OA;

It is further prayed that this Hon'ble Tribunal may pass any such or further order as it may deem fit and proper in the interest of justice and fairplay in favour of the Answering Respondent.

THROUGH

  
A.R.TAKKAR, SHRIYA TAKKAR, BHARGAVA RAVIKUMAR, KAPIL BAKSHI,

*Himani*

MANAN TAKKAR, HIMANI BHADOURIA, PRINCE SHARMA  
ADVOCATES

M/s ARTLO

# A25/12, DEODAR MARG, DLF PHASE -1,  
GURGAON - 122002

EMAIL: [SHRIYATAKKAR@ARTLO.IN](mailto:SHRIYATAKKAR@ARTLO.IN)

MOB.9582209633

PLACE: GURUGRAM

DATE- 02.02.2024

## BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

## PRINCIPAL BENCH AT NEW DELHI

Original Application No. 912 Of 2022

IN THE MATTER OF:

Manav Sewa Sansthan &amp; Anr

...Applicants

VERSUS

Union of India &amp; ors.

...Respondents

Affidavit of Mr. Subhashish Ghosh , S/o Sh.Prabir Ghosh , aged about 42 years, Authorised Signatory of M/S BALRAMPUR CHINI MILLS LTD., 213, Rectangle One, D-4, District Centre , Saket, New Delhi (the Respondent 4 herein)

I, the above named deponent do hereby solemnly affirm and state as under:

1. That the above titled Reply has been drafted under the authority and instructions of the deponent and after perusing its contents, the deponent has duly signed it, and the contents of paragraph Nos. 1 to thereof are true and correct to the knowledge of the deponent, and the same may be read as contents of this affidavit also, which are not being reproduced for the sake of brevity. No part of it is false and nothing material has been kept concealed therefrom.
2. That the annexure attached with the Reply are true copy of their respective originals.



*Subhashish Ghosh*

DEPONENT

**VERIFICATION:**

Verified at New Delhi on 2nd day of February, 2024 that the contents of para 1 and 2 of my affidavit are true and correct to my knowledge. No part of it is false and nothing material has been kept concealed therefrom.

*Ans*  
I identify the deponent  
who has signed in my Presence

02 FEB 2024

*Subhashish Ghosh*  
DEPONENT



Certified That the Deponent  
Shri/Smt. *Subhashish Ghosh*  
S/o./W/o./D/o. Shri. *Pradeep*  
R/o. *Pradeep*  
Identified by Shri. *Pradeep*  
has solemnly affirmed before me at New Delhi  
On..... that The contents of this affidavit  
which has been read over & explained to him are true  
& correct to his knowledge.

Oath Commissioner, New Delhi  
*Pradeep*

02 FEB 2024

# Balrampur chini mills ltd

## Development of Green belt



722



723



724

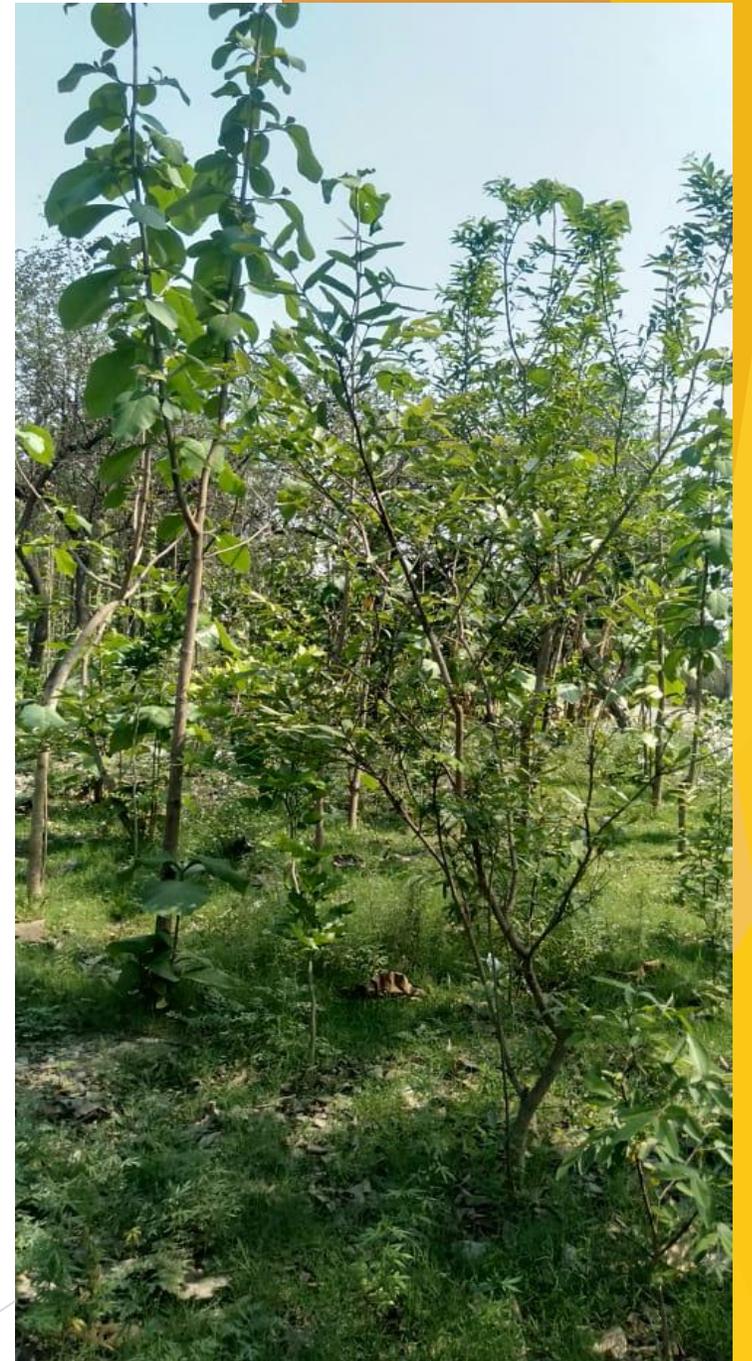




बलरामपुर फाउण्डेशन  
 द्वारा प्रदूषण नियंत्रण हेतु  
 रोपित पौधों का विवरण  
 केमिकल डिवीजन - 10520  
 दुर्गा मन्दिर के सामने - 6000  
 दुर्गा मन्दिर के पश्चिम - 1800  
 योग - 18320  
 प्रस्तावित पौधसं - 16000  
 रोपित प्रजाति :- आम, अमरुद, ककरोल  
 अर्जुन, जामुन, कर्नाटलक्ष्मी आदि /  
 रोपाईयालय - राजानसरी  
 रायबरेली मो.-9415743055

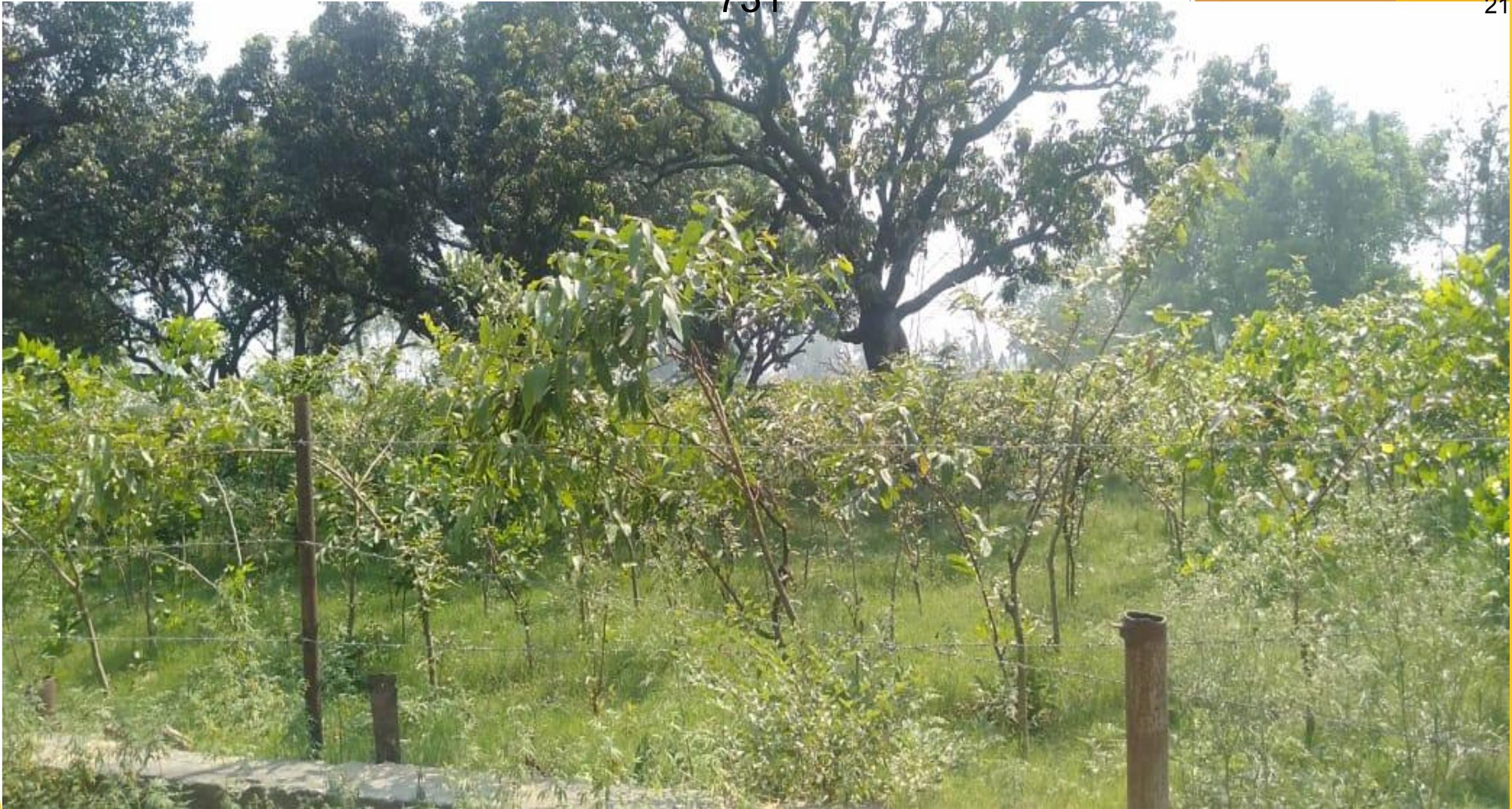


728









732

22





734

24





736





Our Campaign for awareness

**APPENDIX-B**

# **Balrampur Chini Mills Ltd**

## **Balrampur**

**Glimpse of Colour Coding**

739

29

# Boiler Area



**Fire Fitting line**



## Cooling Tower Area



**Distillation**





744



34





# Color Coding of Pipeline

Condensate line



Condensate feed line



Caustic dosing line



Caustic line



# Color Coding of Pipeline

HCL Line



Gas line



MGF line



ACF line



# 748 Color Coding of Pipeline

UV Feed line



UV Permeate line



UF Feed line



UF Permeate line



# 749 Color Coding of Pipeline

RO Feed line



RO Permeate line



RO CIP line



RO permeate line



**APPENDIX-C****REPORT****On****Water Audit Study****At****Balrampur Chinni Mills Limited, Unit- Balrampur,  
(UP.)****By**

**Resource Conservation & Management Division  
Federation of Indian Chambers of Commerce and Industry  
Federation House, Tansen Marg, New Delhi – 110 001**

**(February 2023)**



## ACKNOWLEDGEMENT

Federation of Indian Chambers of Commerce & Industry (FICCI) places on record its sincere thanks to **Mr. (), Mr. &** for entrusting the task of conducting Resource Audit for “Water Audit Study” at **Balrampur Chinni Mills Limited, Unit- Balrampur, (UP.)** during February -2023.

We hereby express our sincere thanks to **Mr.** and their team, from **Balrampur Chinni Mills Limited, Unit- Balrampur, (UP.)** for their proactive support and courtesy extended to the FICCI team during field study. We also thank other officials from **Balrampur Chinni Mills Limited, Unit- Balrampur, (UP.)** for their cooperation and support provided during data collection. We are also grateful to all those we interacted with during the audit who gave us some operational insights.

We hereby submit the Water Audit Report for your reference.

**M A Patil**  
**Asst Secretary General**  
**RCM Group, FICCI**  
**New Delhi**

---

## **PROJECT TEAM MEMBERS**

### **Online/Backend Team**

- M A Patil, Assistant Secretary General
- Karishma Bist, Additional Director
- Pushpendra Nayak, Joint Director
- Ileshu Ghai, Senior Assistant Director

### **On-Site Team**

- Pankaj Dhote, Sr. Associate
- Vishal Dhiman, Engineer

## Content

EXECUTIVE SUMMARY .....	10
SUMMARY OF RECOMMENDATIONS .....	13
CHAPTER: 1 : INTRODUCTION.....	17
1.1 About the Plant: General Plant Details .....	17
1.2 Process Description.....	17
1.3 Process Block Diagram .....	19
1.4 Water Conservation Initiatives taken by Plant.....	19
CHAPTER: 2 : SCOPE OF WORK .....	20
2.1 Scope of Water Audit Study.....	20
CHAPTER: 3 : METHODOLOGY OF THE WATER AUDIT STUDY .....	21
3.1 Methodology followed for conducting water audit study .....	21
CHAPTER: 4 : ASSESSMENT OF PRESENT WATER USAGE.....	24
4.1 Water sourcing and major water use areas.....	24
4.2 Borewell Water Quality .....	30
4.3 Water Distribution and water balance .....	30
4.4 Water Metering System.....	33
4.5 Water Use Baseline Data as provided by the Plant.....	33
4.5.1 Borewell water .....	33
4.5.2 Ground water used for Domestic activities.....	34
4.5.3 Industrial water .....	35
4.5.4 Fresh water use Power Plant.....	36
4.5.5 ETP Treated Water .....	37
4.5.6 STP Treated Water.....	38
4.6 Water Costing.....	39
4.6.1 Cost of abstraction of Borewell Water.....	39
4.6.2 Pumping cost-energy .....	40
4.6.3 Cost of Treatment .....	41
4.7 Annual Water & Wastewater Management Cost of the Plant.....	47
CHAPTER: 5 : WATER & WASTEWATER TREATMENT & RECYCLING PRACTICES	
48	
5.1 DM Treatment Unit:.....	48
5.2 CPU (Condensate Polishing Unit) & R .....	50
5.3 STP (Sewage Treatment Plant).....	52

5.4	ETP (Effluent Treatment Plant) .....	54
CHAPTER: 6 : DATA ANALYSIS & RESULTS .....		57
6.1	Water Consumptive Units and Wastewater Mapping .....	57
6.1.1	Water consumption pattern .....	57
6.1.2	Wastewater generation and mapping .....	58
6.2	Specific Water Consumption in terms of Water Use Ratio (WUR) of the Plant .....	60
CHAPTER: 7 : WATER CONSERVATION OPPORTUNITIES WITH COST BENEFIT ANALYSIS		61
7.1	Install flowmeters with telemetry system on borewells to comply with CGWA Guidelines.....	61
7.2	Construct the Concrete Structure across the Borewells as per CGWA guidelines .....	66
7.3	Optimise water flow in handwashing and other taps for fresh water conservation in plant & colony .....	67
7.4	Use waterless urinal system in existing pots in toilets to save water .....	70
7.5	Optimize ground water consumption in colony to save fresh water .....	71
7.6	Install 'Tank Bank (For Flush Tanks)' or install with Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks .....	74
7.7	Use treated water in place of raw ground water for flushing in toilet closets & Urinals	76
7.8	Regularly calibrate & maintain existing water flow meters.....	77
7.9	Proper Installation of existing water flow meters installed at power plant borewell. ....	77
7.10	Construct the New Borewell and shut down the old borewell-4 due to no water availability.....	77
7.11	Maintain logbook of daily groundwater abstraction .....	78
7.12	Enhance Training and awareness of the employees at all levels and placing 'water saving' posters/slogans at various locations: .....	78
7.13	Periodically conduct 'water & wastewater audit' .....	78
7.14	Regular payment of applicable groundwater abstraction charges.....	79
7.15	Ensure to comply with the NOC conditions to avoid any penalty .....	79
IMPLEMENTATION PLAN .....		81
CHAPTER: 8 ANNEXURES (MEASURED DATA) .....		87
8.1	Annexure 1: Pump measurements & Pumping Cost.....	88
8.2	Annexure 2: Borewell water test reports .....	89
8.3	Annexure 3: Flow Meters Details .....	91
8.4	Annexure 4: CGWA NOC .....	92
8.5	Annexure 5: CGWA NOC of Borewells.....	93
8.6	Annexure 6: CPU inlet & outlet water test report.....	101

8.7	Annexure 7: ETP Test Reports.....	103
-----	-----------------------------------	-----

### **List of Tables**

Table 1	Balrampur Chinni Mills Limited, Unit- Balrampur, (U.P.).....	12
Table 2:	Production Details of FY 2019-20, FY 2020-21 & FY 2021-22.....	18
Table 3:	Water Conservation Initiatives taken up by plant.....	19
Table 4:	Details of borewells .....	24
Table 5:	Details of piezometer wells (observation well) .....	25
Table 6:	Total Water Requirement by Plant .....	26
Table 7:	Percentages of Freshwater and recycled water .....	27
Table 8:	Borewell measured flow .....	30
Table 9:	List of Water Storage Tanks in the Plant.....	30
Table 10:	Location of Identified Water Meters .....	33
Table 11:	Monthly water abstraction from borewells (FY 2019-20, FY 2020-21 & FY 2021-22) .....	33
Table 12:	Monthly ground water used for domestic activities (FY 2019-20, FY 2020-21 & FY 2021-22).....	34
Table 13:	Monthly ground water used for Industrial activities (FY 2019-20, FY 2020-21 & FY 2021-22).....	35
Table 14 :	Monthly Water Use Power Plant (FY 2019-20, FY 2020-21 & FY 2021-22).....	36
Table 15:	Monthly ETP Treated Water (FY 2019-20, FY 2020-21 & FY 2021-22) .....	37
Table 16:	STP Treated Water (FY 2019-20, FY 2020-21 & FY 2021-22) .....	38
Table 17:	Cost of borewell water abstraction .....	39
Table 18:	Cost of pumping system at BCML, Unit- Balrampur, .....	40
Table 19:	Cost of DM treated water at Balrampur Chinni Mills Limited, Unit- Balrampur, .....	41
Table 20:	Cost of CPU treated water at Balrampur Chinni Mills Limited, Unit- Balrampur,.....	42
Table 21:	Cost of STP treated water at Balrampur Chinni Mills Limited, Unit- Balrampur, .....	43
Table 22:	Cost of ETP treated water.....	44
Table 23:	Total Annual Water Cost of BCML, Unit- Balrampur, .....	47
Table 24:	Water Utilization Scenario at the plant.....	57
Table 25 :	Major Wastewater generating areas at BCML, Unit- Balrampur, .....	59
Table 26:	Specific Water Consumption of BCML, Unit- Balrampur, - FY 2019-20, 2020-21, 2021-22 .....	60
Table 27:	Measurements taken at various locations .....	68
Table 28:	Water & Cost Savings .....	69
Table 29:	Water & Cost Savings .....	71
Table 30:	Estimated specific water consumption (lphd).....	72
Table 31	Estimated specific water consumption (lphd).....	72
Table 32:	Estimation of water requirements for drinking & domestic use in households.....	72
Table 33:	Approximate water requirement for Colonies & as per CGWA Standard .....	73
Table 34	Approximate water requirement for Colonies & as per CGWA Standard .....	73
Table 35:	Water & Cost savings for colony domestic .....	73
Table 36:	Water & Cost savings for Plant domestic.....	73
Table 37:	Water & Cost Savings .....	76

Table 38: Fresh Water & Cost Savings.....	76
Table 39: List of meters installed in the plant.....	77
Table 40: Format for maintaining logbook for water meters.....	78
Table 41: Rates of Ground Water abstraction charges for other industries & infrastructure projects (Rs per m <sup>3</sup> ).....	79
Table 42: Penalty provision for non-Compliance of No Objection Certificate conditions .....	79
Table 43: Pumping Cost.....	88

### **List of Figures**

Figure 1 : Water Sources area.....	10
Figure 2 : Waste water generation & consumption .....	11
Figure 3: Sources of Water (Freshwater, treated water and recycled water).....	27
Figure 4: Type of Water Use (%) .....	27
Figure 5: Existing water circuit diagram of the Sugar plant.....	28
Figure 6: Existing water distribution of Power Plant.....	28
Figure 7: Depicts the existing water and wastewater balance diagram of plant.....	31
Figure 8: Depicts the existing water and wastewater balance diagram of Power plant.....	32
Figure 9: Borewell water extraction trend (FY 2019-20, FY 2020-21 & FY 2021-22) .....	34
Figure 10: Borewell water usage for domestic activities trend (FY 2019-20, FY 2020-21 & FY 2021-22).....	35
Figure 11: Borewell water usage for Industrial activities trend (FY 2019-20, FY 2020-21 & FY 2021-22).....	36
Figure 12: Borewell water usage for Industrial activities trend (FY 2019-20, FY 2020-21 & FY 2021-22).....	37
Figure 13: ETP Treated water trend (FY 2019-20, FY 2020-21 & FY 2021-22) .....	38
Figure 14: STP Treated water trend (FY 2019-20, FY 2020-21 & FY 2021-22).....	39
Figure 15: Existing water cost at user location accounting water pumping and treatment cost at plant.....	45
Figure 16: Existing water cost at user location accounting water pumping and treatment cost at power plant.....	46
Figure 17: Scheme of DM Plant .....	48
Figure 18: Scheme of CPU Plant.....	50
Figure 19: Percentage of total water utilization .....	58
Figure 20: Percentage of wastewater generation at BCML, Unit- Balrampur, .....	59
Figure 21: Water Usage Ratio.....	60
Figure 22: Installation position of tamper proof flow meter with telemetry at groundwater abstraction structures. ....	63

### **List of Pictures**

Picture 1: Photos of Borewells taken during the audit.....	24
Picture 2: Pictures of Piezometers .....	26
Picture 3: Pictures of water taps installed in the plant.....	68
Picture 4: Pictures of water taps measurement .....	68
Picture 5: Aerator type hand washing taps .....	69

---

Picture 6: Pictures of urinals installed in the plant .....	70
Picture 7: Photo shows the retrofit of "New Water Less System" in old urinal pots. ....	71
Picture 8: Closets installed in the plant.....	74
Picture 9: Tank Bank (For Flush Tanks).....	75
Picture 10: Dual flush Cistern 3-6 litres .....	75

## ABBREVIATIONS

ETP	:	Effluent Treatment Plant
kW	:	Kilo Watt
kWh	:	Kilo Watt hour
lpcd	:	litres per capita per day
lpm	:	litres per minute
OHT	:	Overhead Tank
RWH	:	Rainwater Harvesting
RO	:	Reverse Osmosis
SWC	:	Specific Water Consumption
CPU	:	Condensate Polishing Unit
MEE	:	Multi Effect Evaporation
UPGWA:		UP Ground Water Authority

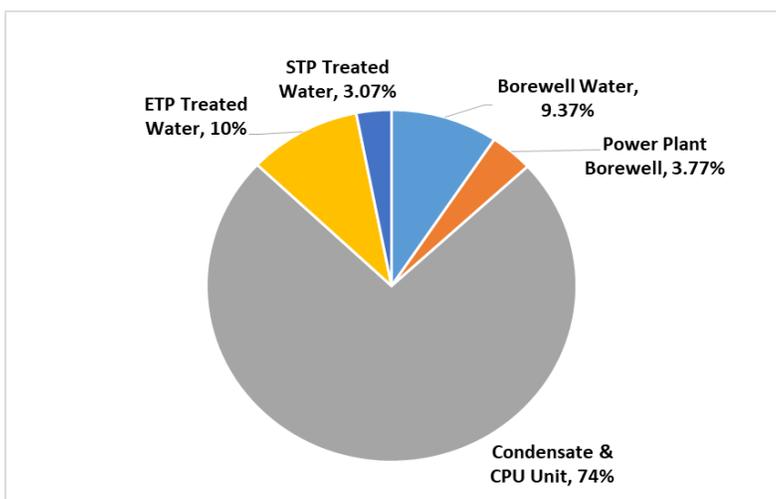
## EXECUTIVE SUMMARY

FICCI has conducted a detailed Water Audit Study of the Balrampur Chini Mills Limited, Balrampur, unit (UP.) during February 2023. The study estimated that the total Water use by the plant is about 16619 m<sup>3</sup>/day out of which about 9.37% (1557 m<sup>3</sup>/day) is freshwater, 74% (12288 m<sup>3</sup>/day) is process condensate obtained from cane crushing & juice heating, 10% (1638 m<sup>3</sup>/day) is ETP Treated water, 3.07% (509.5 m<sup>3</sup>/day) is STP treated water, 3.77% (626.4 m<sup>3</sup>/day) is Power plant borewell. The main source of freshwater is supplied from groundwater by borewells. The plant consumes about 138637 m<sup>3</sup> of groundwater as per FY 2021-22. The main water sources and their uses are given in Table below.

**Table A: Total water Requirement by Plant**

Type of water	m <sup>3</sup> /day	Water to	Water Quality	Major Usage Area	Water Use (%)
Borewell Water	1557	Sugar Plant	Fresh Water	Domestic (Drinking/Hand wash/Cooking/Washing/flushing)	9.37%
Power Plant Borewell	626.4	Power Plant	Fresh Water	Cooling Tower make-up, Ro plant, Fire Hydrant, DM make-up	3.77%
Condensate & CPU Unit	12288	Sugar Plant	Recycled	Boiler, imbibition, Cleaning, Process, Vacuum Filter, Magma Melter, Centrifugal, Pan Boiling, Refinery	74%
ETP Treated Water	1638	Sugar Plant	Recycled	Distillery, New Mill House, Old Mill House, Process, Molasses Cooling, Power Plant	10%
STP Treated Water	509.5	Sugar Plant	Recycled	Horticulture	3.07%
<b>Total</b>	<b>16619</b>				<b>100%</b>

The water is mainly used in Plant & colony Domestic (Drinking/Hand wash/Cooking/Washing), Lab (Testing/Handwashing/Flushing/Drinking), making DM water, for boiler make-up (DM plant), CT makeup, Imbibition, CPU RO feed, pan movement, centrifugal, molasses preparation, magma Melter, cleaning (evaporator, pan, juice heater), mill & process equipment cooling, Gardening, irrigation, trolley yard, cold UGR makeup etc. Following diagram shows the different type of water uses and their share



**Figure 1 : Water Sources area**

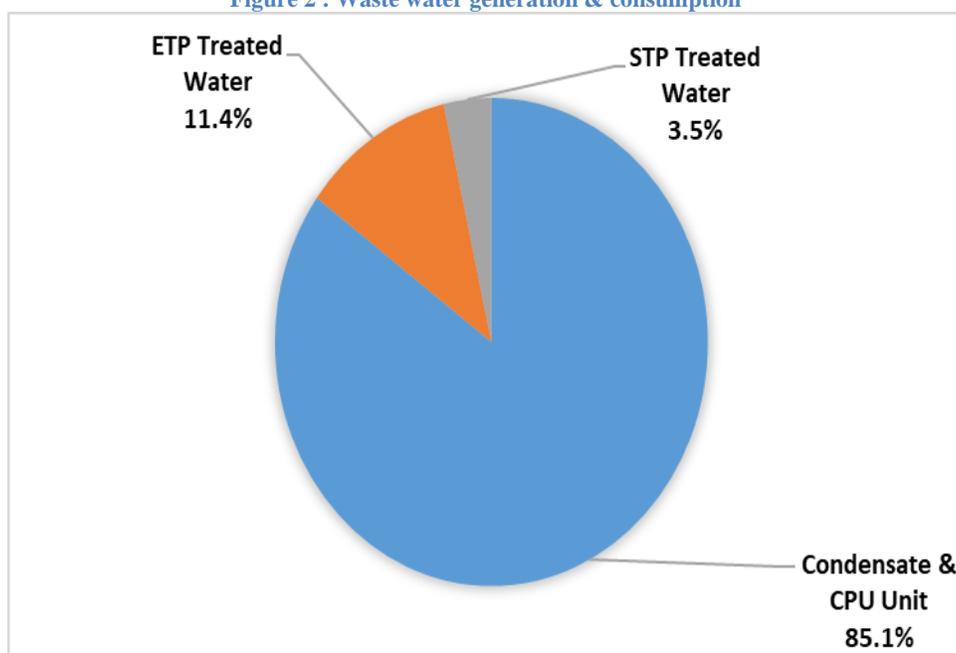
The total wastewater generation in the plant is about 14436 m<sup>3</sup>/day, out of which about 85.1% (12288 m<sup>3</sup>/day) wastewater generated from cane crushing & obtained in the form of process condensate, 11.3% (1638 m<sup>3</sup>/day) wastewater generated from cleaning process boiler blowdown, equipment cleaning, DM backwash, cooling tower blowdown, CPU RO reject which is treated in ETP, 3.5% (509.5 m<sup>3</sup>/day) is generated by domestic activities in colonies

& plant which is treated in STP. Plant has installed CPU unit of 1600 KLD capacity for treating process condensate & the treated water is being fed to cooling tower for makeup. The ETP treated water is used to cold UGR make-up to reuse in process cooling and cleaning application & Distilleries plant. The breakup of wastewater generation from different sections is provided in below table. The detailed Water balance is discussed in the subsequent chapter.

**Table B: Major Wastewater generating areas**

S. No.	Major Sections	Recycled/Discharge	Wastewater Generation (m <sup>3</sup> /day)	Percentage
1	Condensate & CPU Unit	Recycled	12288	85.1%
3	ETP Treated Water	Recycled	1638	11.3%
4	STP Treated Water	Recycled	509.5	3.5%
			<b>14436</b>	<b>100%</b>

**Figure 2 : Waste water generation & consumption**



### Water Management Summary Graph

Table 1 Balrampur Chinni Mills Limited, Unit- Balrampur, (UP.)

Plant Name and Location	Balrampur Chini Mills Limited, Unit- Balrampur, (UP.)				
Plant zone	Safe Zone				
Depth of ground water table	25 metres				
Type of products	White Sugar				
No. of working days/year	133				
Annual Production	Product	Unit	2019-20	2020-21	2021-22
	White Sugar	tons	176420.20	150962.55	121379.13
Major Water Usage Area in the Plant	Domestic (Drinking/Hand wash/Cooking/Washing), making DM water for boiler, Backwash (DM plant), Cold UGR makeup, Cooling Tower Makeup, Imbibition, CPU RO feed, pan movement, centrifugal, molasses preparation, magma Melter, cleaning (evaporator pan juice heater), mill & process equipment cooling, trolley yard, Irrigation/horticulture, process, vacuum filter, Refinery, milk of lime preparation.				
Main Source of Freshwater and sourcing cost (Rs/m <sup>3</sup> )	Borewell- 1557 m <sup>3</sup> /day & water cost rate Rs 0.90/m <sup>3</sup> (UP GWA Charge)				
Total annual Fresh Water consumption	Unit	2019-20	2020-21	2021-22	
	KL	526631	368713	138637	
Total Water Use (Freshwater, Recycled RO Reject Water, CPU Treated Water) for Plant	<ul style="list-style-type: none"> <li>• Fresh Borewell water – 1557 (m<sup>3</sup>/day)</li> <li>• Process Condensate &amp; CPU Treated – 12288 (m<sup>3</sup>/day)</li> <li>• ETP Treated Water– 1638 (m<sup>3</sup>/day)</li> <li>• Power Plant borewell – 626.4 (m<sup>3</sup>/day)</li> <li>• STP Treated Water–509.5 (m<sup>3</sup>/day)</li> </ul>				
Cost of Water at various water use areas	<ul style="list-style-type: none"> <li>• Average Rate of abstraction of borewell water- Rs 0.9/ m<sup>3</sup></li> <li>• Cost of DM water – Rs 9.8 / m<sup>3</sup></li> <li>• Cost of CPU Treated water- Rs 6.65 /m<sup>3</sup></li> <li>• Cost of ETP Treated water- Rs 86.35 / m<sup>3</sup></li> <li>• Cost of STP Treated Water- Rs 11.6/m<sup>3</sup></li> </ul>				
Average Effluent Generation in the ETP & Reuse (m <sup>3</sup> /day)	1638 m <sup>3</sup> /day of industrial wastewater is treated and reused in Distillery, Cooling process, 509.5 m <sup>3</sup> / day of domestic sewage is treated in STP & used in Horticulture.				
Power Supply Cost (2021-22)	Rs. 3.38/ kWh				
Average Specific Water Consumption in terms of Freshwater Use (2021-22)	3.092 m <sup>3</sup> of water / ton of product (sugar)				

The water audit study of the plant has identified various water & cost saving opportunities which are discussed in the report. The summary of recommendations is given in table below.

## SUMMARY OF RECOMMENDATIONS

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
1	Install flow meters with telemetry system on borewells to comply with CGWA Guidelines	The plant has 4 borewells but telemetry system is not installed on the borewell pumps. It is recommended to comply with CGWA NOC guidelines & install telemetry system	It is recommended to comply with CGWA NOC guidelines & install telemetry system				
2	Borewell Water Flow meters	Existing Borewells was not having concrete structure as per CGWA guidelines	We recommend to construct the proper concrete structure as per CGWA Guideline	-	-	-	-
3	Hand Washing	Old conventional type of Taps are used for handwashing pots taps which are having high flow charge of water.	Retrofit high flow rate hand washing taps with aerators and flow restrictors so as to have 2-3 lpm flow rate in hand washing taps in the buildings ensuring a wider spray area when opened. An estimated 40% savings can be achieved by using flow restrictors in hand washing taps. Over all 0.83% of fresh water can be saved on a daily basis.	43800	63510	2,50,000	3.9
4	Urinals	The plant uses about 20 m <sup>3</sup> per day of treated water in urinal pots. During the audit, a detailed building survey including process area was conducted to measure the flow rates of the fixtures, inspection of flushes and analysing the water use practices of officials. Officers holding higher posts have separate washrooms inside their cabins & a	It is suggested to install following water efficient fixtures in the buildings to save domestic water consumption. Overall, 90-95% domestic water consumption use in urinals will be reduced by installing and maintaining suggested fixtures.				

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
		lot of employees were found to be using toilet closets for discharging urine instead of urinals as only closets are available nearby their working area.	Approx. 0.8% of freshwater can be saved on a daily basis.				
5	Colony	The plant has colonies for plant officials as residential colony. The colony has about - nos. of building including guest house. The colony receives raw water from borewells in Storage Tanks installed at the rooftop of the buildings while.	It is recommended that plant should take measures to ensure that the raw ground water is not used for activities other than domestic use. For gardening only treated water must be used. Approx. 31 % of raw water can be saved which will reduce the quantum of ground water abstraction.	2049657.58	697578	0.34	Immediate
6	Toilet Closet	In toilet closets groundwater (100 m <sup>3</sup> /day) is used for flushing and about 7-10 litres of freshwater is used per flush. Officers holding higher posts have separate washrooms inside their cabins & a lot of employees were found to be using toilet closets for discharging urine instead of urinals as only closets are available near their working area.	To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install 'Tank-Bank' in the existing flush tanks. By just placing tank bank in the flush tank, we displace and save water equal to the space occupied by the tank bank for every flush. This will save about 20% of flush water in toilets. However, the existing 7-9 litres flush tanks can also be replaced by Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks to save water. This will save about 30% of the flush water in toilets. Over all	10950	15877	50000	3.14

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
			about 1.92 % of fresh water can be saved by this project.				
7	Flushing	The plant uses 120 (m <sup>3</sup> /day) of fresh water for flushing. Fresh raw water from borewells wells is used in toilets having an average TDS in the range of 360-416 ppm. The plant has another source of water i.e., ETP treated water as well as STP of 700 KLD capacity.	It is suggested that the plant should use STP/ETP treated water in place of fresh ground water for reducing fresh water consumption. About 7.29% of freshwater savings can be achieved in this project.	43800	63510	7.8	-
8	Regularly calibrate & maintain existing water flow meters	It was observed that the existing borewell meter are installed and calibrated	It is suggested to continue to calibrate and maintain the existing flow meters.	Monitoring Water consumption patterns	Efficient Water Accounting	Low	-
9	Water Flow Meters	It was observed that the plant has installed water flow meter in borewell. But water flow meter is not in proper line location.	It is suggested to re installed the mtr at borewell at right location (after the borewell discharge)	This will help to know the right & actual flow value	Efficient Water Accounting	Low	-
10	Borwell Relocating	As per discussion with plant team member, it was observed that the water level in borewell number 4 is reduce and there is no water under this bore. Plant has operating other three borewells for water extraction for complete the requirement	It is suggested that the plant has to change the location of existing borewell to another location with proper labelling. To identify the new location plant has to contact with local vendor for bore. If the condition of pump of previous borewell is healthy then it can be reused otherwise plant has to purchase new pump for borewell.				

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
11	Maintain logbook of daily groundwater abstraction	It was observed that the plant is maintaining data of daily groundwater abstraction	The proposed digital flow meter with telemetry will be equipped with online data recording facility	It will help to know the daily water consumption	Efficient Water Accounting	Low	-
12	Enhance Training and Awareness of the Employees at all Levels and Placing 'Water Saving' posters/Slogans at various Locations	Plant is regularly conducting Training and Awareness of the Employees, events to promote water conservation like celebration of world water day, world environment day" and Placing 'Water Saving' Posters/Slogans at various Locations	Maintain the system and suggested to keep continue the water conservation activities and promotion in the plant	Reduction in Freshwater Use due to awareness & training	Water cost savings due to reduced water use	Low	-
13	Periodically conduct 'Water & Wastewater Audit'	Plant has formed a cell for assessment of potential for water & wastewater management in the plant for water saving & wastewater management.	Conduct periodic 'Water Audit' at least once in 2-3 years either by an experienced external Audit Team to assess the efficiency of water usage in processes; reduce water losses in the system and optimize costs & energy consumption.	Efficient water & wastewater management	Evolving schemes leading to water and associated cost savings	Low	-
14	Regular payment of applicable groundwater abstraction charges	It was observed that plant team is regularly paying the applicable ground water charges to concern authority	It is suggested to maintain the same				
15	Ensure to comply with the NOC conditions to avoid any penalty	It was observed that plant team is meeting all applicable compliance	It is suggested to maintain the same				

## CHAPTER: 1 : INTRODUCTION

### 1.1 About the Plant: General Plant Details

Balrampur Chinni Mills Limited ('BCML') is one of the largest sugar manufacturing companies in India with a significant strength in the manufacture of downstream products like power (co-generation) and ethanol. The company possesses a cane crushing capacity of 11500 tons per day.

Unit- Balrampur is located in Balrampur, (UP) & has a crushing capacity of 11500 tons per day.

### 1.2 Process Description

The Raw Syrup plant consist a following equipment

#### Juice Extraction

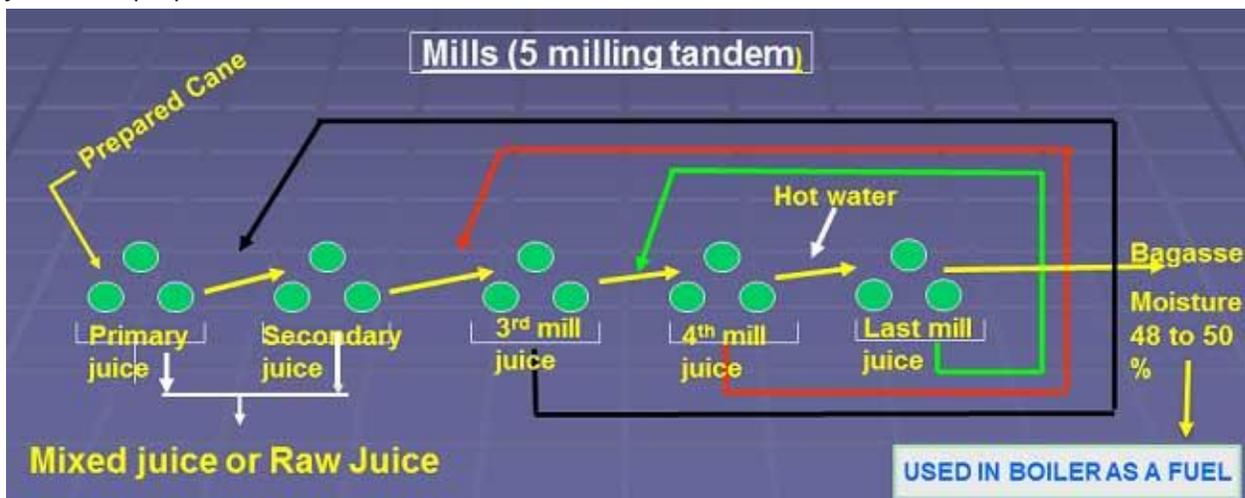
The following technologies are using the extraction of juice from sugar cane.

#### Cane Preparation

In this process cane is shredded or cut in to small pieces in the chopper then it sent to fiberize where rapture the cells make it fibrous.

#### Milling Technology

In this process follow five stages (set of mills) for juice extraction in milling process. According to that the set of mills the system is called as 5-Milling Tandem. The milling tandem hot water is used for maximum extraction of juice from prepared cane. This hot water is also called imbibition water.



#### Mill sanitation

The first important operation in the raw juice manufacture is the "sanitation." Every unit from mills to conveyors is kept clean to prevent the bacterial infection. To control the growth of dextran the good quality mill sanitation chemicals should be used in optimum dose. The growth of dextran should be controlled through proper sanitation.

#### Defecation Process

The process of Defecation is used in the clarification process of raw juice manufacturing industry. After extraction of the juice from sugar cane by milling is subjected to defecation process. This process can be defined as a neutralize the raw juice by adding of lime (add in the form of Milk of lime).

- a) In this process lime & heat are two basic agents. First the Juice is heated up to 70 °C then send to defecator for the addition of MOL & mixing.
- b) The lime and heat treatment forms a heavy precipitate of complex composition.
- c) Contains in soluble lime salts, coagulated albumin, and varying proportion of the fats, waxes and gums.
- d) Phosphoric acid is added to increase P2O5 content of juice to 300 ppm.
- e) Then lime added to neutralize organic acids,
- f) Besides insoluble tricalcium phosphate [Ca3 (PO4) 2-] is also formed which occludes colloids & suspended impurities.

**Settling**

The limed juice or defecated juice or treated juice is heated up to 102 °C to 103 °C and then sent to clarifier for settling & further filtration purpose. The function of juice clarifier is to separate insoluble solids in limed juice (Defecated juice), which are in "flocs" by means of settling and allowing the clear Juice. The settling process separates the treated juices treated into two layers of clear juice which rises to the top surface and mud which collects at the bottom of the clarifier. The different types of clarifier design to carry out this separation as completely and rapidly as possible. Normally settling aid is added so as to maintain the juice free from suspended matter and turbidity. The settled mud in clarifier contains also having sugar so it will be extracted by using vacuum filters. The extracted juice in vacuum filters is again sent back to the defecation process.

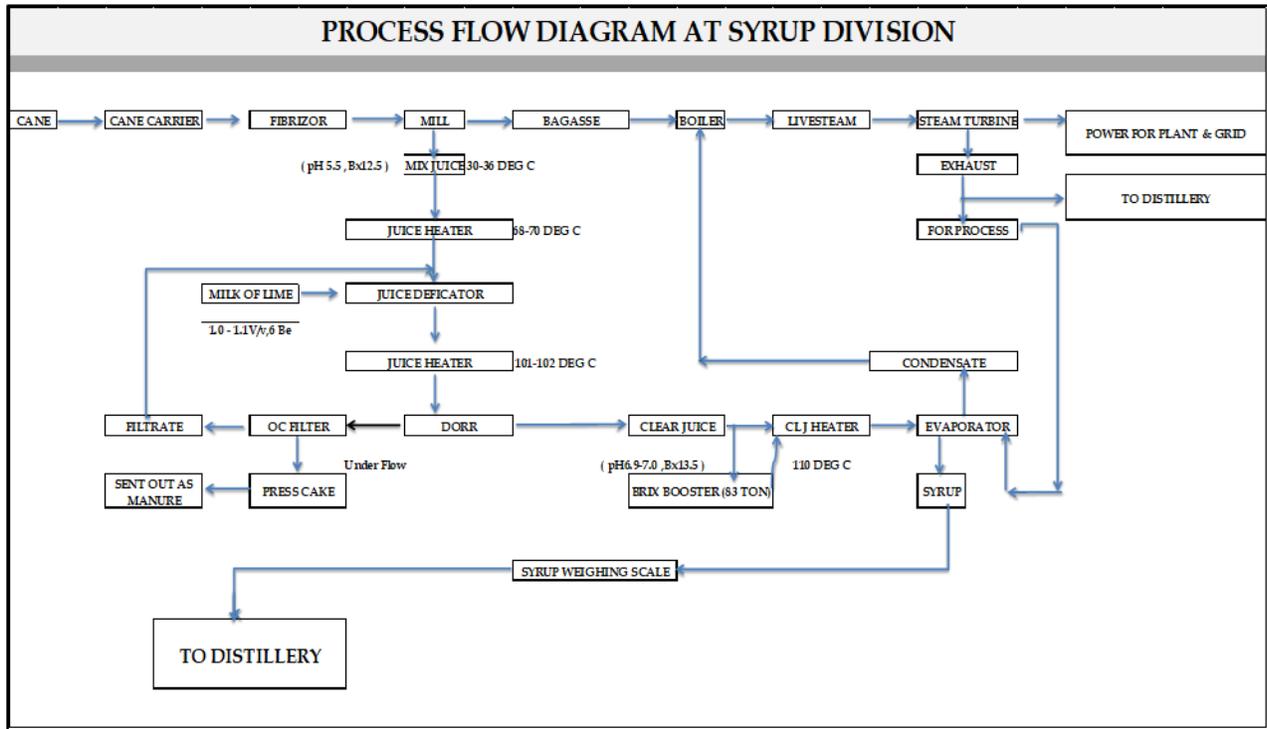
**Evaporation**

The clarified juice sent to evaporator bodies to increase its solid concentration. After evaporation it is called as a syrup. In the process of evaporation, the concentration of clear juice is carried out until the percentage of solids has reached up to 60% 70% as per the requirement. This evaporation process is conducted under a system of multiple effect evaporators as per the view of energy conservation. The following picture is of a Robert Evaporator Design-

**Table 2: Production Details of FY 2019-20, FY 2020-21 & FY 2021-22**

Product	Unit	2019-20	2020-21	2021-22
Sugar	Tons	176420.20	150962.55	121379.13

### 1.3 Process Block Diagram



### 1.4 Water Conservation Initiatives taken by Plant

Table 3: Water Conservation Initiatives taken up by plant

S.NO.	WATER CONSERVATION MEASURE TAKEN
1	Treated water is being used for pans, evaporator trial & testing water.
2	Surplus condensate water 100% is treating from CPU and purifying by RO plant thereafter purified is being used in sugar boiler through DM plant, Co-gen cooling towers & distillery plant.
3	Treated effluent water (ETP Water) 70% is purifying by UF & RO Plant thereafter purified water is being used in Sugar process, co-gen cooling tower and distillery process/ cooling towers and rest treated is being in irrigation, spraying, cleaning etc.

## CHAPTER: 2 : SCOPE OF WORK

### 2.1 Scope of Water Audit Study

The main objective of the study is to identify the water uses & water saving opportunities. Scope of work of the study includes the following:

- On-site training and discussion with facility manager and personnel
- Water system analysis and Quantification of baseline water map
- Water use Monitoring and measurements using pressure and flow meters and various other devices
- Quantification of inefficiencies and leaks in the water system
- Quantification of water quality loads and discharges
- Quantification of variability in flows and quality parameters
- Strategies for water treatment and reuse or direct use
- Development of detailed water circuit diagram and water balance of the facility
- Mapping of water quality requirement to develop 'recycle' and 'reuse' opportunities
- Developing Water consumption and wastewater generation pattern
- Estimating Specific water use and conservation potential
- Develop & Maintain monthly MIS on water extracted from borewells, water level, water quality etc.
- Calculation of Rainwater Harvesting Potential for the site and assessment of the existing structures
- Evolving Water saving opportunities with method of implementing the proposal with
- Description and figures related to water management schemes
- Investment required for water saving schemes/Cost Benefit Analysis
- Submission of water audit report & its presentation at site (if required)
- Following opportunities would also be assessed for Industries for water conservation:
  - Setting up of norms for water budgeting
  - Modernization of industrial process to reduce water consumption
  - Recycling water with a re-circulating cooling system
  - Ozonation cooling water approach which can result in fivefold reduction in blow down when compared to traditional chemical treatment
  - Reduction in reuse of de-ionized water by eliminating some plenum flushes, converting from a continuous flow to an intermittent flow system and improving control on the use
  - Use of wastewater for gardening
  - Proper processing of effluents to adhere to the norms of disposal

## CHAPTER: 3 : METHODOLOGY OF THE WATER AUDIT STUDY

### 3.1 Methodology followed for conducting water audit study

#### Step 1: Reconnaissance or Walk-through survey

- Understanding of existing water sourcing, storage, and distribution facility.
- Assessing the water demand and water consumption areas/processes.
- Preparation of detailed water circuit diagram.

#### Step 2: Secondary Data Collection through the Discussion with plant executives, past records, Available technical literature/specifications

- Analyse historic water use and wastewater generation
- Field measurements for estimating current water use
- Metered & unmetered supplies.
- understanding of "base" flow and usage trend at site
- Past Water Bills
- Wastewater Treatment scheme & costs etc.

#### Step 3: Site Water Audit Planning (based on site operations and practices)

- Preparation of water flow measurement plan to quantify water use at various locations
- Wastewater flow measurement and sampling plan
- Instruments availability like Ultrasonic Water Flow Meter, Doppler type Flow meter, Stop Watch, measuring cylinders, Power Analyser etc.

#### Step 4: Conduction of Detailed Water Audit & Measurements

- Conduction of field measurements to Quantify water/wastewater streams
- Power Measurement of Pumps/Motors
- Measurement of suction & discharge pressure at various pumps
- Wastewater sampling & analysis
- Preparation of Water Balance Diagram
- Establishing Water Consumption Pattern
- Evolving value added "cost of water" at various locations
- Detection of potential leaks & water losses in the system
- Assessment of productive and unproductive usage of water
- Determine key opportunities for water consumption reduction, reuse & recycle with paybacks

#### Step 5: Preparation of Water Audit Report with Sustainable Water Management Plan

- Documentation of collected & analysed Water Balancing and Measurement details
- Projects and procedures to maximize water savings and minimize/eliminate water losses
- Water Metering and Accounting System

- Opportunities for Water Conservation based on Reduce/ Recycle/ Reuse/ Regeneration/ Recharge options with Cost Benefit Analysis

**Step 6: Water Audit Report Finalization and Submission**

- Incorporation of required changes based on discussions with plant executives
- Preparation & submission of final report.

**3.1 Methodology Adopted for Performance Evaluation of Pumps**

The Plant has installed number of pumps in various sections to transfer/ circulate the water for different applications. During the audit, flow measurements were conducted at various pumps and performance evaluation of all the major pumps were conducted to estimate their present operating efficiency & cost of pumping. The estimated efficiency is based on operating head, measured flow rate & power consumption of the pumps.

➤ **Water Flow Measurement**

The water flow measurement was conducted using transit time ultrasonic flow meter at the discharge side of the pumps or any suitable location. The step wise methodology is given below,

- a. A suitable location for measurement of flow rate was identified on discharge pipeline of the pump and initial pipe preparation was done by cleaning and filing of pipe at measurement location
- b. The circumference of pipe for calculating the external diameter was measured by inch tape and the pipe thickness was measured by digital thickness gauge or by measurement of spare pipe.
- c. The parameter like pipe diameter, type of pipe, water temperature, pipe thickness, roughness etc. are input in the ultrasonic flow meter
- d. Based on above input values, the flow meter reflects the distance between the traducers to be positioned on the pipe while measuring the flow
- e. The traducers are placed on the surface of the pipe (filed surface) at the same distance given by flow meter
- f. The ultrasonic flow meter displays instantaneous values of water flow rate in m<sup>3</sup>/hr. The average of these values may be considered as flow rate of water.

➤ **Electrical Power Measurement**

The instantaneous electrical power consumption of pumps was measured from the corresponding electrical panel by portable Fluke Make Power analyser by measurement of electrical parameters like voltage, current, power factor, power etc.

➤ **Head Measurement**

The discharge head of the pump was determined by noting installed pressure gauges at the pump discharge while the suction head was estimated by physical measurement of horizontal and vertical length of suction pipeline. The total operating head was calculated by addition of suction and discharge head.

➤ **Efficiency Calculation**

The operating efficiency of the pumps was based on measured flow, head & power drawn by pumps is

calculated with the help of following formula:

$$\text{Efficiency, \%} = \frac{Q \text{ (m}^3\text{/Hr.)} \times H \text{ (m)} \times 9.81 \times \rho \text{ (kg/m}^3\text{)}}{1000 \times 3600 \times \text{Motor Input Power (kW)}}$$

Where,

Efficiency % = Efficiency of pump set i.e. (Combined efficiency of pump & motor)

- Q = Measured Water Flow rate in m<sup>3</sup>/hr
- P = density of water i.e., 1000 kg/m<sup>3</sup>
- H = Total Head developed (m of water column), Discharge + Suction
- kW = Actual power measured at motor input.

## CHAPTER: 4 : ASSESSMENT OF PRESENT WATER USAGE

### 4.1 Water sourcing and major water use areas

**Details of Source of Water:** The main source of freshwater for the plant is four bore wells. The total freshwater consumption is 2183.4 m<sup>3</sup>/day, out of which 1557 m<sup>3</sup>/day is used for sugar plant & 626.4 m<sup>3</sup>/day is used for power plant. During the study it was observed borewell no-4 is not working because water is not found in the underground so plant is now working on new bore for water extraction. The other sources of water are recycled water from process condensate, ETP and STP treated water. The groundwater is mainly used for Domestic applications of Colony & plant. Other requirements like plant process, cooling the various process utilities, etc. in the plant are met with recycled water.

**Borewells and location:** The borewells are located near Guest House, Near Cane Yard, Near UGR and Near Cogen-3. The rated yield of all borewell pump is 80 m<sup>3</sup>/hr. The flows concurred with the measurements done by FICCI team using ultrasonic flow meter. The borewell have electronic type meter installed from which reading were taken manual and maintained in logbook.

Table 4: Details of borewells

Borewells	Location of Bore-wells	Depth of Bore-well	Type of Pump (mono-block/ Submersible etc.)	Pump Rated Capacity (HP)	Rated yield (m <sup>3</sup> /hr)	TDS (mg/l)
1	Near Guest House	119.78 Mtr	Submersible	25 HP	80	360
2	Near Cane Yard	119.78 Mtr	Submersible	25 HP	80	372
3	Near UGR	119.78 Mtr	Submersible	25 HP	80	358
4	Near Cogen	119.78	Submersible	25 HP	80	362

Picture 1: Photos of Borewells taken during the audit

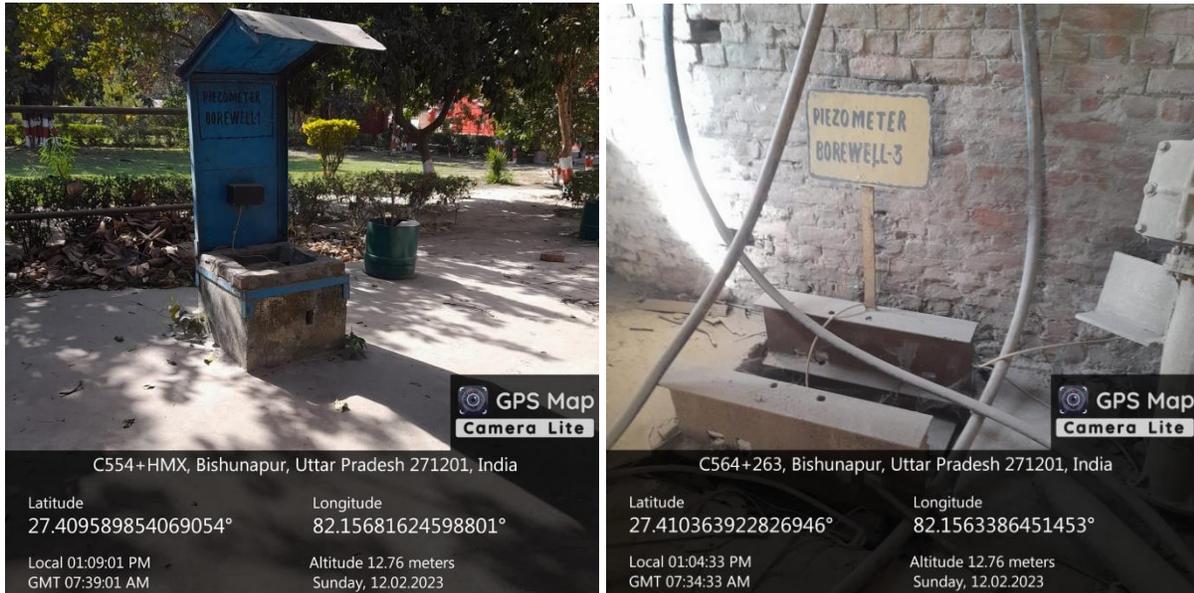


The Piezometer is used to measure pressure via the rise of fluid column. There are 4 piezometers installed in the plant & they are 25-35 m deep and at a distance of 400 – 500 m from the borewells.

**Table 5: Details of piezometer wells (observation well)**

Piezometer	Location of piezometer	Depth of piezometer (meter)	Distance from the existing borewell (meter)	Total Dissolved Solids (mg/l)
1	Near Officer Clun	25	500	366
2	Near Cane Carrier	25	400	358
3	Near boiler	35	300	369
4	Near VIP Guest House	35	500	371

**Picture 2: Pictures of Piezometers**



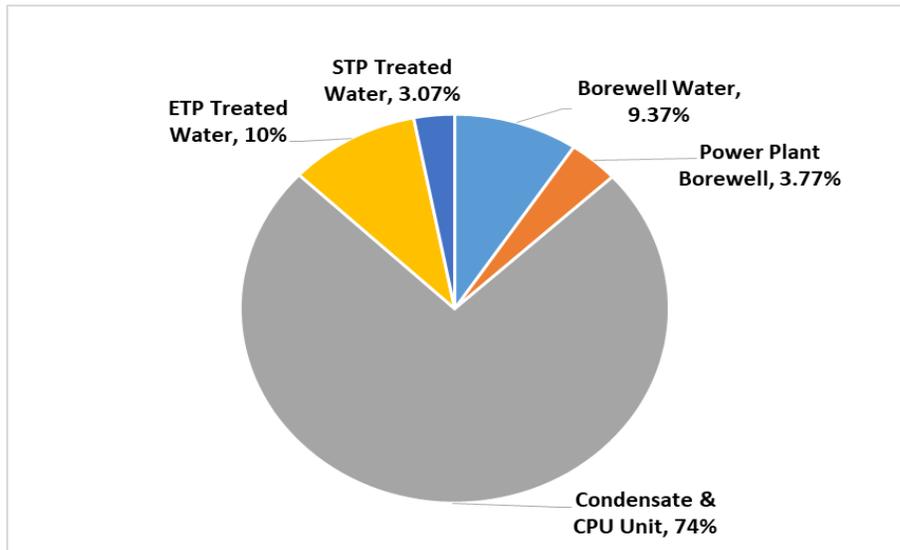
Another source of water is recycled water generated from juice heating which is generated by cane crushing & used in distillation in distillery, Equipment cleaning, chemical preparation, air blowers, Mill house bearing cooling, imbibition, filter cake washing, milk of lime, CPU (distillery). about 1638 (m<sup>3</sup>/day) is obtained from ETP plant which is used for Distillery, New Mill House, Old Mill House, Process, Molasses cooling, 509.5 (m<sup>3</sup>/day) is STP treated water which is used for horticulture & irrigation. Therefore, the total estimated water requirement of the plant is about 16619 (m<sup>3</sup>/day) (freshwater, treated, and recycled water) in various sections of the plant as shown below.

**Table 6: Total Water Requirement by Plant**

Type of water	m <sup>3</sup> /day	Water to	Water Quality	Major Usage Area	Water Use (%)
Borewell Water	1557	Sugar Plant	Fresh Water	Domestic (Drinking/Hand wash/Cooking/Washing/Flushing's)	9.37%
Power Plant Borewell	626.4	Power Plant	Fresh Water	Cooling Tower make-up, Ro plant, Fire Hydrant, DM make-up	3.77%
Condensate & CPU Unit	12288	Sugar Plant	Recycled	Boiler, imbibition, Cleaning, Process, Vacuum Filter, Magma Melter, Centrifugal, Pan Boiling, Refinery	74%
ETP Treated Water	1638	Sugar Plant	Recycled	Distillery, New Mill House, Old Mill House, Process, Molasses Cooling, Power Plant	10%
STP Treated Water	509.5	Sugar Plant	Recycled	Horticulture	3.07%
<b>Total</b>	<b>16619</b>				<b>100%</b>

**Remarks:-**Above table shows the total water usage percentage

Figure 3: Sources of Water (Freshwater, treated water and recycled water)



Out of the 16619 m<sup>3</sup>/day of water, about 9.37% & 3.77% water is freshwater, 73.9% is reclaimed water, 12.9% Treated water as shown in below.

Table 7: Percentages of Freshwater and recycled water

Type of water	Water to	m <sup>3</sup> /day	Major Usage Area	Water Use (%)
Freshwater	Sugar Plant	1557	Domestic (Drinking/Hand wash/Cooking/Washing/Flushing's)	9.37%
Freshwater	Power Plant	626.4	Cooling Tower make-up, Ro plant, Fire Hydrant, DM make-up	3.77%
Reclaimed Water	Sugar Plant	12288	Boiler, imbibition, Cleaning, Process, Vacuum Filter, Mega Melter, Centrifugal, Pan Boiling, Refinery	73.9%
Treated Water	Sugar Plant	2148	Cold UGR, Cooling Process, Distillery Horticulture, Power Plant	12.9%
		<b>16619</b>		<b>100%</b>

Figure 4: Type of Water Use (%)

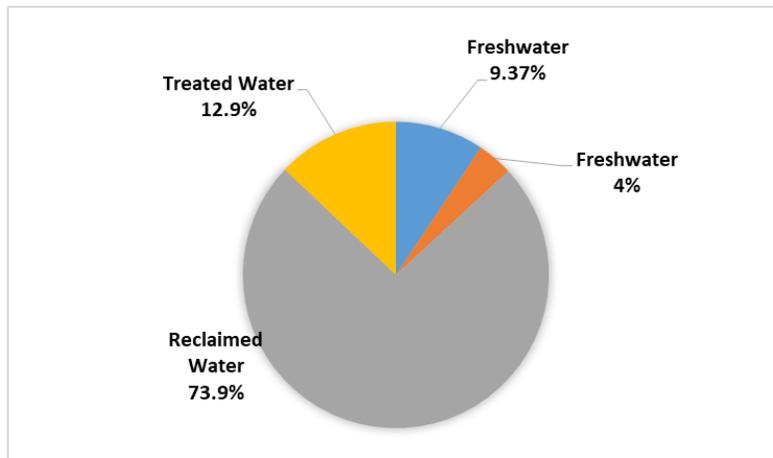


Figure 5: Existing water circuit diagram of the Sugar plant

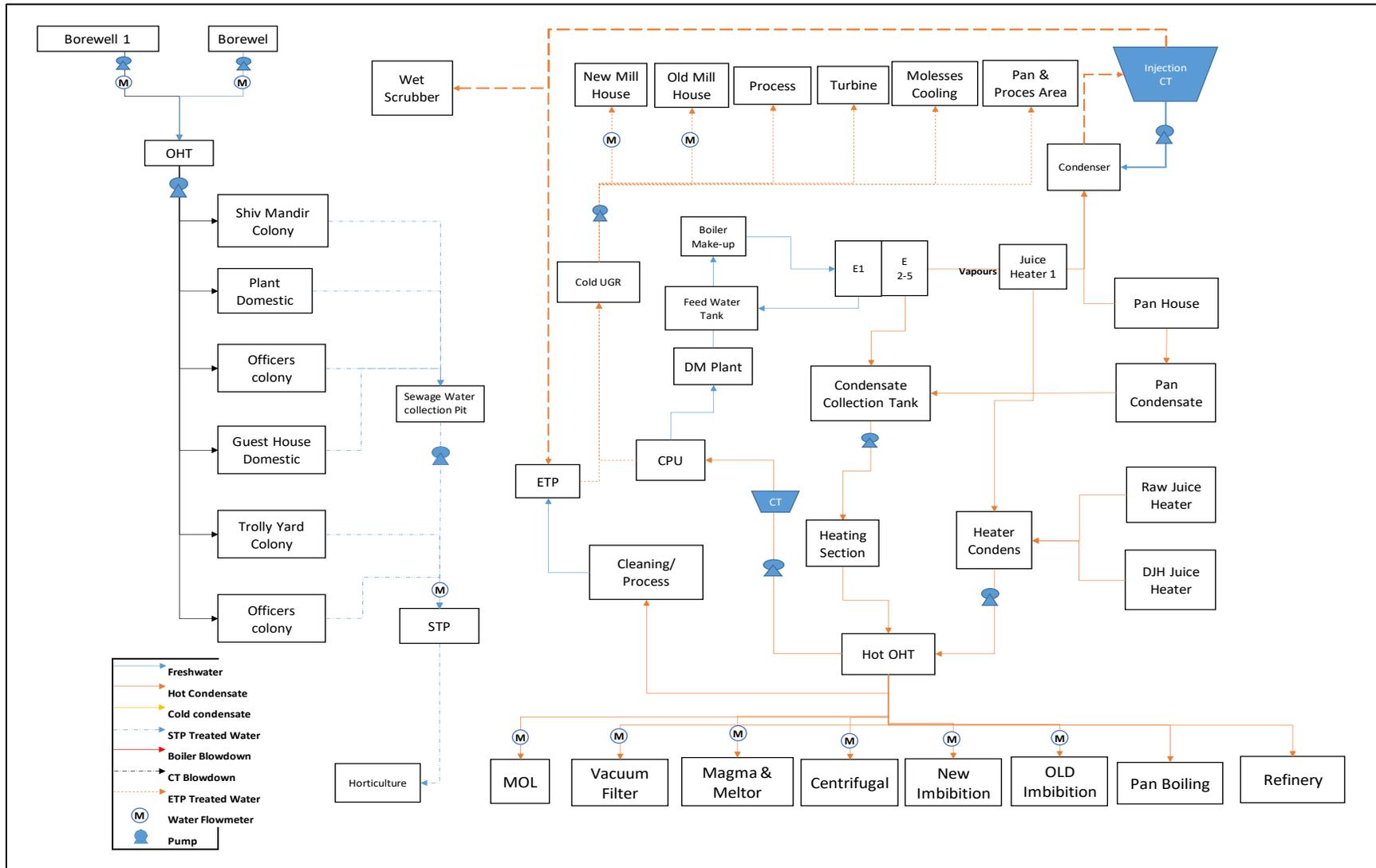
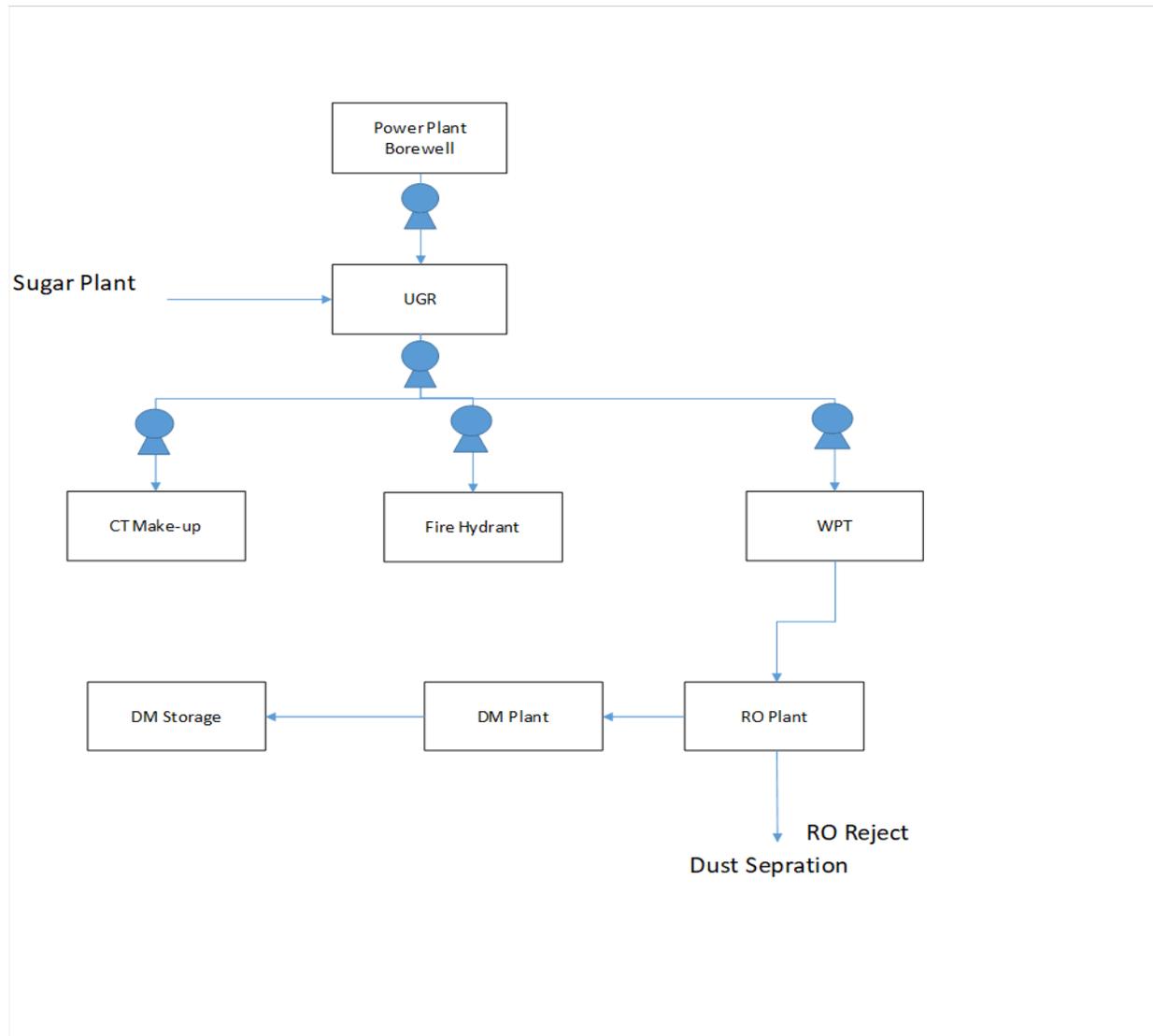


Figure 6: Existing water distribution of Power Plant.



## 4.2 Borewell Water Quality

Borewell water quality report attached in annexure

## 4.3 Water Distribution and water balance

During the opening meeting, On-site training and discussion with facility manager was conducted to explain to the plant officials about effective management of groundwater, purpose of water audit and basic guidelines of the UP GWA notification.

As per the measurements conducted by FICCI team, water distribution and water balance were prepared for the plant. The plant abstracts about 2183.4 (m<sup>3</sup>/day) of groundwater from 3 number of borewells. Instantaneous water flow was measured using ultrasonic flow meters. The measured flow of borewells are in between 160 - 194 m<sup>3</sup>/hr. The borewells have 50 HP motors that runs for about 2-3 hours daily.

**Table 8: Borewell measured flow**

Borewell No.	Measured Flow (m <sup>3</sup> /hr)
Power Plant Borewell 1 Pump	194
Borewell 2 Pump	161
Borewell 3 Pump	188

Details of storage system in the plant is mentioned below

**Table 9: List of Water Storage Tanks in the Plant**

S.NO.	Type of Storage System (Over Head Tank, Underground Tanks, Reservoir etc.)	Location	Storage Capacity (m <sup>3</sup> )
1	Over Head Tank R.C.C	Sugar	600
-	-	-	-
-	-	-	-
-	-	-	-

Abstracted bore well water from borewell 1 to 3 no of borewell is pumped Shiv mandir, plant domestic, officer colony, guest house, Trolley yard. The Cooling towers are fed with 944 (m<sup>3</sup>/day) of freshwater with the help of CT makeup water pumps, for DM plant 459.4 (m<sup>3</sup>/day) of water is used & for Boiler make-up

During the visit, it was observed that plant has installed CPU for process condensate treatment so that the water obtained after treatment can be used in power plant cooling tower, Distillery. The water balance is prepared according to the water consumption pattern in FY 2021-22 season.

The details of water flow & balance in different sections of the plant are mentioned in

Figure 7: Depicts the existing water and wastewater balance diagram of plant

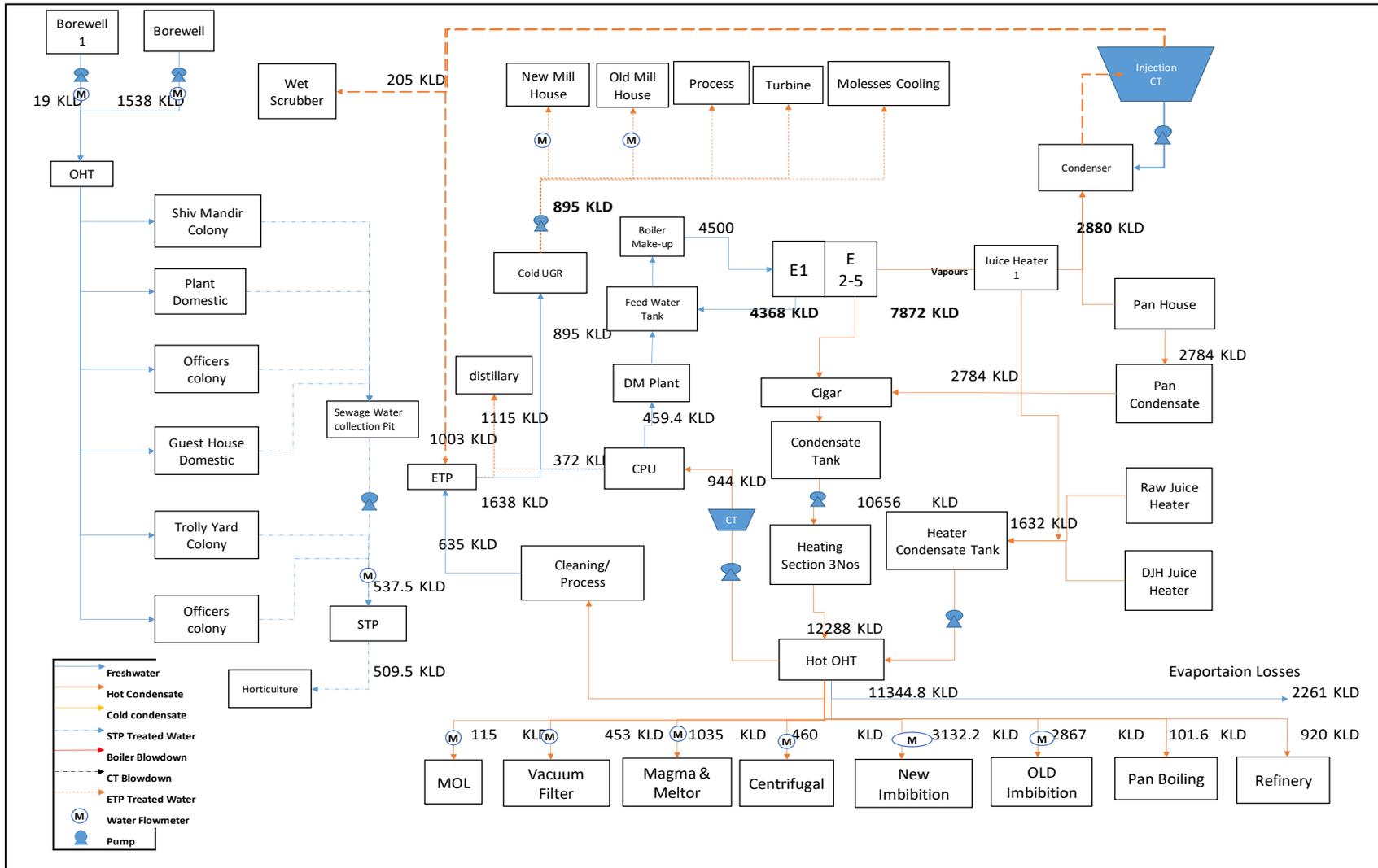
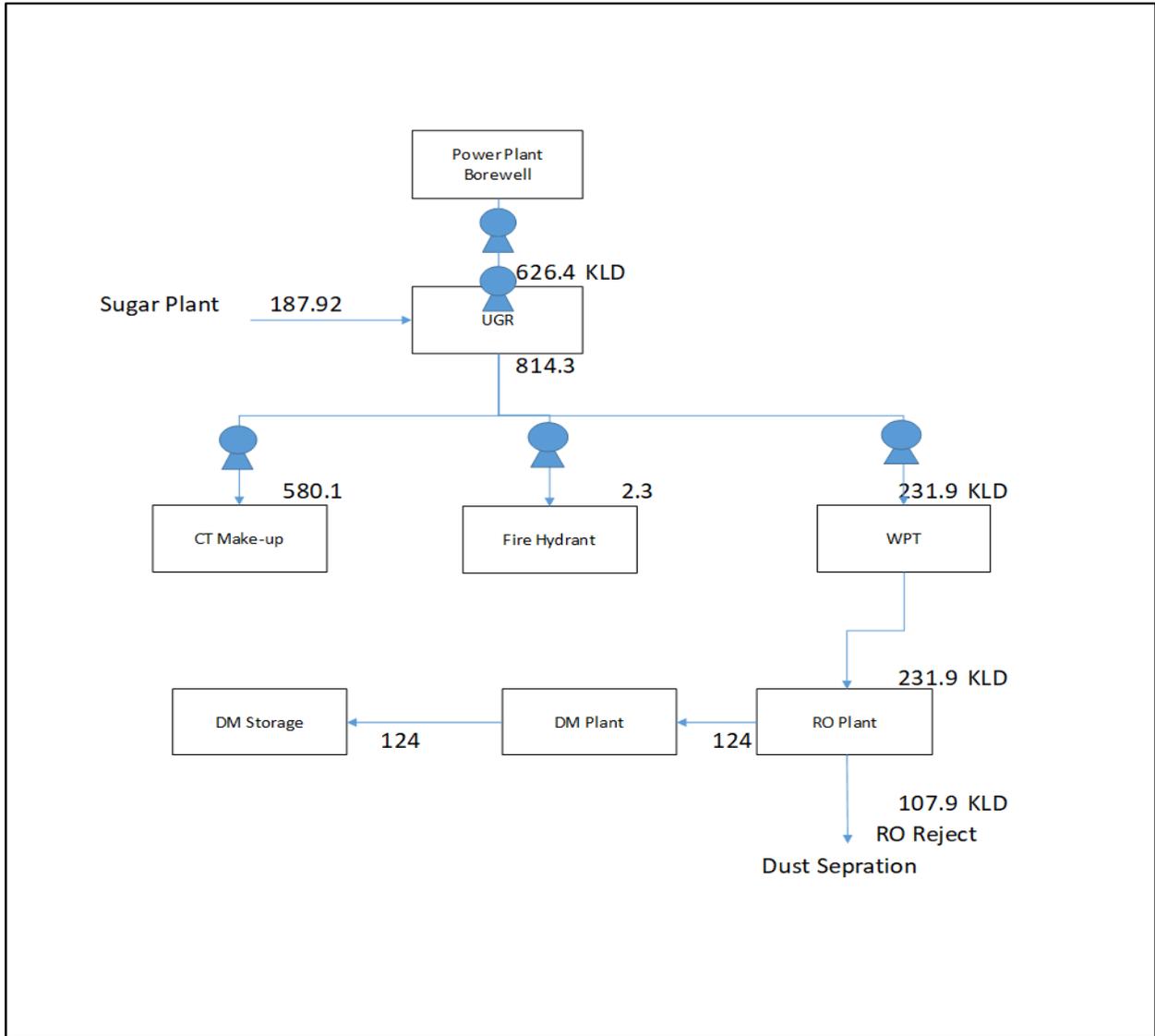


Figure 8: Depicts the existing water and wastewater balance diagram of Power plant



#### 4.4 Water Metering System

There are 46 meters and sub-meters installed inside the plant. All meters are electromagnetic. The meter readings are recorded regularly & most of them are calibrated. Some of the meters are mentioned in the Table 10 below.

**Table 10: Location of Identified Water Meters**

S.NO.	Meter Number	Meter location	Type of meter	Regularly recorded (Yes/No)	Calibrated (Yes/No)
1	FET3211A0	Tube well No. 1	Mag. Flow	Yes	Yes (Zero Cal.)
2	FET3211A	Tube well No. 2	Mag. Flow	Yes	Yes (Zero Cal.)
3	2115158	ETP Treated Water	Mag. Flow	Yes	Yes (Zero Cal.)
4	IFC100/OPT4000	ETP Treated in Process	Mag. Flow	Yes	Yes (Zero Cal.)
5	IFC100/OPT4000	CPU treated Water	Mag. Flow	Yes	Yes (Zero Cal.)
6	8705TSA60C1100B3	Cooling Water meter	Mag. Flow	Yes	Yes (Zero Cal.)

#### 4.5 Water Use Baseline Data as provided by the Plant

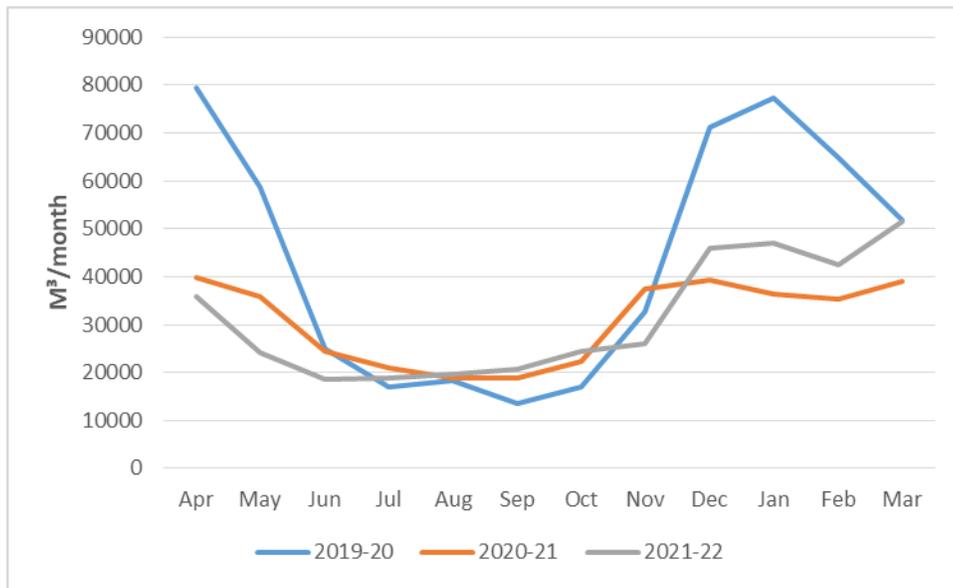
##### 4.5.1 Borewell water

The month-wise meter readings were provided by the plant for the quantity of water drawn from the borewells. Table 11 below depicts the Total groundwater intakes for FY 2019-2020, FY 2020-2021 & FY 2021-22.

**Table 11: Monthly water abstraction from borewells (FY 2019-20, FY 2020-21 & FY 2021-22)**

Borewell Water withdrawn			
Months	2019-20	2020-21	2021-22
Apr	79362	39844	35770
May	58726	35869	24070
Jun	24848	24554	18596
Jul	17016	20941	18713
Aug	18186	18779	19726
Sep	13601	18952	20634
Oct	16906	22309	24477
Nov	32797	37510	26109
Dec	71111	39232	46074
Jan	77362	36355	47146
Feb	64834	35329	42492
Mar	51882	39039	51476
<b>Total</b>	<b>526631</b>	<b>368713</b>	<b>375283</b>

Figure 9: Borewell water extraction trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



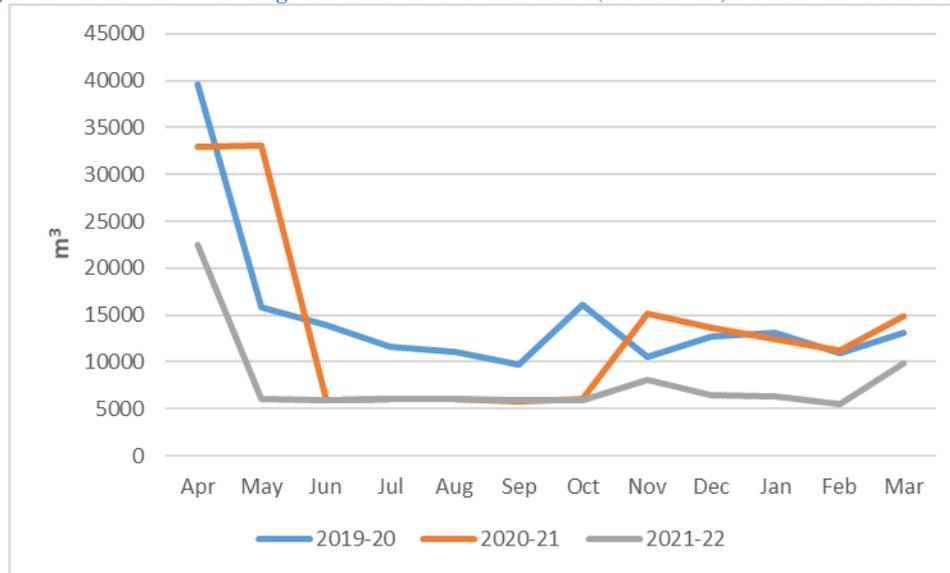
#### 4.5.2 Ground water used for Domestic activities

The Month-wise meter readings were provided by the plant for the quantity of water used for Domestic activities.

Table 12: Monthly ground water used for domestic activities (FY 2019-20, FY 2020-21 &amp; FY 2021-22)

Ground Water used for Domestic Activities			
Months	2019-20	2020-21	2021-22
Apr	32556	39042	35770
May	31980	35210	23975
Jun	15173	23282	18014
Jul	15915	17490	18713
Aug	17854	18348	19726
Sep	13308	18952	17885
Oct	16625	19015	24477
Nov	24538	37510	25989
Dec	40795	39122	45315
Jan	44502	36355	47146
Feb	48344	35329	42492
Mar	51071	39039	50894
<b>Total</b>	<b>352661</b>	<b>358694</b>	<b>370396</b>

Figure 10: Borewell water usage for domestic activities trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



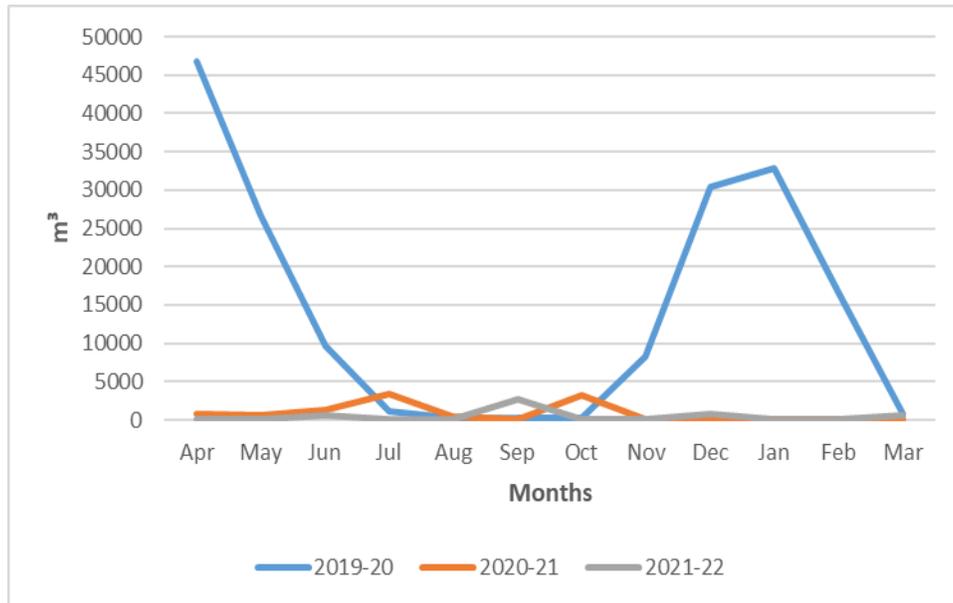
#### 4.5.3 Industrial water

The Month-wise meter readings were provided by the plant for the quantity of water used for Industries activities.

Table 13: Monthly ground water used for Industrial activities (FY 2019-20, FY 2020-21 &amp; FY 2021-22)

Ground Water used for Industrial Activities			
Months	2019-20	2020-21	2021-22
Apr	46806	802	0
May	26746	659	95
Jun	9675	1272	582
Jul	1101	3451	0
Aug	332	431	0
Sep	293	0	2749
Oct	281	3294	0
Nov	8259	0	120
Dec	30316	110	759
Jan	32860	0	0
Feb	16490	0	0
Mar	811	0	582
<b>Total</b>	<b>173970</b>	<b>10019</b>	<b>4887</b>

Figure 11: Borewell water usage for Industrial activities trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



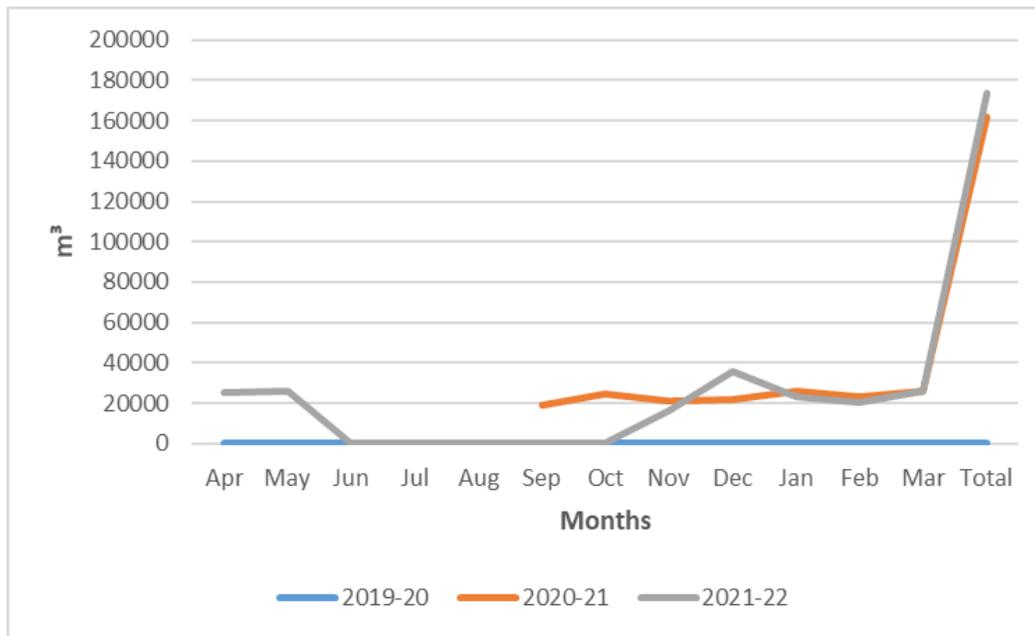
#### 4.5.4 Fresh water uses Power Plant

The Month-wise meter readings were provided by the plant for the quantity of water used for Power Plant.

Table 14 : Monthly Water Use Power Plant (FY 2019-20, FY 2020-21 &amp; FY 2021-22)

Ground Water used for Power Plant			
Months	2019-20	2020-21	2021-22
Apr	0		25120
May	0		25745
Jun	0		308
Jul	0		320
Aug	0		303
Sep	0	19139	301
Oct	0	24688	311
Nov	0	20852	16112
Dec	0	21875	36018
Jan	0	25855	23065
Feb	0	23435	20040
Mar	0	25910	26080
<b>Total</b>	<b>0</b>	<b>161754</b>	<b>173723</b>

Figure 12: Borewell water usage for Industrial activities trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



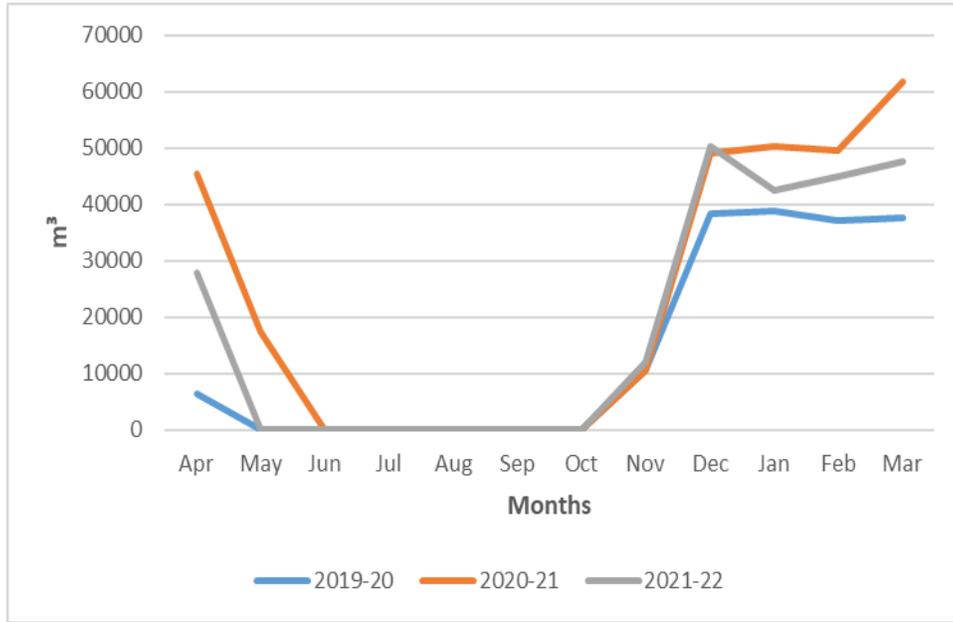
#### 4.5.5 ETP Treated Water

The Month-wise meter readings were provided by the plant for the quantity of water treated in ETP plant.

Table 15: Monthly ETP Treated Water (FY 2019-20, FY 2020-21 &amp; FY 2021-22)

ETP Treated Water			
Months	2019-20	2020-21	2021-22
Apr	6300	45366	27890
May	0	17433	0
Jun	0	0	0
Jul	0	0	0
Aug	0	0	0
Sep	0	0	0
Oct	0	0	0
Nov	10580	10545	11900
Dec	38240	48990	50400
Jan	38773	50400	42560
Feb	37035	49500	44900
Mar	37726	61746	47665
<b>Total</b>	<b>168654</b>	<b>283980</b>	<b>225315</b>

Figure 13: ETP Treated water trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



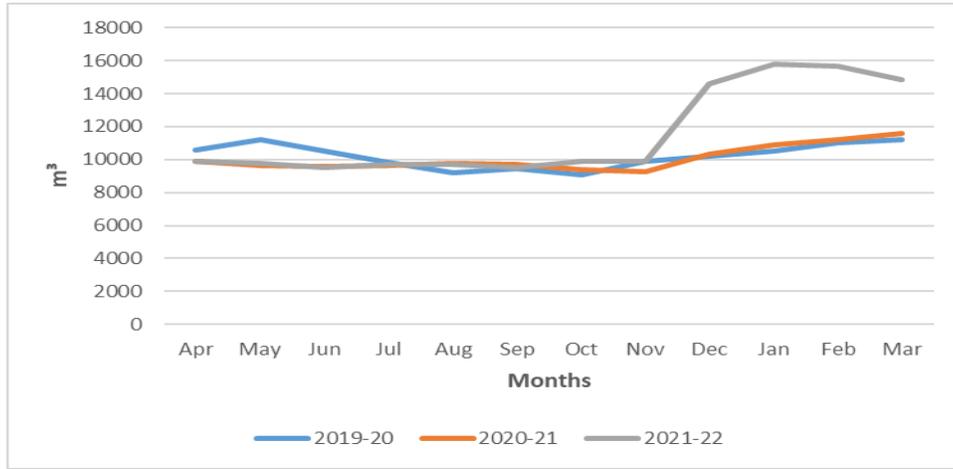
#### 4.5.6 STP Treated Water

The Month-wise meter readings were provided by the plant for the quantity of water treated in STP plant.

Table 16: STP Treated Water (FY 2019-20, FY 2020-21 &amp; FY 2021-22)

STP Treated Water			
Months	2019-20	2020-21	2021-22
Apr	10555	9875	9922
May	11240	9655	9760
Jun	10530	9570	9544
Jul	9860	9672	9700
Aug	9200	9755	9680
Sep	9450	9680	9544
Oct	9050	9380	9870
Nov	9870	9277	9886
Dec	10200	10360	14570
Jan	10540	10870	15788
Feb	11020	11235	15660
Mar	11240	11568	14870
<b>Total</b>	<b>122755</b>	<b>120897</b>	<b>138794</b>

Figure 14: STP Treated water trend (FY 2019-20, FY 2020-21 &amp; FY 2021-22)



#### 4.6 Water Costing

Water and wastewater cost at plant includes water cess, cost of pumping, cost of raw water treatment, cost of DM treatment, cost of BRS treatment, Cost of CPU, cost of STP treatment, cost of ETP treatment. **The actual weighted average cost of abstraction borewell water is estimated to be Rs 0.90 /m<sup>3</sup>, cost of Borewell Pumping water supply is Rs 0.6/m<sup>3</sup>, the cost of DM treated water is Rs 9.8/m<sup>3</sup>, cost of CPU treated water is Rs 6.65/m<sup>3</sup>, the cost of STP treated water is Rs 23.32/m<sup>3</sup> & the cost of ETP treatment is estimated to be about 86.35 /m<sup>3</sup>, as discussed below.** The water and wastewater costing for various user points is shown in Figure 15.

##### 4.6.1 Cost of abstraction of Borewell Water

Rates of ground water abstraction charges for other industries and infrastructure projects in safe, semi-critical and critical assessment units is given in table below. Since BCML Balrampur is in safe zone and NOC limit for water abstraction is 3000 m<sup>3</sup>/day, which is under range of 1000 to <5000 m<sup>3</sup>/day, therefore the cost of groundwater abstraction is **Rs 0.90/m<sup>3</sup> as per Table 17**

Table 17: Cost of borewell water abstraction

S.No.	Category of area ↓ Ground water Use →	Quantum of ground water withdrawal			
		< 500 (m <sup>3</sup> /day)	500 to <1000 (m <sup>3</sup> /day)	1000 to <5000 (m <sup>3</sup> /day)	5000 (m <sup>3</sup> /day) and above
1.	Safe	0.70	0.80	0.90	1.0
2.	Semi-critical	0.80	0.90	1.0	1.10
3.	Critical	0.90	1.0	1.10	1.20
4.	Over exploited	1.0	1.1	1.20	1.30

#### 4.6.2 Pumping cost-energy

Flow measurements were made during the field study. The Transit time ultrasonic flow meter was used for water flow measurements. Table 18 below summarises the water flow measurements at Pump discharge line. Apart from pump discharges, power measurements including voltage, current and power factor etc. were taken. Using the measured data for the pumps, the actual pumping costs are calculated for various pumps.

Table 18: Cost of pumping system at BCML, Unit- Balrampur,

S. No	Pump name	Total Flow	Power Consumption	Sp. Power	Cost of Pumping	Daily Run hours	Daily flow	Daily Pumping Cost	Total Annual Cost @133 days
				Consumption					
Electricity Charges @ 3.38 Rs/kWh		m <sup>3</sup> /h	kW	kWh/m <sup>3</sup>	Rs/m <sup>3</sup>	h/day	m <sup>3</sup> /day	Rs/day	Rs/yr.
1	Borewell Pump -1 Power Plant	194	36	0.186	0.6	4	776.0	486.7	64734
2	Borewell Pump -2 Sugar Plant	161	32.65	0.203	0.7	4	644.0	441.4	58710
3	Borewell Pump -3 Sugar Plant	188	32.80	0.174	0.6	4	752.0	443.5	58980
4	DM Feed pump	40	13	0.325	1.1	12	480.0	527.3	70128
5	Cold UGR To Cooling Process Pump	37	8	0.216	0.7	24	888.0	649.0	86312
6	New Imbibition	135	25	0.185	0.6	24	3240.0	2028.0	269724
7	Old Imbibition	122	24.6	0.202	0.7	24	2928.0	1995.6	265408

#### 4.6.3 Cost of Treatment

##### Cost of DM Water

About 459 (m<sup>3</sup>/day) water is treated daily at the DM Plant. The cost of chemical treatment is Rs 5.4/m<sup>3</sup> and Electrical Cost is Rs 4.4/m<sup>3</sup>. Total cost of treatment at DM Plant is Rs 9.8 /m<sup>3</sup> as shown in table below

**Table 19: Cost of DM treated water at Balrampur Chinni Mills Limited, Unit- Balrampur,**

	DM Plant			
Average Quantity of treated water ((m <sup>3</sup> /day))	459			
<b>Chemical Cost</b>				
<b>Name of Chemical/s</b>	<b>Quantity kg/month/No.</b>	<b>Rate Rs/Kg/ Rs/No</b>	<b>Price Rs/month</b>	<b>Rs/day</b>
HCL	2000	4.5	9000	375
NaoH	700	72	50400	2100
<b>Total Cost of chemical treatment (Rs/day)</b>				<b>2475</b>
<b>Total Cost of chemical treatment (Rs/m<sup>3</sup>)</b>				<b>5.4</b>
<b>Electricity Cost</b>				
Power Consumption (Units/day)				600
Specific Power Consumption (kWh/m <sup>3</sup> )				1.31
Cost per unit (Rs/kWh)				3.38
Electrical cost (Rs./day)				2028
Electrical cost (Rs./m <sup>3</sup> )				<b>4.4</b>
<b>Total Cost of treatment (Rs/m<sup>3</sup>)</b>				<b>9.8</b>
<b>Total Cost of treatment (Rs/day)</b>				<b>4503</b>

##### Cost of CPU Treated Water

About 944 (m<sup>3</sup>/day) water is treated daily at the CPU Plant. The cost of chemical treatment is Rs 2.1/m<sup>3</sup> and Electrical Cost is Rs 4.5/m<sup>3</sup>. Total cost of treatment at CPU Plant is Rs 6.6/m<sup>3</sup> as shown in table below

Table 20: Cost of CPU treated water at Balrampur Chinni Mills Limited, Unit- Balrampur,

		CPU RO PLANT		
Average Quantity of treated water ((m <sup>3</sup> /day))		944		
<b>Chemical Cost</b>				
Name of Chemical/s	Quantity kg/month/No.	Rate Rs/Kg/ Rs/No	Price Rs/month	Rs/day
SMBS	180	271	48780	2032.5
Lime	120	4.5	540	23
Membrane	118	38000	4484000	186833
<b>Total Cost of chemical treatment (Rs/day)</b>				<b>2055</b>
<b>Total Cost of chemical treatment (Rs/m<sup>3</sup>)</b>				<b>2.1</b>
<b>Electricity Cost</b>				
Power Consumption (Units/day)				1250
Specific Power Consumption (kWh/m <sup>3</sup> )				1.32
Cost per unit (Rs/kWh)				3.38
Electrical cost (Rs./day)				4225
Electrical cost (Rs./m <sup>3</sup> )				4.5
<b>Total Cost of treatment (Rs/m<sup>3</sup>)</b>				<b>6.6</b>
<b>Total Cost of treatment (Rs/day)</b>				<b>6280</b>

### Cost of STP Treated Water

About 538 (m<sup>3</sup>/day) water is treated daily at the STP Plant. The cost of chemical treatment is Rs 6.6/m<sup>3</sup> and Electrical Cost is Rs 10.1/m<sup>3</sup>. Total cost of treatment at STP Plant is Rs 16.7/m<sup>3</sup> as shown in table below

**Table 21: Cost of STP treated water at Balrampur Chinni Mills Limited, Unit- Balrampur,**

	STP PLANT			
Average Quantity of treated water ((m <sup>3</sup> /day))	538			
<b>Chemical Cost</b>				
Name of Chemical/s	Quantity kg/month/No.	Rate Rs/Kg/ Rs/No	Price Rs/month	Rs/day
Urea	300	150	45000	1875
Dap	180	225	40500	1688
<b>Total Cost of chemical treatment (Rs/day)</b>				<b>3563</b>
<b>Total Cost of chemical treatment (Rs/m<sup>3</sup>)</b>				<b>6.6</b>
<b>Electricity Cost</b>				
Power Consumption (Units/day)				1600
Specific Power Consumption (kWh/m <sup>3</sup> )				2.98
Cost per unit (Rs/kWh)				3.38
Electrical cost (Rs./day)				5408
Electrical cost (Rs./m <sup>3</sup> )				<b>10.1</b>
<b>Total Cost of treatment (Rs/m<sup>3</sup>)</b>				<b>16.7</b>
<b>Total Cost of treatment (Rs/day)</b>				<b>8971</b>

**Cost of ETP Treated Water**

About 1638 (m<sup>3</sup>/day) water is treated daily at the ETP. The cost of chemical treatment is Rs 24.44/m<sup>3</sup> and Electrical Cost is Rs 61.90/m<sup>3</sup>. The total cost of Treated water is Rs 86.35/m<sup>3</sup> as shown in table below

Table 22: Cost of ETP treated water

	ETP			
Average Quantity of treated water (m <sup>3</sup> /day)	1638			
<b>Chemical Cost</b>				
<b>Name of Chemical/s</b>	<b>Quantity kg/month</b>	<b>Rate Rs/Kg</b>	<b>Price Rs/month</b>	<b>Rs/day</b>
Lime	12000	65	780000	32500
Alum	6000	25	150000	6250
Cost of Membrane Replacement (Rs/day)			30800	1283
Total chemical cost (Rs/day)				40033
<b>Total Cost of chemical treatment (Rs/m<sup>3</sup>)</b>				<b>24.44</b>
<b>Electricity Cost</b>				
Power Consumption (Units/day)				30000
Specific Power Consumption (kWh/m <sup>3</sup> )				18.32
Cost per unit (Rs/kWh)				3.38
Electrical cost (Rs./day)				101400
Electrical cost (Rs./m <sup>3</sup> )				<b>61.90</b>
<b>Total Cost of treatment (Rs/m<sup>3</sup>)</b>				<b>86.35</b>
<b>Total Cost of treatment (Rs/day)</b>				141433

Figure 15: Existing water cost at user location accounting water pumping and treatment cost at plant

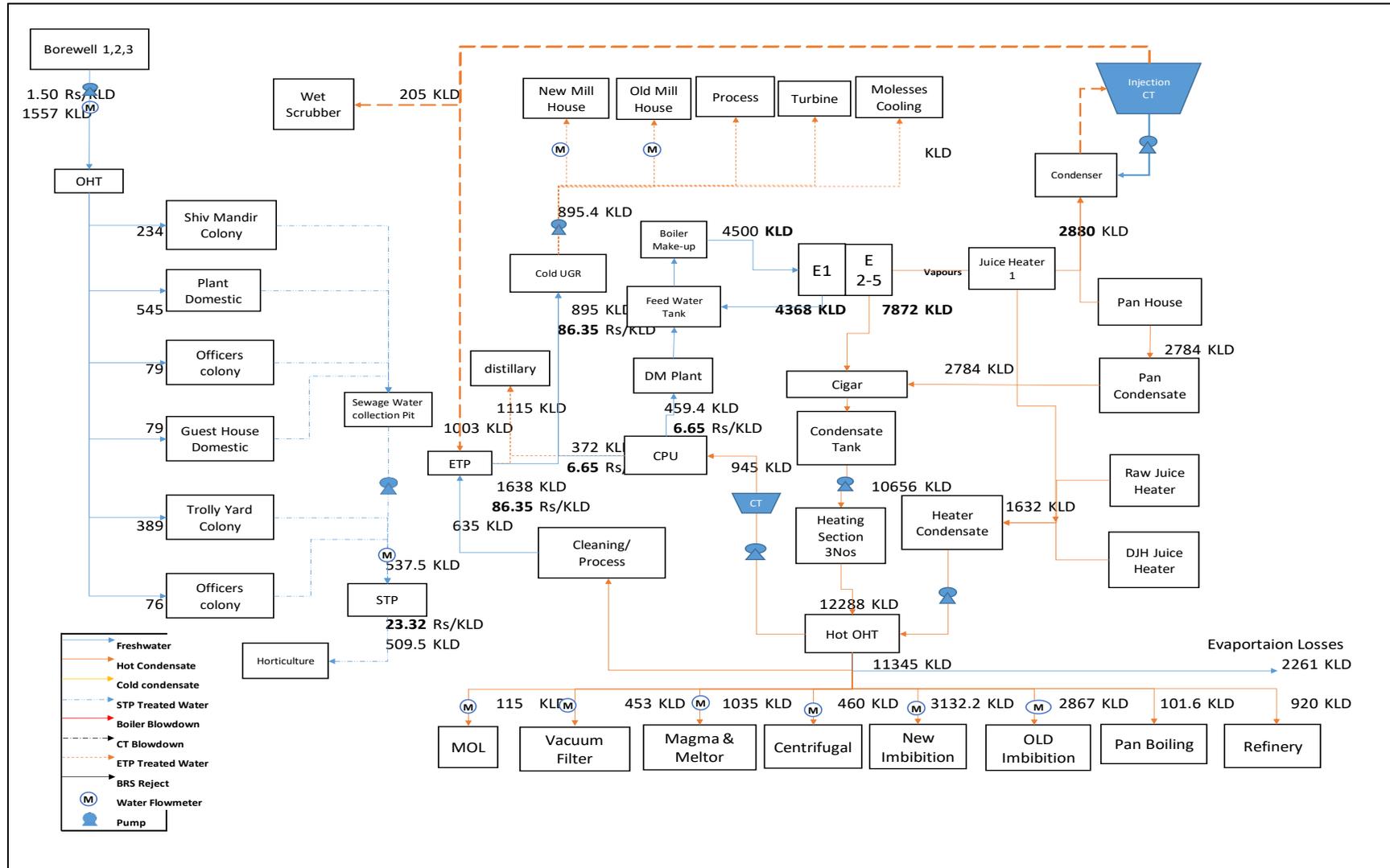
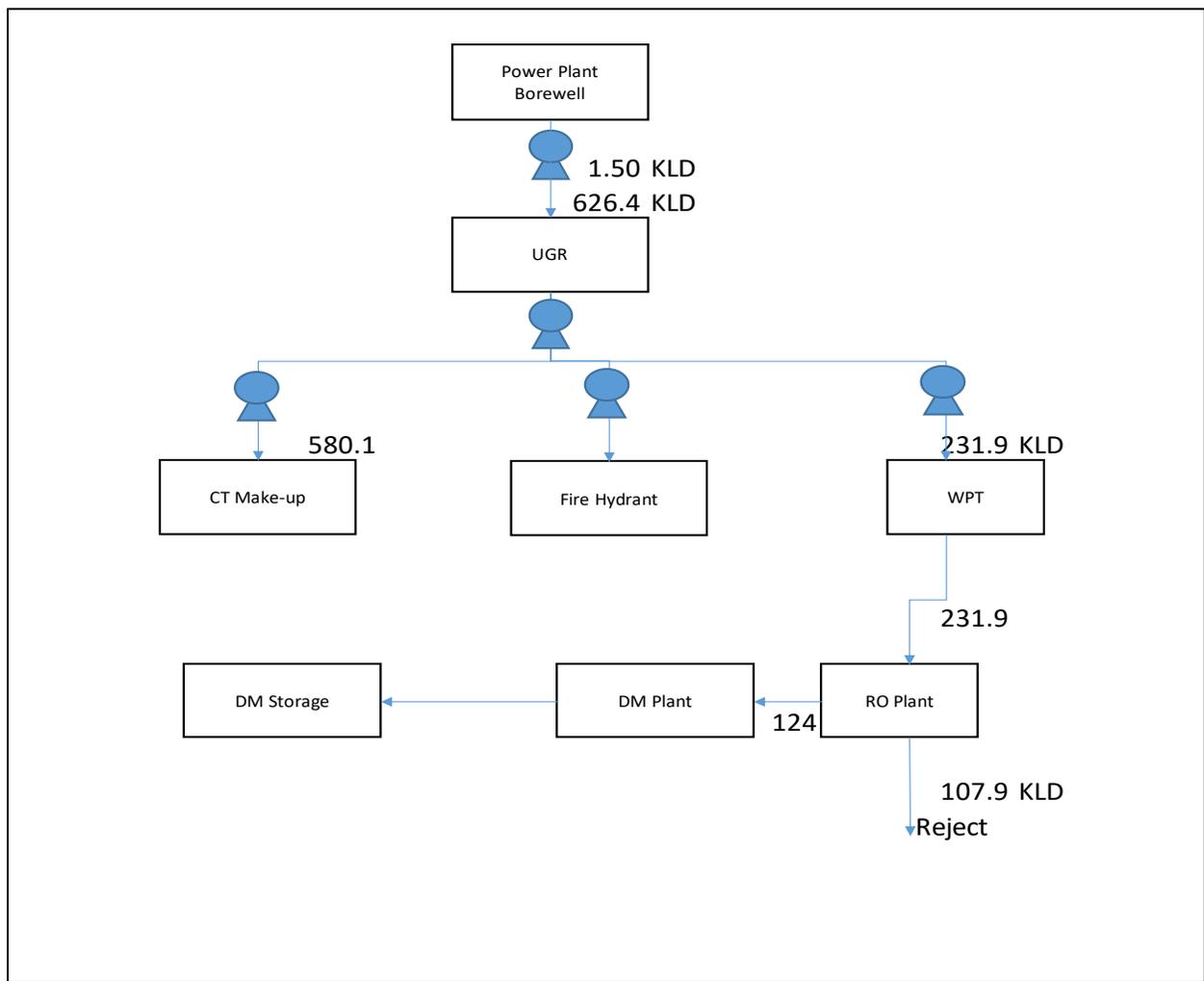


Figure 16: Existing water cost at user location accounting water pumping and treatment cost at power plant



#### 4.7 Annual Water & Wastewater Management Cost of the Plant

The total annual water and wastewater cost is calculated by the sum of Total Water abstracted, Total Pumping cost and Total Water and Wastewater Treatment cost as mentioned in the previous part.

**Table 23: Total Annual Water Cost of BCML, Unit- Balrampur,**

S. No.			Total cost	Total Annual Cost	Water Consumption
		Rs/m <sup>3</sup>	(Rs/day)	(Rs/year)	(m <sup>3</sup> /day)
1	<b>Cost of Borewell abstraction</b>	0.90	2028	<b>740111</b>	<b>1557</b>
2	<b>Pumping Cost</b>			<b>340983</b>	
	Energy	0.60	934	340983	<b>1557</b>
3	<b>Water Treatment (DM)</b>			<b>598899</b>	
	DM Unit				
	Cost of Chemical treatment at DM	5.4	2475	329175	<b>459</b>
	Cost of Electrical treatment at DM	4.4	2028	269724	
4	<b>Wastewater Treatment (CPU)</b>			<b>835240</b>	
	CPU				
	Cost of chemical treatment at CPU	2.18	2055	273315	<b>944</b>
	Cost of Electrical treatment at CPU	4.47	4225	561925	
5	<b>Effluent Wastewater Treatment (ETP)</b>			<b>18810633</b>	
	ETP				
	Cost of chemical treatment at ETP	24.44	40033	5324433	<b>1638</b>
	Cost of Electrical treatment at ETP	61.90	101400	13486200	
6	<b>Sewage Wastewater Treatment (STP)</b>			<b>1193077</b>	
	STP				
	Cost of chemical treatment at STP	6.63	3563	473813	<b>538</b>
	Cost of Electrical treatment at STP	16.69	5408	719264	

## CHAPTER: 5 : WATER & WASTEWATER TREATMENT & RECYCLING PRACTICES

The plant has installed the following water and wastewater treatment systems for treating the incoming freshwater:

- DM Plant
- CPU & RO Plant
- STP
- ETP

### 5.1 DM Treatment Unit:

During the 2022-2023 season, approximately 459 (m<sup>3</sup>/day) of treated effluent, purified through UF, UV, and RO plants, is being utilized in the DM plant instead of borewell water. The water undergoes a sequence of treatment stages: it is pumped from the raw water storage tank to the MGF plant, then to a cation exchanger, followed by a degasser, anion exchanger, and finally, a mixed bed exchanger to remove remaining Total Dissolved Solids (TDS). The resulting demineralized (DM) water is stored in dedicated tanks and subsequently used for boiler makeup.

Figure 17: Scheme of DM Plant



#### Unit Description

##### **MGF (Multi Grade Filter)**

An MGF is used in water and wastewater treatment to remove suspended solids, dust, and dirt present in the water. The MGF is a depth filter that makes use of coarse and fine media to create pore dimensions that retain large and small suspended particles. Function of the filter is to act as a tertiary treatment unit to trap the trace amounts of solids which escape the clarifier, and can typically handle up to 50 mg/l of solids in an economical manner. This unit is essentially filled with graded media (sand and gravel). The water filtered with filter is passed on to the next stage in the DM chain: The Iron Removal Filter.

##### **Degassers**

Degassers are economically beneficial to many demineralization systems, because they reduce the amount of caustic required for regeneration. Water from a cation exchanger is broken into small droplets by sprays and trays or packing in a degasser. The water then flows through a stream of air flowing in the opposite direction. Carbonic acid present in the cation effluent dissociates into carbon dioxide and water.

The carbon dioxide is stripped from the water by the air, reducing the load to the anion exchangers. Typical forced draft degassers are capable of removing carbon dioxide down to 10-15 ppm. However, water effluent from a degasser is saturated with oxygen.

### **Strong Acid Cation Exchanger**

Strong acid cation exchanger is a vessel in which an ion exchange process takes place. The cations (calcium, magnesium and sodium chloride, sulphates, carbonate, and bicarbonate salts) present in the water gets converted into their equivalent acid in this unit. Strong acid cation resin will replace all the cations in raw water with hydrogen ions, thus reducing the dissolved solids in raw water. When the cation exchanger gets exhausted, it is regenerated with acid to restore hydrogen ions. It is suitable for both manual and automatic operation. They are available as both co-flow and counter current regeneration units.

### **Strong Base Anion Exchanger**

Strong base anion unit is a vessel in which an ion exchange process takes place.  $\text{OH}^-$  ions replace the anions present in TDS to produce demineralized water. The anions present in the water i.e.  $\text{Cl}$ ,  $\text{SO}_4$ ,  $\text{HCO}_3$  and silica etc. are exchanged with  $\text{OH}^-$  ions available in the resin and water is demineralized. Therefore, water becomes demineralized resulting in a solution of pure water. When the anion exchanger gets exhausted, it is regenerated with caustic solution to replenish  $\text{OH}^-$  ions. They can be operated manually or automatically. They are available as co-flow and counter current regeneration units.

### **Mixed Bed Exchangers**

A mixed bed exchanger has both cation and anion resin mixed together in a single vessel. As water flows through the resin bed, the ion exchange process is repeated many times, "polishing" the water to a very high purity. During regeneration, the resin is separated into distinct cation and anion fractions. The resin is separated by backwashing, with the lighter anion resin settling on top of the cation resin. Regenerate acid is introduced through the bottom distributor, and caustic is introduced through distributors above the resin bed. The regenerate streams meet at the boundary between the cation and anion resin and discharge through a collector located at the resin interface. Following regenerate introduction and displacement rinse, air and water are used to mix the resins. Then the resins are rinsed, and the unit is ready for service.

Counter flow and mixed bed systems produce a purer water than conventional cation-anion demineralizers, but require more sophisticated equipment and have a higher initial cost. The more complicated regeneration sequences require closer operator attention than standard systems. This is especially true for a mixed bed unit.

### **Storage Tanks (Raw & DM water)**

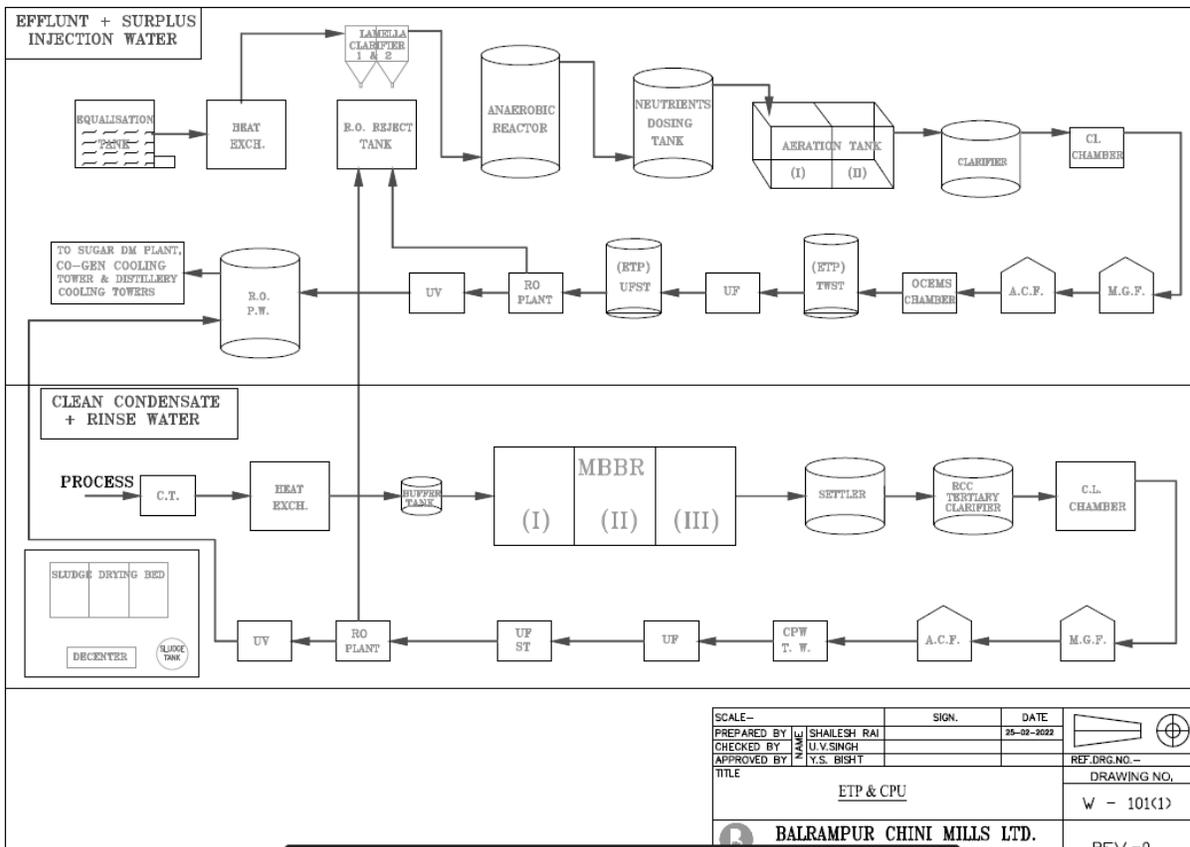
Storage tanks act as simple tanks build for storage of raw water & treated DM water.

**5.2 CPU (Condensate Polishing Unit) & R**

The unit has a CPU plant, during the cane crushing process, juice is extracted. This juice, when subjected to heating in juice heaters, evaporators, and pans, produces Vapors. When these Vapors are condensed, they form what is known as process condensate. The process condensate contains low Total Dissolved Solids (TDS) water, with a maximum of 400 ppm. To reduce the TDS value, the condensate undergoes treatment in a condensate polishing unit with reverse osmosis (RO) technology, making it suitable for reuse in the cooling tower makeup.

In CPU the major input is from boiling house in the form of process condensate. About 944 KLD of condensate is sent to CPU for treatment. The Description installed CPU is given below.

**Figure 18: Scheme of CPU Plant**



SCALE-	SIGN.	DATE	
PREPARED BY	SHALESH RAI	25-02-2022	
CHECKED BY	U.V.SINGH		
APPROVED BY	M.S. BISHT		REF. DRG. NO. -
TITLE	ETP & CPU		DRAWING NO.
	BALRAMPUR CHINI MILLS LTD.		W - 101(1)
			REV - 0

**UNIT DESCRIPTION**

**CONDENSATE COLLECTION TANK**

The function of this tank is to collect the condensate obtained from the hot condensate which is obtained directly from the boiling house. This tank acts as a storage for condensate.

**PHE (PLATE HEAT EXCHANGER)**

The plate heat exchanger (PHE) is a specialized design well suited to transferring heat between medium- and low-pressure fluids. Welded, semi-welded and brazed heat exchangers are used for heat exchange between high-pressure fluids or where a more compact product is required. The concept behind a heat exchanger is the use of pipes or other containment vessels to heat or cool one fluid by transferring heat between it and another fluid. In most cases, the exchanger consists of a coiled pipe containing one fluid that passes through a chamber containing another fluid. The walls of the pipe are usually made of metal, or another substance with a high thermal conductivity, to facilitate the interchange, whereas the outer casing of the larger chamber is made of a plastic or coated with thermal insulation, to discourage heat from escaping from the exchanger.

#### **MULTI GRADE FILTER**

An MGF is used in water and wastewater treatment to remove suspended solids, dust, and dirt present in the water. The MGF is a depth filter that makes use of coarse and fine media to create pore dimensions that retain large and small suspended particles. Function of the filter is to act as a tertiary treatment unit to trap the trace amounts of solids which escape the clarifier, and can typically handle up to 50 mg/l of solids in an economical manner. This unit is essentially filled with graded media (sand and gravel). The water filtered with filter is passed on to the next stage in the CPU chain: The Iron Removal Filter.

#### **IRON REMOVAL FILTER**

Iron Removal Filter is used to remove Iron from water. IRF consists of a Manganese Dioxide layer, which works as a catalyst in converting Ferrous to ferric, which can be easily precipitated and filtered physically. The raw water flows down from the filter inlet through the filter media. When the raw water passes through the media, the iron and manganese particles are oxidized thereby killing the bacteria present in the water. The filtered water can be collected at the outlet of the filter. As per the SOP, the filter media has to be cleaned periodically using the back-wash method.

#### **ACTIVATED CARBON FILTER**

An activated carbon filter, like the Pressure Sand Filter, is a tertiary treatment unit. It receives the water that is already filtered by the Pressure Sand Filter and improves multiple quality parameters of the water: suspended solids, clarity (turbidity), colour and odour.

#### **RO (REVERSE OSMOSIS PLANT)**

Reverse Osmosis (RO) filters use a multi-stage filtration process to purify water. The filters use a combination of active carbon particle filtration processes to remove the impurities. The filters have a membrane with very small pores that helps in removing micro-organisms. The inlet feed is directly from UF filtered water. The treated water from RO i.e. permeate is sent to cooling tower makeup. RO Reject water is sent to ETP for treatment.

### 5.3 STP (Sewage Treatment Plant)

Plant treats Domestic Sewage in well-designed existing sewage treatment plant (Total Capacity 700 KLD). In STP the major input from is from colony Domestic sewage. As per data observation, approx. 510 KLD water is treated in the facility. The Description installed STP is given below.

#### UNIT DESCRIPTION

##### **SETTLING CHAMBER**

A sedimentation tank in wastewater treatment removes particles from the water. The accumulated solids, or sludge, form at the bottom of the sedimentation tank and are removed periodically. Coagulants are typically added to the water before sedimentation to aid in the settling process. Sedimentation is a physical water treatment process using gravity to remove suspended solids from water. Solid particles entrained by the turbulence of moving water may be removed naturally by sedimentation in the still water of lakes and oceans.

##### **OIL AND GREASE TRAP**

The oil and grease trap is placed at the discharge point of the settling tank itself to arrest solid and fatty matter at source or it is placed after screen chamber so as prevent the fatty matter to enter Equalisation chamber. The wastewater output from this unit is taken to the equalization tank. The solids and fats that are separated in this unit are disposed-off along with other biodegradable waste, and can be used as feed for piggeries. The use of skimmers in industrial applications is often required to remove oils, grease, and fats prior to further treatment for environmental discharge compliance. By removing the top layer of oils, water stagnation, smell and unsightly surface scum can be reduced. Placed before an oil water treatment system an oil skimmer may give greater overall oil separation efficiency for improved discharge wastewater quality. It should be noted that all oil skimmers will pick up a percentage of water with the oil which will need to be decanted to obtain concentrated oil. Separating grease from the wastewater at source ensures that the contact time between solids and wastewater is kept to a minimum, so that the wastewater does not absorb additional organic pollutant loads (starch, carbohydrates, proteins) due to leaching of these substances from the solids. (Rather than building a larger STP to digest this extra organic matter, it is far more economical to prevent the organic matter from entering the STP.)

##### **EQUALIZATION TANK**

The sewage from the bar screen chamber and oil, grease and grit trap then enters in the equalization tank. The equalization tank is the first collection tank in an STP. Its main function is to act as buffer: To collect the incoming raw sewage that comes at widely. Equalization tank is used only for buffering the daily fluctuations in the sewage flow quantity. The equalization tank must be of sufficient capacity to hold the peak time inflow volumes. Equalization tank with a capacity to hold 4-6 hours of average hourly flow should be adequate.

##### **AERATION TANK**

The biological treatment of the wastewater takes place in the aeration tank. Before the wastewater gets to this tank, it is mixed with activated sludge. This contains countless microorganisms, such as bacteria, that are able to break down the colloidal, organic contaminants dissolved in the wastewater. Aeration brings water and air in close contact in order to remove dissolved gases (such as carbon dioxide) and oxidizes dissolved metals such as iron, hydrogen sulphide, and volatile organic chemicals (VOCs). Aeration is often the first major process at the treatment plant. During aeration, constituents are removed or modified before they can interfere with the treatment processes. The oxidized sewage overflows into the secondary settling tank.

### **TUBE SETTLER**

Tube settlers utilize multiple adjacent tubular channels that are sloped at a nominal 60° angle and combine to form an increased effective settling area. The size and shape of the tubular channels vary by manufacturer. Brentwood's tube settler design features a trapezoidal shape created by thermoforming PVC sheets. It is incorporated after the biological process to settle down the solids form after aeration. Polyelectrolyte is used sometimes to achieve maximum solid settling after aeration process. To produce clear supernatant water, in the overflow from the clarifier feed to clear water tank. All the above actions occur due to gravity. The thick biomass is re-circulated back to the aeration tank & if there is excess sludge then it is sent to belt press for sludge dewatering.

### **CHLORINE CONTACT TANK**

Chlorine contact tanks are commonly used to disinfect drinking water prior to distribution. These tanks are usually open chambers split by a series of baffles. Sub-dividing the chambers helps to control the flow of water through the tanks and improves the chlorine disinfection process.

### **FILTER FEED PUMPS**

Function Filter feed pumps are used to take the water from the clarified water sump and pass it through the pressure sand filter and activated carbon filter installed in series.

### **PRESSURISED SAND FILTER**

Function of the pressurised sand filter is used as a tertiary treatment unit to trap the trace amounts of solids which escape the clarifier, and can typically handle up to 50 mg/l of solids in an economical manner. This unit is essentially filled with graded media (sand and gravel). The water filtered with sand filter is passed on to the next stage in the STP chain: The Activated Carbon Filter.

### **ACTIVATED CARBON FILTER**

An activated carbon filter, like the Pressure Sand Filter, is a tertiary treatment unit. It receives the water that is already filtered by the Pressure Sand Filter and improves multiple quality parameters of the water: BOD, COD, clarity (turbidity), colour and odour.

#### **5.4 ETP (Effluent Treatment Plant)**

During the production of sugar, the industry generates about 1638 KL/day effluent. The industry has full-fledged Effluent Treatment Plant to treat the generated effluent as per norms of UP Pollution Control Board. The industry has also enhanced their treatment capacity as per direction of State Pollution Control Board. The complete treatment unit is based on an advanced environmental technology.

The industry has installed well advanced Primary and Secondary Effluent Treatment System based on maximum generated effluent flow 1638 KL/day. The primary effluent plant comprises physical and chemical treatment and secondary effluent treatment plant comprises activated sludge system is biological treatment. So, total three stages of effluent treatment system are capable to treat the total generated effluent and after passing through the three stages of treatment system, the treated effluent achieves the norms of State Pollution Control Board. The effluent treatment plant consists of following equipment

#### **UNIT DESCRIPTION**

##### **PLATE TYPE SETTLER**

Tube settlers which are also known as plate settlers or lamella clarifiers are used in drinking- and wastewater treatment plants to settle out suspended solids. Depending on the application the TSS (total suspended solids) loading can vary between 50 to 500 mg/l. Tube settlers are usually made of PVC plastic and consist of multiple corrugated sheets which are glued together to form rectangular blocks with multiple channels. Plate settlers in comparison usually consist of stainless-steel plates which are assembled into large modules.

##### **OIL & GREASE TRAP**

Oil & Grease chamber works for the removal of oil & grease from the influent which may cause damage to pumping unit. The oil and grease trap is placed before EQT to arrest solid and fatty matter at source or it is placed after screen chamber so as prevent the fatty matter to enter Equalization chamber. The wastewater output from this unit is taken to the equalization tank. The solids and fats that are separated in this unit are disposed-off along with other biodegradable waste, and can be used as feed for piggeries.

##### **CHEMICAL MIXING TANK/BUFFER TANK**

Buffer basins may be used for temporary storage for high – strength waste. Basin provides a place to temporarily hold incoming sewage during plant cleaning / Equipment's cleaning a means of diluting and distributing batch discharge of toxic or high – strength waste which might otherwise inhibit biological secondary treatment.

##### **EQUALIZATION TANK**

Equalization basins may be used for temporary storage of diurnal of wet – weather flow peaks. Basin provides a place to temporarily hold incoming sewage during plant maintenance & a means of diluting and distributing batch discharge of toxic or high – strength waste which might otherwise inhibit biological secondary treatment.

**PRIMARY CLARIFIER**

Clarifiers are settling tanks built with mechanical means for continuous removal of solids being deposited sedimentation. Primary clarifier is incorporated before the biological process to settle down the agglomerate form after coagulation and flocculation process purpose and function of the clarifier is threefold: Allow settling of biomass solids in the Mixed Liquor coming out of the flocculation, to the bottom of the clarifier to thicken the settled biomass, in order to produce a thick underflow To produce clear supernatant water, in the overflow from the clarifier feed to Aeration Tank. All the above actions occur due to gravity. The thick biomass is re-circulated back to the aeration tank.

**AERATION TANK**

Aeration is the process by which air is circulated through, mixed with or dissolved in a liquid or substances. Hence aeration tank is provided to aerate the waste water by biological treatment. Aeration brings water and air in close contact by exposing drops or thin sheets of water to the air or by introducing small bubbles of air (the smaller the bubble, the better) and letting them rise through the water. The scrubbing process caused by the turbulence of aeration physically removes dissolved gases from solution and allows them to escape into the surrounding air. Aeration also helps remove dissolved metals through oxidation, the chemical combination of oxygen from the air with certain undesirable metals in the water. Once oxidized, these chemicals fall out of solution and become particles in the water and can be removed by filtration or flotation.

**SECONDARY CLARIFIER**

Clarifiers are settling tanks built with mechanical means for continuous removal of solids being deposited sedimentation. Secondary clarifier is incorporated after the biological process to settle down the solids form after aeration. Polyelectrolyte is used sometimes to achieve maximum solid settling after aeration process. To produce clear supernatant water, in the overflow from the clarifier feed to clear water tank. All the above actions occur due to gravity. The thick biomass is re-circulated back to the aeration tank & if there is excess sludge then it is sent to belt press for sludge dewatering.

**SLUDGE DRYING BED**

Sludge drying beds are used for dewater the settled sludge. The excess sludge from the clarifier is discharge to sludge drying bed at an interval so that the concentration of MLSS is maintained in aeration tank.

**DECANTER FOR SLUDGE DRYING**

Decanter is used for dewatering the sludge. The sludge from the sludge drying bed sent at decanter to dry the sludge & recovery of water.

**SAND FILTER**

Function of the pressurised sand filter is used as a tertiary treatment unit to trap the trace amounts of solids which escape the clarifier, and can typically handle up to 50 mg/l of solids in an economical manner. This unit is essentially filled with graded media (sand and gravel). The water filtered with sand filter is passed on to the next stage in the ETP chain: The Activated Carbon Filter.

**CARBONS FILTER**

An activated carbon filter, like the Pressure Sand Filter, is a tertiary treatment unit. It receives the water that is already filtered by the Pressure Sand Filter and improves multiple quality parameters of the water: BOD, COD, clarity (turbidity), colour and odour.

## CHAPTER: 6 : DATA ANALYSIS & RESULTS

### 6.1 Water Consumptive Units and Wastewater Mapping

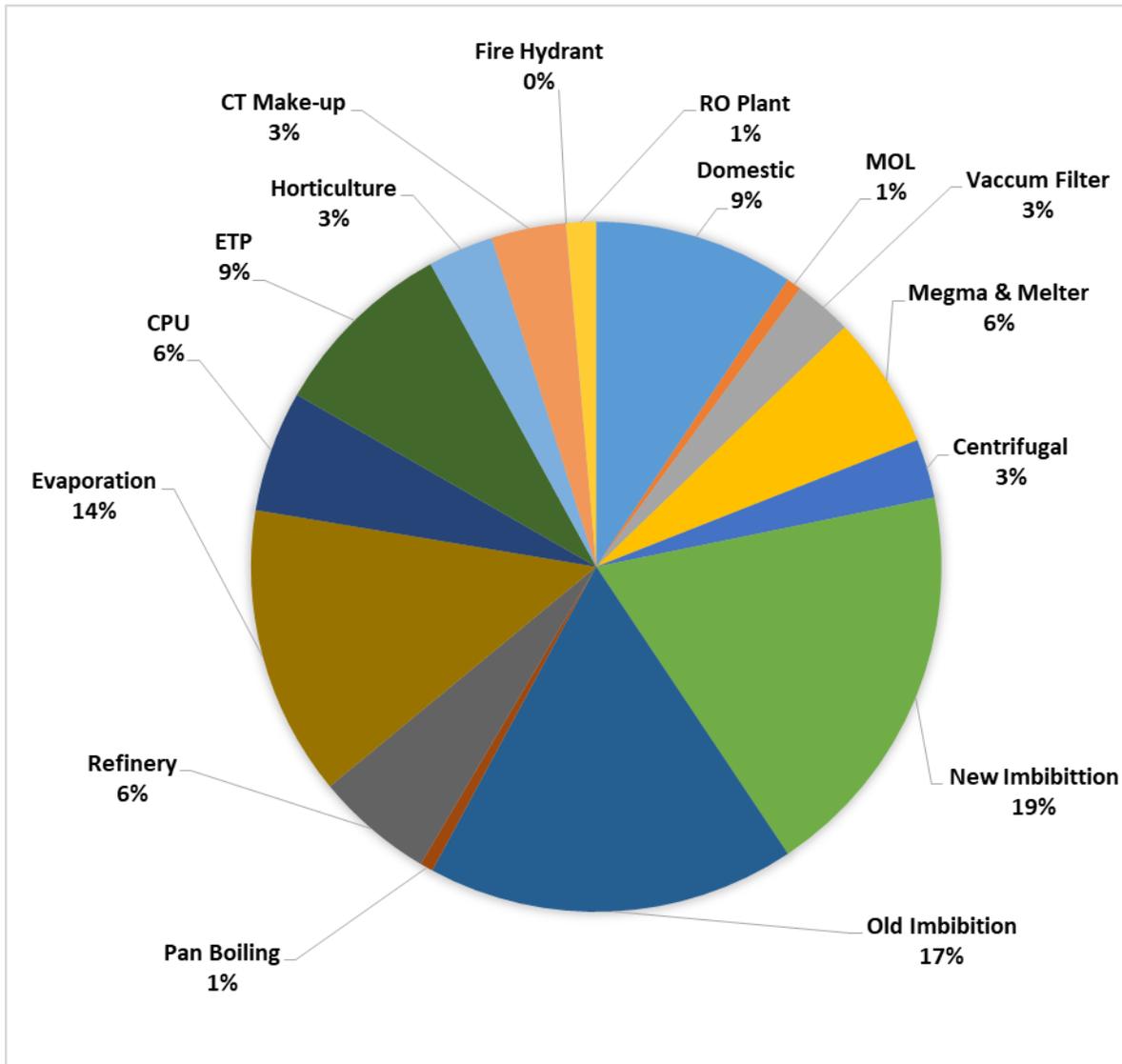
#### 6.1.1 Water consumption pattern

The water consumption pattern shows that out of total water (16619 m<sup>3</sup>/day) about 9% is used in domestic, about 0.7% is used for milk lime preparation, about 2.7% is used for vacuum filter, about 6.2% is used magma Melter, about 2.8% is used in centrifugal, about 18.8% is used for new imbibition, about 17.3% is used for old imbibition, about 0.6% is used for Pan boiling, about 5.5% is used for refinery, about 13.6% is Evaporation Losses, about 5.7% is used for CPU plant, about 8.7% is used for process cooling and distillery, about 3.1% is used for horticulture, about 3.5% is used for power plant CT Make-up, about 0.01% is used for power plant fire hydrant, 1.4% is used for power plant RO and DM make-up for boiler steam generation. The tentative breakup of all areas is shown in the below table.

Table 24: Water Utilization Scenario at the plant

Key Water Usage Section	Type of water used	Water Used to	Water Consuming activities	Quantity Used (m <sup>3</sup> /day)	Percentage (%)
Domestic	Fresh Water	Sugar Plant	Shiv Mandir, plant domestic, officer colony, guest house, Trolley yard	1557	9%
MOL	Recycled	Sugar Plant	Milk of lime Preparation	115	0.7%
Vacuum Filter	Recycled	Sugar Plant	Vacuum Filter Process	453	2.7%
magma & Melter	Recycled	Sugar Plant	Magma & Melter Process	1035	6.2%
Centrifugal	Recycled	Sugar Plant	Centrifugal Process	460	2.8%
New Imbibition	Recycled	Sugar Plant	New Imbibition Process	3132	18.8%
Old Imbibition	Recycled	Sugar Plant	Old Imbibition Process	2867	17.3%
Pan Boiling	Recycled	Sugar Plant	Pan Boiling Process	102	0.6%
Refinery	Recycled	Sugar Plant	Refinery's Process	920	5.5%
Evaporation	Recycled	Sugar Plant	Evaporations Process	2261	13.6%
CPU	Recycled	Sugar Plant	DM Plant for boiler make-up and Distillery	944	5.7%
ETP	Recycled	Sugar Plant	Process cooling, Distillery	1450	8.7%
Horticulture	Recycled	Sugar Plant	Horticatures, irrigation	510	3.1%
CT Make-up	Fresh Water & Recycled	Power Plant	Cooling	580	3.5%
Fire Hydrant	Fresh Water & Recycled	Power Plant	Fire Hydrant	2	0.01%
RO Plant	Fresh Water & Recycled	Power Plant	CT Make-up & DM Plant	232	1.4%
				<b>16619</b>	<b>100%</b>

Figure 19: Percentage of total water utilization



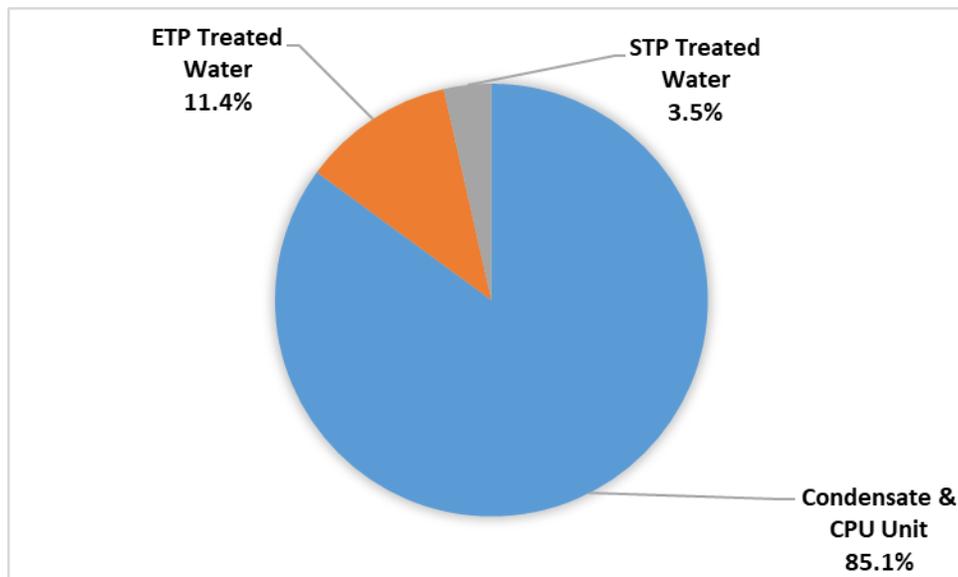
### 6.1.2 Wastewater generation and mapping

The total wastewater generation in the plant is about 14376 (m<sup>3</sup>/day), out of which about 85.1% (12228 m<sup>3</sup>/day) wastewater is generated from cane crushing, 11.4% (1638 m<sup>3</sup>/day) wastewater is generated from ETP which is further treated used in distillery & cooling tower, 3.5 % (509.5 m<sup>3</sup>/day) is generated by colony domestic sewage water which is treated in STP and reused in Horticulture & irrigation. The breakup of wastewater generation from different sections is provided in below table.

Table 25 : Major Wastewater generating areas at BCML, Unit- Balrampur,

S. No.	Major Sections	Recycled/Discharge	Wastewater Generation ((m <sup>3</sup> /day))	Percentage
1	Condensate & CPU Unit	Recycled	12228	85.1%
3	ETP Treated Water	Recycled	1638	11.4%
4	STP Treated Water	Recycled	509.5	3.5%
			<b>14376</b>	<b>100%</b>

Figure 20: Percentage of wastewater generation at BCML, Unit- Balrampur,

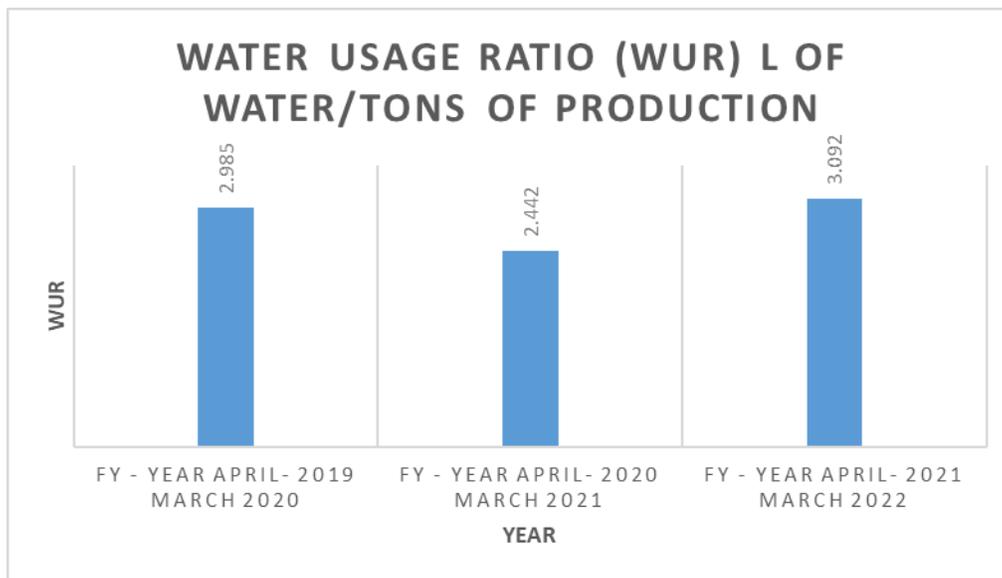


## 6.2 Specific Water Consumption in terms of Water Use Ratio (WUR) of the Plant

Table 26: Specific Water Consumption of BCML, Unit- Balrampur, - FY 2019-20, 2020-21, 2021-22

Particulars		2019-20	2020-21	2021-22
Sugar Production in tons	Tons/Year	176420.2	150962.55	121379.13
Total Freshwater intake (Borewell)	m <sup>3</sup> /year	52631	368713	375283
<b>Specific Water Consumption</b>	<b>m<sup>3</sup>/Ton</b>	<b>2.985</b>	<b>2.442</b>	<b>3.092</b>

Figure 21: Water Usage Ratio



Over the three fiscal years from 2019-20 to 2021-22, there has been a noticeable trend in sugar production and associated water usage for a particular entity. In the 2019-20 period, the sugar production stood at 176,420.2 tons per year, experiencing a subsequent decrease to 150,962.55 tons in 2020-21, and a further reduction to 121,379.13 tons in 2021-22. Simultaneously, the total freshwater intake from borewells demonstrated a significant increase from 52,631 cubic meters in 2019-20 to 368,713 cubic meters in 2020-21, followed by a marginal rise to 375,283 cubic meters in 2021-22. The specific water consumption, representing the volume of water used per ton of sugar produced, exhibited a fluctuating pattern. It started at 2.985 cubic meters per ton in 2019-20, decreased to 2.442 in 2020-21, and then slightly increased to 3.092 in 2021-22 due to expansion and capacity enhance. Existing plant was under the expansion due to this Specific water consumption was increased as per the plant details. These statistics underscore the dynamic interplay between sugar production and freshwater utilization, with the specific water consumption acting as a crucial metric reflecting the efficiency of water use in the production process. The trends observed over these years may prompt further analysis and strategic considerations to optimize both sugar production and water resource management.

## CHAPTER: 7 : WATER CONSERVATION OPPORTUNITIES WITH COST BENEFIT ANALYSIS

### 7.1 Install flowmeters with telemetry system on borewells to comply with CGWA Guidelines

Existing Scenario: The plant has 4 borewells but telemetry system is not installed on the borewell pumps. It is recommended to comply with CGWA NOC guidelines & install telemetry system Details of Telemeter Meter as per CGWA Guidelines are as follows

#### 1. Specification of Tamper proof electronic water meter with telemetry

Metering Technology	: Ultrasonic or Electromagnetic
Communication type	: LAN (for internet connectivity) or Lora WAN and/or Cellular (GPRS / 3G / 4G)
Tamper proof:	
a) Power source	: The meter shall be battery operated or UPS powered supply with provision of power OFF detection. The telemetry system units shall be battery operated or through external power supply. The metering data should be stored in the meter even if the telemetry system is off due to power failure.
b) Sealing	: The meter and telemetry system shall have proper mechanical and electronic sealing (through software) arrangement. Any attempt to open the meter or system enclosure should physically damage the tag.
Compliance	: The meter shall preferably be manufactured as per ISO 4064: 2014 Standards and shall have IP 68 ingress protection.
Accuracy	: The meter shall be of accuracy better than $\pm 2\%$ for the operating flow range (from 10 % to 100 % of maximum flow rate).
Test certificate	: The meter manufacturer shall submit the latest test/calibration certificate of the meter, from Fluid Control Research Institute (FCRI) / National Physical Laboratory (NPL) or any third-party laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL), for every meter.
Parameters to monitor	: The meter (since installation of the requisite water meter) shall transmit the following parameters to a secure cloud <ul style="list-style-type: none"> <li>● Timestamp</li> <li>● Cumulative forward flow volume</li> <li>● Cumulative reverse flow volume</li> <li>● Cumulative Net volume</li> </ul>

- Cumulative pump working hours
  - Meter serial number
  - Device last calibration date
  - Borewell id (Provided by CGWA)
- Cloud : The Communication / telemetry data should be directly captured in a secure cloud. The cloud service provider should be empaneled with The Ministry of Electronics and Information Technology (MeitY).
- Transmission frequency : The data shall be transmitted minimum 2 times in a day
- Battery life : In case of battery-operated meters, the battery shall run at least for a period of 3 years with 2 transmissions per day. The battery shall be replaceable without any data loss.
- Data acquisition : The meter shall be supplied with complete AMR / AMI system with Data Management software. The Data Management Software must be capable of running on a standard PC.

The Data Management Software should be cloud based and should have web portal access so that user can view customer data through browser. In addition to above, Data Management Software will be installed on Server placed in Central Data Base/Control Room, and the software may have option for individual customer to view their meter consumption data through Web portal. Consumer, engineer and manager screens shall be available separately.

Data Collection Unit shall be capable of taking data from meter, pump etc. and should be posted in Data Management Software.

- Real-time data to CGWA : The un-tampered data from the secure cloud shall be sent to Central Ground Water Authority (CGWA) real-time data management platform once it is ready. Proper cyber security measures shall be taken in the secure cloud.

**2. Installation of meter**

- Location : The meter shall be installed at the bore-well pump discharge line before any branching and preferably as shown in Figure. 1
- Bypassing : There shall be no bypassing of pipe prior to the installed flow meter.

Full flow

: The installation of the meter shall ensure the pipe shall have full of water at all times. Sufficient upstream and downstream straight length shall be provided for the meter (Refer to Figure 1.)

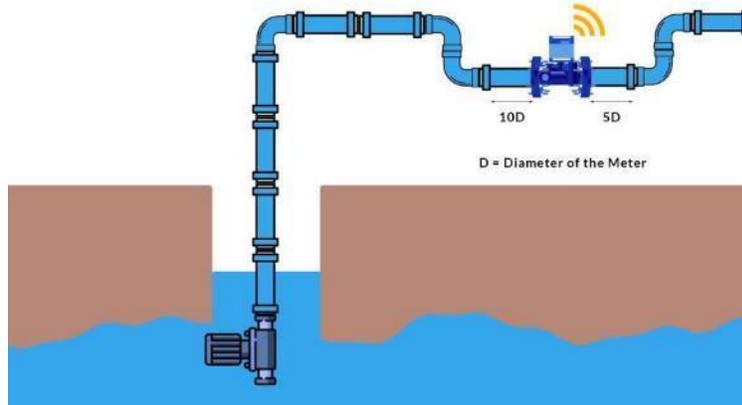


Figure 22: Installation position of tamper proof flow meter with telemetry at groundwater abstraction structures.

## DETAILED TECHNICAL SPECIFICATIONS OF AUTOMATED METER READING (AMR) / ADVANCED METERING INFRASTRUCTURE AMI WATER FLOW METERS

### Specification of flow meter

Flow meters shall meet the following metrological specification:

Turndown ratio of 10 or above Accuracy  $\pm 2\%$

Technology: electromagnetic or ultrasonic

#### Size:

DN40 - Flow range: 0.5 lps to 5 lps

DN100 - Flow range: 3 to 30 lps

DN150 - Flow range: 13 to 130 lps

Meter performance shall not get affected by external magnetic field, as specified in ISO 4064.

Meters must be able to retain their accuracy, when installed in either horizontal and/or vertical planes.

### Material of Construction:

The manufacturer shall provide specific details of materials used for various parts of the meter which must meet the specifications for the material of construction of the individual parts of the meters as per applicable standards (referred above).

- The water meter and accessories shall be manufactured from materials of adequate strength and durability.

- The body of the meter shall be of Brass/Bronze/MS/CI/SS/Engineering Plastic and compact enough to avoid tampering of meter. The manufacturer shall specifically mention in the offer, the material used in manufacturing.
- The materials, which come in contact with the potable water, shall not create a toxic hazard, shall not support microbial growth, and shall not give rise to unpleasant taste, Odor, or discoloration in the water supply.
- The painting material used should be free from toxic constituents and safe for human uses and should not affect human health (Health Certificate should be attached/provided).
- Each meter should be supplied in separate individual box with its accessories, test/ calibration Certificate (for accuracy parameter) and Guarantee Card for free repair/replacement during the warranty period.

#### **Markings on the Body of the Meter:**

- Make/Brand, Size / Nominal Dia.
- Sl. No. / Year of Manufacture, Metrological specifications etc.

#### **Meter indicator**

The digital indicator shall be designed in such a way that if the protective glass is broken for a reason or another, the indicator cannot be removed from its place. The protective cover of the indicator shall be made of sturdy glass/PP/PC.

- It shall be of straight reading type.
- No. of digits and verification scale interval shall be as sufficient enough to meet the required accuracy.
- Totalizer shall be made of suitable material required to maintain IP 68 protection class.

#### **Telemetry System**

- The AMR/AMI system should have the facility to detect and communicate any abnormalities, i.e. high consumption, tampering etc. along with necessary alarms.
- The system will communicate in real time for battery and tamper alarms, in order to provide relevant monitoring and management data for operational purposes.
- The battery shall be replaceable without any data loss.
- The meters should report an alarm to the server as and when tampered.
- All Water Meter readings should be time stamped.
- The meter should have the capability to detect and record reverse flow separately.
- The meter should be capable of to detect Leak, Zero (No) Flow, High Flow.

- The AMR/AMI should operate even in electrically noisy environments with electromagnetic interference. The AMR/AMI should function even in the presence of high voltage power lines.
- Battery usage has to be indicated at the server. Provision should be provided to replace batteries if required.
- The communication shall be encrypted to avoid tampering.
- The meter should be configurable either using the DTU or from the server.
- Loss of communication should be indicated in the server within 48 hours.
- The meter should be able to log the daily flow data with a timestamp which is supposed to be sent to the cloud via telemetry for at least 2 years.
- In case the telemetry is non-functional because of power cut or weak cellular signals, the meter should be able to store the data and transmit to the cloud as soon as the telemetry system is live.
- This data shall also be used for retrieval in case of any dispute between meter data and online data.

#### **Data Management Software**

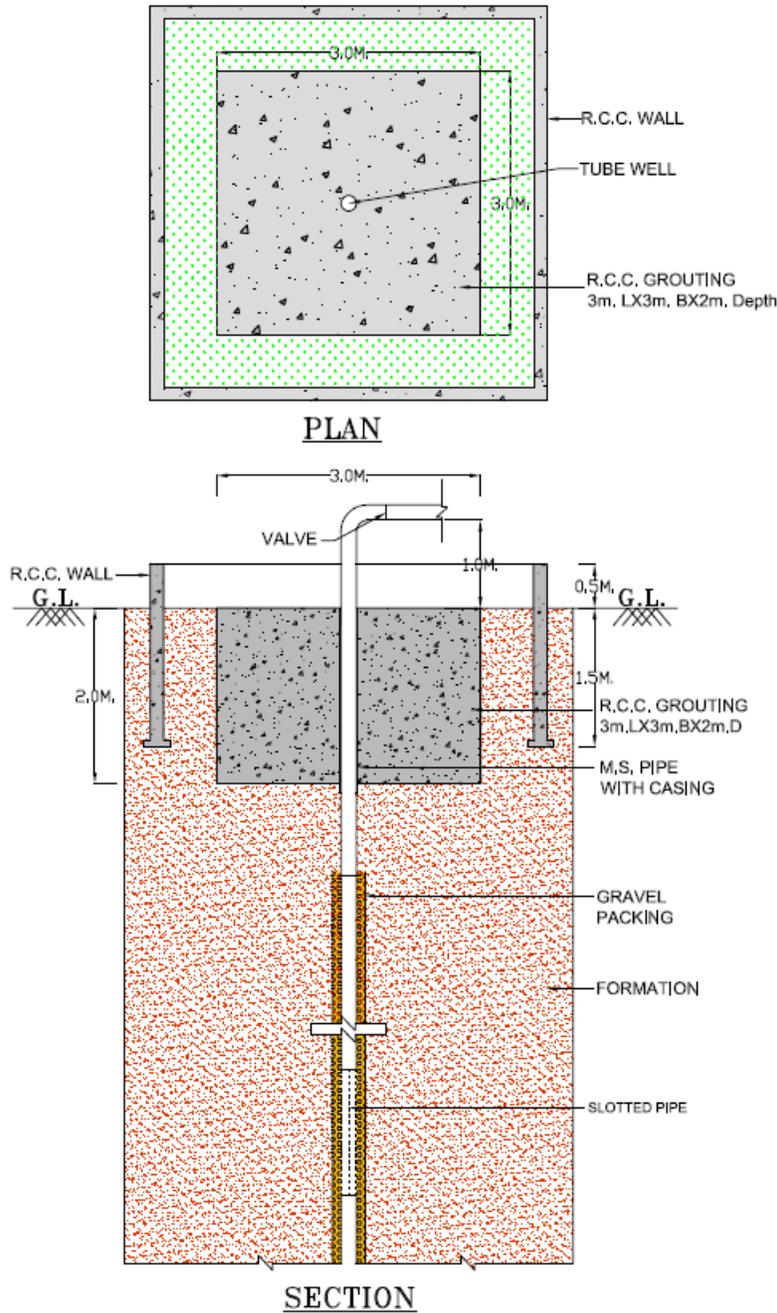
- The web-based Data Management Software must be capable of running on a standard PC compatible with minimum Pentium Processor; in addition, the software must run under Windows XP Professional, Windows Vista, Windows 7 and / or latest version of Windows Operating System and HP Unix, Linux, Solaris, etc.
- The Data Management Software should be clouding base and should have web portal access so that user can view customer data through browser. In addition to above, Data Management Software will be installed on Server placed in Central Data Base / Control Room, and the software may have option for individual customer to view their meter consumption data through Web portal.
- The Data Management Software shall provide database backup/restore functions and must have real-time data access. The software should be web-enabled and alerts to be provided through email/SMS to the user.
- The Data Management Software shall post the reading from the communication infrastructure on to appropriate accounts within the Database.
- The Data Management Software should be able to display all kind of data on screen at any time.
- The Data Management Software should have capability to add additional customer information and create customizable data fields.
- b Testing / calibration:

- Testing or Calibration of meters shall be performed at ISO 17025: 2017 accredited laboratory. The accuracy of meter shall be within  $\pm 2\%$  in the operating range. The meter shall have valid model approval certificate.
- The meter shall have model approval from India or abroad. Every meter should be calibrated
- / tested for accuracy in the operating flow range (10% to 100%). At least 4-point calibration at 10%, 40%, 70% and 100% of maximum/rated flow shall be performed.

## 7.2 Construct the Concrete Structure across the Borewells as per CGWA guidelines

All industries/ projects which are extracting the water from borewell are hereby directed to follow the under mentioned procedure both for existing and new category.

1. No tube well/ bore well / dug well should be constructed in the vicinity of the processing unit. Tube well/ bore well should be constructed at the place which is hygienically maintained.
2. Only Mild Steel pipe should be used for assembly/ casing and PVC (Poly Vinyl Chloride) or similar pipes should not be used. The tube well/ bore well having PVC or similar pipes should be abandoned and filled back.
3. Around the tube well/ bore well, R.C.C (Reinforced Concrete Cement) grouting of 3 meters (length) x 3 meters (width) x 2 meters (depth) must be provided. The pipe of the tube well/ bore well must be raised 1 meter above ground level (1 magl). The tube well/ bore well must be surrounded by R.C.C wall of 0.5-meter height and 1.5-meter depth to prevent any surface contamination to enter the constructed tube well/ bore well. Plan/Sectional diagram is enclosed for reference (Appendix 1 and 2).
3. The tube well/ bore well must be fitted with NRV (Non-Return Valve) in order to ensure that the constructed tube well/ bore well is exclusively used for abstraction of ground water only.
4. at no point of time there should be any injection of any water or fluid into the constructed tube well/ bore well/ Piezometer.
5. The industries/ projects under this category should not implement any recharge measures within the plant premises.
6. Any tube well/ bore well located/ constructed in the vicinity of STP (Sewage Treatment Plant) or ETP (Effluent Treatment Plant) should be abandoned and filled back.
7. The piezometer to be constructed for monitoring purpose should follow the same procedure as that for tube well/ bore well for such industries/ projects.



### 7.3 Optimise water flow in handwashing and other taps for fresh water conservation in plant & colony

**Present Scenario:** About 400 m<sup>3</sup> of water is used in hand washing by approx. 1350 employees in the plant & 1220 residents of the colony and 50 nos Visitors visit in Plant. Flow rates in hand washing taps are of 5-7 lpm (average 6 lpm). The taps do not have any fitment for increasing the surface area of water, as a result the tap is opened for longer time & more water is consumed. The pressure from these taps were high. It is suggested to use water efficient taps for hand washing, the water efficient hand washing

taps use 2-3 lpm only. Plant is having total 1350 number of employees working & 1220 residents. As per calculation basis, we say employees use existing water taps consumes 2-3 litre of water per wash and generally during the shift time per day around 2-3 times each individual washes their hands, (4-6 times for colony residents). It should be noted that renovations are being done in the guest house & plant, new water taps have been installed at some of the rooms in the guest house & plant buildings, the flow from those taps are low & they are fitted with flow restrictors.

Picture 3: Pictures of water taps installed in the plant



Picture 4: Pictures of water taps measurement



Table 27: Measurements taken at various locations

Area	Location	Taps	ML	Second	LPM
Sugar Plant & Power Plant	Near Time office tap 1	1	500	6	5.0
	Near Time office tap 2	1	500	11	2.7
	Sugar Office Washroom tap 1	1	500	4	7.5

Area	Location	Taps	ML	Second	LPM
	Weighing go down Washroom tap	1	500	3.2	9.4
	ADDL G.M.P office washroom	1	500	4.86	6.2
	General office Washroom	1	500	8.62	3.5
	ETP Near Washroom tap	1	500	2	15.0
	Turbine Floor Washroom tap 1		500	8.2	3.7
	Turbine Floor Washroom tap 2	1	500	5.6	5.4
	<b>Average</b>			<b>5.94</b>	<b>6.5</b>

Picture 5: Aerator type hand washing taps



**Proposed Scenario:** Retrofit high flow rate hand washing taps with aerators and flow restrictors so as to have 2-3 lpm flow rate in hand washing taps in the buildings ensuring a wider spray area when opened. An estimated 30% savings can be achieved by using flow restrictors in hand washing taps. Over all 0.83% of fresh water can be saved on a daily basis.

Table 28: Water & Cost Savings

Particular	Unit	Value
Direct quantity of raw water used for Handwashing	m3/day	400.0
With Water aerator taps	m3/day	280
Water saving after aerator taps	m3/day	120.0
No or Working days	Days/year	170
Cost of fresh water (Abstraction & pumping cost included)	Rs/m3	1.45
Water Savings	m3/year	43800
Monetary Savings	Rs/year	63510
Investment for 500 water efficient taps @ Rs 500/piece	Rs.	2,50,000
Simple Payback Period	year	3.9

#### 7.4 Use waterless urinal system in existing pots in toilets to save water

**Present Scenario:** The plant uses about 20 m<sup>3</sup> per day of treated water in urinal pots. During the audit, a detailed building survey including process area was conducted to measure the flow rates of the fixtures, inspection of flushes and analysing the water use practices of officials. Officers holding higher posts have separate washrooms inside their cabins & a lot of employees were found to be using toilet closets for discharging urine instead of urinals as only closets are available nearby their working area. To optimize water, use in the buildings for domestic purpose. Plant is having approx. 1350 number of employees working. As per calculation basis, we say men employees uses existing urinals pots consumes 2-3 litre of water per flushing in urinals, and generally during the shift time per day around 2-3 times each individual used urinal.

Picture 6: Pictures of urinals installed in the plant



Here is how it works:

1. Urine flows into the drain insert of the **"New Water Less System"**
2. Inside of the **"New Water Less System"** the urine moves through a floating layer of immiscible gel liquid, which creates a barrier, preventing sewer gases and urine odours from entering the restroom area.
3. The urine below the Gel barrier over spills into the central tube and travels down into the drain line.
4. Approximately 1450 sanitary uses are possible with just 3 ounces of Gel. When the Gel liquid is gone, it is simply replenished. This only takes about 20 seconds to perform and the **"New Water Less System"** is not touched.
5. Urine sediments are retained within the **"New Water Less System"**. Replacement is easy and need only be done 2 to 4 times per year depending on traffic to the urinal.

Other more complex arrangements cannot compare to the superior efficiency and simplicity of the design. A urinal's internal trap way may become clogged without urinal trap inserts included. Urinals do not need to be cleaned out. They are simply changed out as explained above. In addition, our urinals help retain urine sediments.

Picture 7: Photo shows the retrofit of "New Water Less System" in old urinal pots.



#### Benefits of the Waterless Approach:

Urinals save more than just water: they save time, and money. The upkeep of traditional flush urinals can be expensive, and maintenance in certain instances can take hours. The waterless fixtures eliminate the need for flush valve repairs, waste line clean outs, deodorizers, and blockage removals.

#### Recommendations:

It is suggested to install following water efficient fixtures in the buildings to save domestic water consumption. Overall, 90-95% domestic water consumption use in urinals will be reduced by installing and maintaining suggested fixtures.

Table 29: Water & Cost Savings

Particular	Unit	Value
Direct quantity of raw water used for Urinals	m <sup>3</sup> /day	20
With Water less urinals	m <sup>3</sup> /day	2
Water saving	m <sup>3</sup> /day	18
Cost of treated water (Abstraction & pumping cost included)	Rs/m <sup>3</sup>	1.45
No of working days	Days/Year	365
Water Savings	m <sup>3</sup> /year	6570
Monetary Savings	Rs/year	9526.5

#### 7.5 Optimize ground water consumption in colony to save fresh water

**Existing Scenario:** The plant has colonies for plant officials as residential colony. The colony has about - nos. of building including guest house. The colony receives raw water from borewells in Storage Tanks installed at the rooftop of the buildings while. The colony uses about 1012 m<sup>3</sup>/day of raw water for its various domestic uses. The consumption of plant domestic is around 545 m<sup>3</sup>/day. The wastewater from colony & plant is treated in STP (700 KLD capacity) and the STP treated water is used for cold UGR makeup.

Table 30: Estimated specific water consumption (lphd)

Facility	Water consumption (m <sup>3</sup> /day)	Services at Colonies	Estimated Population (Nos.)	Specific Water consumption (lphd)
Colony domestic	1012	Flats, guest house (Colony)	1270	796

Table 31 Estimated specific water consumption (lphd)

Facility	Water consumption (m <sup>3</sup> /day)	Services at Colonies	Estimated Population (Nos.)	Specific Water consumption (lphd)
Plant domestic	545	Domestic (Plant)	1400	363

Table 32: Estimation of water requirements for drinking &amp; domestic use in households

1	For communities with populations up to 20,000	
	Water supply through standpost	40 lphd (minimum)
	Water supply through house service connection	70 to 100 lphd
2	For communities with population 20,000 to 100,000 together with full flushing system	100 to 135 lphd
3	For communities with population above 100,000 together with full flushing system	150 to 200 lphd

\*SOURCE: NATIONAL BUILDING CODE 2016, BIS

The estimated specific water consumption in litres per capita per day (lpcd) is higher than the standard norm of 135 lpcd and indicates that water use can be optimized in both the colonies. The following observations were made during field visit:

- 1557 m<sup>3</sup>/day of water is supplied for only approx. users which means water is consumed at the rate of 796 litres / day / head, which is high compared to the standard norms (135 lphd) for the colony domestic.
- Raw water is used for irrigation/gardening activities other than domestic activities.
- The STP treated water is used for Horticulture, about 509.5 m<sup>3</sup>/day.
- Lack of water conservation and saving awareness among users.
- High flow rates in the water taps and water is supplied 24 x 7.
- Lack of water efficient fixtures, Flush tanks are of large capacity using about 8-10 litres per flush.

**Recommendation:** It is recommended that plant should take measures to ensure that the raw ground water is not used for activities other than domestic use. For gardening only treated water must be used. Approx. 31 % of raw water can be saved which will reduce the quantum of ground water abstraction.

**Table 33: Approximate water requirement for Colonies & as per CGWA Standard**

Facility	Water consumption (m3/day)	Services at Colonies	Estimated Population (Nos.)	Specific Water consumption (lphd)
Colony	171.45	Flats, guest house	1270	135

**Table 34 Approximate water requirement for Colonies & as per CGWA Standard**

Facility	Water consumption (m3/day)	Services at Colonies	Estimated Population (Nos.)	Specific Water consumption (lphd)
Plant	67.5	Domestic	1350	45

**Table 35: Water & Cost savings for colony domestic**

Details for BCML	Unit	Value
Total water consumption by colonies & plant domestic	KLD	1012
No of people in colony	Nos	1220
Daily visitors (approx.)	Nos	50
Total no of people	Nos	1270
Recommendation water consumption (135 lphd for 1270)	m3/day	171.45
Water saving potential	m3/day	841
Cost of fresh water ( extraction & pump cost include)	Rs/m3	1.45
water saving	m3/annum	306800.8
Monitory saving	Rs/annum	444861.1
Investment	Rs	800000
Simple payback period	years	1.8

**Table 36: Water & Cost savings for Plant domestic**

Details for BCML	Unit	Value
Total water consumption by plant domestic	KLD	545
total no of employees in plant including contactor	Nos	1350
Visitors	Nos	150

Details for BCML	Unit	Value
Total Nos of Employees	Nos	1450
Recommendation water consumption (45 lphd for 1450)	m <sup>3</sup> /day	67.5
Water saving potential	m <sup>3</sup> /day	478
Cost of fresh water ( extraction & pump cost include)	Rs/m <sup>3</sup>	1.45
No of working days for plant	days/year	365
water saving	m <sup>3</sup> /annum	174287.5
Monitory saving	Rs/annum	252716.9
Investment	Rs	500000
Simple payback period	years	2.0

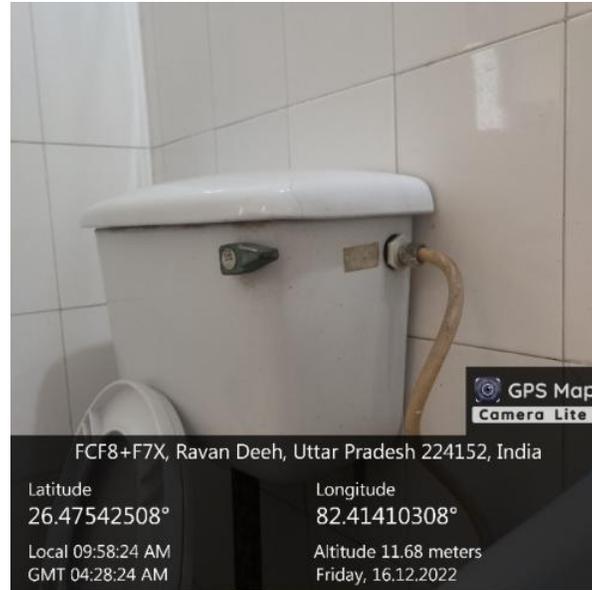
In addition, the unit should take the following steps for water saving in the colonies

- Installing Water flow Meters for internal accounting of water use like at A block, B block, guest house etc.
- Awareness Generation programs for the Officials staying at colonies.
- Reuse STP treated water for flushing as a separate system.
- Water Saving Posters/Labels/Slogans to be placed at important locations of the colonies.
- Collection of grey water from laundry and handwashing washbasins for treatment and reuse for flushing toilets instead of using Raw water.

#### 7.6 Install 'Tank Bank (For Flush Tanks)' or install with Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks

**Present Scenario:** In toilet closets groundwater 100 (m<sup>3</sup>/day)) is used for flushing and about 7-10 litres of freshwater is used per flush. Officers holding higher posts have separate washrooms inside their cabins & a lot of employees were found to be using toilet closets for discharging urine instead of urinals as only closets are available near their working area. Plant is having approx. 1350 number of employees working and 50 Visitors. As per calculation basis, we say 70% of men employees uses existing closets consumes 7-10 litre of water per flushing in closet, and generally during the shift time per day around 2-3 times each individual used closet (4-5 times for 1306 colony residents).

Picture 8: Closets installed in the plant



**Recommendation:** To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install 'Tank-Bank' in the existing flush tanks. By just placing tank bank in the flush tank, we displace and save water equal to the space occupied by the tank bank for every flush. This will save about 20% of flush water in toilets. However, the existing 7-9 litres flush tanks can also be replaced by Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks to save water. This will save about 30% of the flush water in toilets. Over all about 1.92 % of fresh water can be saved by this project.

**Picture 9: Tank Bank (For Flush Tanks)**



**Picture 10: Dual flush Cistern 3-6 litres**



Table 37: Water &amp; Cost Savings

Particular	Unit	Value
Direct quantity of raw water used in Toilet Closets	m <sup>3</sup> /day	100
With Tank banks	m <sup>3</sup> /day	70
Water saving	m <sup>3</sup> /day	30
Cost of treated water (Abstraction & pumping cost included)	Rs/m <sup>3</sup>	1.45
No of days	Days/Year	365
Water Savings	m <sup>3</sup> /year	10950
Monetary Savings	Rs/year	15877.5
Investment for 100 tank banks @ Rs 500/tank bank	Rs.	50,000
Simple Payback Period	years	3.14

### 7.7 Use treated water in place of raw ground water for flushing in toilet closets & Urinals

**Existing scenario:** The plant uses 120 (m<sup>3</sup>/day) of fresh water for flushing. Fresh raw water from borewells wells is used in toilets having an average TDS in the range of 360-416 ppm. The plant has another source of water i.e. ETP treated water as well as STP of 700 KLD capacity.

**Recommendation:** It is suggested that the plant should use STP/ETP treated water in place of fresh ground water for reducing fresh water consumption.

The salient features of using treated water are

- **Reduced water cost:** Treated water will significantly help in reducing the extraction of ground water. Thus, it helps to meet the UP GWA and environment compliance.
- **Sustainability:** The treated water is regular source of water.
- **Improve environment:** The use of treated water is environment friendly as it reduces the use of ground water & requires less treatment before use.

Table 38: Fresh Water &amp; Cost Savings

Particular	Unit	Value
Direct quantity of raw water used for Urinals & Toilets	m <sup>3</sup> /day	120
Used STP Treated Water	m <sup>3</sup> /day	120
Cost of raw water	Rs/m <sup>3</sup>	1.45
Fresh water saving after using treated water	m <sup>3</sup> /day	120
No of Working Days	Days/Year	365
Water Savings	Rs/year	43800
Monetary Savings	Rs./year	63510
Investment for use STP Treated water in Flushing	Rs.	5,00,000

Particular	Unit	Value
Payback Period	Year	7.87

### 7.8 Regularly calibrate & maintain existing water flow meters

The plant has installed water meters at various important locations including borewells. It is suggested to periodically calibrate the meters and maintain them.

Table 39: List of meters installed in the plant

S.NO.	Meter Number	Meter location	Type of meter	Regularly recorded (Yes/No)	Calibrated (Yes/No)
1	FET3211A0	Tube well No. 1	Mag. Flow	Yes	Yes (Zero Cal.)
2	FET3211A	Tube well No. 2	Mag. Flow	Yes	Yes (Zero Cal.)
3	2115158	ETP Treated Water	Mag. Flow	Yes	Yes (Zero Cal.)
4	IFC100/OPT4000	ETP Treated in Process	Mag. Flow	Yes	Yes (Zero Cal.)
5	IFC100/OPT4000	CPU treated Water	Mag. Flow	Yes	Yes (Zero Cal.)
6	8705TSA60C1100B3	Cooling Water meter	Mag. Flow	Yes	Yes (Zero Cal.)

### 7.9 Proper Installation of existing water flow meters installed at power plant borewell.

**Existing scenario:** there is one separate borewell for the power plant. Water flow meter is installed at the borewell.

**Observation:** During the study, it was observed that the location of installed water flow meter at borewell is not proper. There is tapping before the meter, meter was installed after tapping which is not good. This is illegal as per CGWA norms.

**Recommendation:** it suggested to reinstall the meter but this time at proper location after the borewell discharge. This will help to proper accounting of water extraction from borewell.

### 7.10 Construct the New Borewell and shut down the old borewell-4 due to no water availability.

**Existing scenario:** There are 4 nos of borewell installed in the plant for water extraction. At a time 2 & 3 in operation. And another is standby mode.

**Observation:** As per discussion with plant team member, it was observed that the water level in borewell number 4 is reduce and there is no water under this bore. Plant has operating other three borewells for water extraction for complete the requirement.

**Recommendation:** it is suggested that the plant has to change the location of existing borewell to another location with proper labelling. To identify the new location plant has to contact with local vendor for bore.

If the condition of pump of previous borewell is healthy then it can be reused otherwise plant has to purchase new pump for borewell.

### 7.11 Maintain logbook of daily groundwater abstraction

The plant is suggested to record the water abstraction data, maintain logbook of daily groundwater abstraction and submit the data to UP GWA periodically. The following format may be used for maintaining and recording the meter data on daily basis:

**Table 40: Format for maintaining logbook for water meters**

Meter no.	Date DD/MM/YYYY	Initial reading (A)	Final reading (B)	Water quantity used (m <sup>3</sup> ) [B-A]	Cumulative total (m <sup>3</sup> )

### 7.12 Enhance Training and awareness of the employees at all levels and placing 'water saving' posters/slogans at various locations:

It is suggested that the plant employees at all levels should be made aware and trained on 'Water Saving & Conservation' and 'Good Housekeeping Practices.' Therefore, it is recommended to periodically organize Awareness Programs for office employees including shop floor workers on Water Conservation. It is also suggested that prominent water saving labels/posters should be placed/located in the plant at noticeable locations like process area; near hand washing taps; washrooms, reception office etc. This will create awareness & sense of responsibility among staff/employees/visitors.

### 7.13 Periodically conduct 'water & wastewater audit'

The plant should periodically conduct 'Water & Wastewater Audits' to assess the efficiency of water usage in processes; reduce water losses in the system and optimize costs & energy consumption. A detailed 'Water & Wastewater Audit' should be done at least once in 2-3 year or as per requirement by an experienced Audit Team. The plant can create its own internal Audit team for conducting regular comprehensive 'Water & Wastewater Audit' after providing requisite training to the concerned officials.

### 7.14 Regular payment of applicable groundwater abstraction charges

The plant needs to pay applicable groundwater abstraction charges as per UP GWA notification. The applicable Rates of Ground Water abstraction charges for the plant is Rs 0.90 per m<sup>3</sup> as per the table given below:

**Table 41: Rates of Ground Water abstraction charges for other industries & infrastructure projects (Rs per m<sup>3</sup>)**

Sr. No.	Category of area ↓ Ground water use →	Quantum of ground water withdrawal			
		< 500 (m <sup>3</sup> /day)	500 to <1000 (m <sup>3</sup> /day)	1000 to <5000 (m <sup>3</sup> /day)	5000 (m <sup>3</sup> /day) and above
1.	Safe	0.70	0.80	0.90	1.0
2.	Semi-critical	0.80	0.90	1.0	1.10
3.	Critical	0.90	1.0	1.10	1.20
4.	Over exploited	1.0	1.1	1.20	1.30

### 7.15 Ensure to comply with the NOC conditions to avoid any penalty

It is suggested that the plant should comply with the applicable NOC conditions to avoid any penalty. The penalty provisions for non-compliance of NOC are given below:

**Table 42: Penalty provision for non-Compliance of No Objection Certificate conditions**

S. No.	Items	Charges in Rs.
1	Non installation/faulty Digital water Flow meter with telemetry system.	200000
2	Non-disclosure/ construction of additional groundwater abstraction structures a) Non-functional Structures. b) Defunct/Abandoned Note: Given rates are for unit non-functional/defunct/abandoned structures. This shall be multiplied with total such structures to arrive at consolidated penalty.	200000 100000
3	Reporting of freshwater zones as Brackish / Saline zones in application.	200000
4	Non-Installation of Piezometer.	200000
5	Non-Installation/faulty DWLR/Telemetry system	100000
6	Non-Construction/Inadequate capacity of Recharge / Water conservation structures.	500000
7	Non maintenance of Recharge structures.	200000
8	Injection of treated/untreated water into the aquifer system. Note: In addition to penalty, the proponent shall bear the cost of aquifer remediation as per the provisions of Environment (Protection) Act, 1986.	1000000
9	Non-Submission of Water level/Water quality Data.	50000
10	Non-maintenance of logbook of daily withdrawal/non submission of Groundwater abstraction data.	50000
11	Non submission of photograph of recharge structure(s).	50000

S. No.	Items	Charges in Rs.
12	Non-Submission of Self Compliance report.	100000
13	Construction of groundwater abstraction structures by unauthorized/unregistered Drilling Rigs (per structures).	100000
14	No registration of water supply tankers.	500000
15	Submission of false information/ undertaking.	100000

## IMPLEMENTATION PLAN

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
1	Install flow meters with telemetry system on borewells to comply with CGWA Guidelines	The plant has 4 borewells but telemetry system is not installed on the borewell pumps. It is recommended to comply with CGWA NOC guidelines & install telemetry system	It is recommended to comply with CGWA NOC guidelines & install telemetry system				
2	Borewell Water Flow meters	Existing Borewells was not having concrete structure as per CGWA guidelines	We recommend to construct the proper concrete structure as per CGWA Guideline	-	-	-	-
3	Hand Washing	About 400 m <sup>3</sup> of water is used in hand washing by approx. 1306 employees in the plant & 1220 residents of the colony. Flow rates in hand washing taps are of 5-7 lpm. The taps do not have any fitment for increasing the surface area of water, as a result the tap is opened for longer time & more water is consumed. The pressure from these taps were high. It is suggested to use water efficient taps for hand washing, the water efficient hand washing taps use 2-3 lpm only. Plant is having total 1350 number of employees working & 1220 residents. As per calculation basis, we say employees use existing	Retrofit high flow rate hand washing taps with aerators and flow restrictors so as to have 2-3 lpm flow rate in hand washing taps in the buildings ensuring a wider spray area when opened. An estimated 40% savings can be achieved by using flow restrictors in hand washing taps. Over all 0.83% of fresh water can be saved on a daily basis.	43800	63510	2,50,000	3.9

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
		water taps consumes 2-3 litre of water per wash and generally during the shift time per day around 2-3 times each individual washes their hands, (4-6 times for colony residents). It should be noted that renovations are being done in the guest house & plant, new water taps have been installed at some of the rooms in the guest house & plant buildings, the flow from those taps are low & they are fitted with flow restrictors.					
4	Urinals	The plant uses about 20 m <sup>3</sup> per day of treated water in urinal pots. During the audit, a detailed building survey including process area was conducted to measure the flow rates of the fixtures, inspection of flushes and analysing the water use practices of officials. Officers holding higher posts have separate washrooms inside their cabins & a lot of employees were found to be using toilet closets for discharging urine instead of urinals as only closets are available nearby their working area. To optimize water, use in the buildings for domestic purpose. Plant is having approx. 1350 number of employees and 50	It is suggested to install following water efficient fixtures in the buildings to save domestic water consumption. Overall, 90-95% domestic water consumption use in urinals will be reduced by installing and maintaining suggested fixtures. Approx. 0.8% of freshwater can be saved on a daily basis.	6570	9826.5	300000	31.4

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
		working. As per calculation basis, we say men employees uses existing urinals pots consumes 2-3 litre of water per flushing in urinals, and generally during the shift time per day around 2-3 times each individual used urinal. It should be noted that plant has installed sensor-based urinals at some of the locations.					
5	Colony	The plant has colonies for plant officials as residential colony. The colony has about - nos. of building including guest house. The colony receives raw water from borewells in Storage Tanks installed at the rooftop of the buildings while. The colony uses about 287 m <sup>3</sup> /day of Raw water for its various domestic uses. The wastewater from colony is treated in STP (220 KLD capacity) and the STP treated water is used for cold UGR makeup. Approximately 447 residents are live in the colonies during the production season (November to March) & this number goes down during off season.	It is recommended that plant should take measures to ensure that the raw ground water in not used for activities other than domestic use. For gardening only treated water must be used. Approx. 31 % of raw water can be saved which will reduce the quantum of ground water abstraction.	2049657.58	697578	0.34	Immediate
6	Toilet Closet	In toilet closets groundwater (100 m <sup>3</sup> /day)) is used for flushing and about 7-10 litres of freshwater is used per flush. Officers holding higher posts have separate washrooms inside their cabins & a lot of employees were found to be using toilet closets for discharging urine	To reduce the flushing water per flush, it is suggested to install scientifically designed easy to install 'Tank-Bank' in the existing flush tanks. By just placing tank bank in the flush tank, we displace and save water equal to the	10950	15877	50000	3.14

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
		instead of urinals as only closets are available near their working area. Plant is having approx. 1350 number of employees working. As per calculation basis, we say 70% of men employees uses existing closets consumes 7-10 litre of water per flushing in closet, and generally during the shift time per day around 2-3 times each individual used closet (4-5 times for 1306 colony residents).	space occupied by the tank bank for every flush. This will save about 20% of flush water in toilets. However, the existing 7-9 litres flush tanks can also be replaced by Water efficient flushes with dual flush Cistern 3-6 litres capacity flush tanks to save water. This will save about 30% of the flush water in toilets. Over all about 1.92 % of fresh water can be saved by this project.				
7	Flushing	The plant uses 120 (m <sup>3</sup> /day) of fresh water for flushing. Fresh raw water from borewells wells is used in toilets having an average TDS in the range of 360-416 ppm. The plant has another source of water i.e., ETP treated water as well as STP of 700 KLD capacity.	It is suggested that the plant should use STP/ETP treated water in place of fresh ground water for reducing fresh water consumption. About 7.29% of freshwater savings can be achieved in this project.	43800	63510	7.8	-
8	Regularly calibrate & maintain existing water flow meters	It was observed that the existing borewell meter are installed and calibrated	It is suggested to continue to calibrate and maintain the existing flow meters.	Monitoring Water consumption patterns	Efficient Water Accounting	Low	-
9	Water Flow Meters	It was observed that the plant has installed water flow meter in borewell. But water flow meter is not in proper line location.	It is suggested to re installed the meter at borewell at right location (after the borewell discharge)	This will help to know the right & actual flow value	Efficient Water Accounting	Low	-

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
10	Borwell Relocating	As per discussion with plant team member, it was observed that the water level in borewell number 4 is reduce and there is no water under this bore. Plant has operating other three borewells for water extraction for complete the requirement	It is suggested that the plant has to change the location of existing borewell to another location with proper labelling. To identify the new location plant has to contact with local vendor for bore. If the condition of pump of previous borewell is healthy then it can be reused otherwise plant has to purchase new pump for borewell.				
11	Maintain logbook of daily groundwater abstraction	It was observed that the plant is maintaining data of daily groundwater abstraction	The proposed digital flow meter with telemetry will be equipped with online data recording facility	It will help to know the daily water consumption	Efficient Water Accounting	Low	-
12	Enhance Training and Awareness of the Employees at all Levels and Placing 'Water Saving' posters/Slogans at various Locations	Plant is regularly conducting Training and Awareness of the Employees, events to promote water conservation like celebration of world water day, world environment day" and Placing 'Water Saving' Posters/Slogans at various Locations	Maintain the system and suggested to keep continue the water conservation activities and promotion in the plant	Reduction in Freshwater Use due to awareness & training	Water cost savings due to reduced water use	Low	-
13	Periodically conduct 'Water & Wastewater Audit'	Plant has formed a cell for assessment of potential for water & wastewater management in the plant for water saving & wastewater management.	Conduct periodic 'Water Audit' at least once in 2-3 years either by an experienced external Audit Team to assess the efficiency of water usage in processes; reduce water	Efficient water & wastewater management	Evolving schemes leading to water and associated cost savings	Low	-

Sr. No	Section/Area	Key Observations	Recommendations	Annual water savings (m <sup>3</sup> )/ Year	Annual monetary savings (Rs)	Investment (Rs)	Pay-back period (Years)
			losses in the system and optimize costs & energy consumption.				
14	Regular payment of applicable groundwater abstraction charges	It was observed that plant team is regularly paying the applicable ground water charges to concern authority	It is suggested to maintain the same				
15	Ensure to comply with the NOC conditions to avoid any penalty	It was observed that plant team is meeting all applicable compliance	It is suggested to maintain the same				

## CHAPTER: 9 CONCLUSION AND RECOMMENDATION

- Plant was equipped with all the major and upgraded technology recycling plant to reuse the process condensate in process again to reduce the fresh water usage. Plant have Condensate polishing unit, ETP and STP plant to treat and reuse the water. The capacity all the treatment plant was mentioned in chapter-5.

Financial Year	2019-20	2020-21	2021-22
Sugar Production in tons	176420.2	150962.5	121379.13
Surface Water Usage, KL (A)	0	0	0
Ground Water Usage, KL (B)	52631 Consumption low due to covid pandemic	368713	375283
Total Water = (A+B)	52631	368713	375283
Total Specific Water Consumption (KL of water/Tons of Sugar Production)	2.985	2.442	3.092

Over the three fiscal years from 2019-20 to 2021-22, there has been a noticeable trend in sugar production and associated water usage for a particular entity. In the 2019-20 period, the sugar production stood at 176,420.2 tons per year, experiencing a subsequent decrease to 150,962.55 tons in 2020-21, and a further reduction to 121,379.13 tons in 2021-22. Simultaneously, the total freshwater intake from borewells demonstrated a significant increase from 52,631 cubic meters in 2019-20 to 368,713 cubic meters in 2020-21, followed by a marginal rise to 375,283 cubic meters in 2021-22. The specific water consumption, representing the volume of water used per ton of sugar produced, exhibited a fluctuating pattern. It started at 2.985 cubic meters per ton in 2019-20, decreased to 2.442 in 2020-21, and then slightly increased to 3.092 in 2021-22 due to expansion and capacity enhance. Existing plant was under the expansion due to this Specific water consumption was increased as per the plant details. These statistics underscore the dynamic interplay between sugar production and freshwater utilization, with the specific water consumption acting as a crucial metric reflecting the efficiency of water use in the production process. The trends observed over these years may prompt further analysis and strategic considerations to optimize both sugar production and water resource management.

- The plant has almost achieved Zero Liquid Discharge (ZLD) by treatment, recycling and reuse of the all the wastewater generated in the plant through CPU, ETP and RO systems. Therefore, there is no further scope of reduction in SWC in the process side of water use.
- Since the SWC was increases for FY 2021-22 due to plant expansion activity which can be improved and reduce in upcoming years
- Majority borewell water consumption comes in domestic which further plant needs to reduce and reduce the SWC as per suggestion given .

## CHAPTER: 10 ANNEXURES (MEASURED DATA)

### 10.1 Annexure 1: Pump measurements & Pumping Cost

Table 43: Pumping Cost

S. No	Pump name	Total Flow	Power Consumption	Sp. Power	Cost of Pumping	Daily Run hours	Daily flow	Daily Pumping Cost	Total Annual Cost @133 days
				Consumption					
	Electricity Charges @ 3.38 Rs/kWh	m <sup>3</sup> /h	kW	kWh/m <sup>3</sup>	Rs/m <sup>3</sup>	h/day	(m <sup>3</sup> /day)	Rs/day	Rs/yr.
1	Borewell Pump -1	194	36	0.186	0.6	3	582.0	361.3	48048
2	Borewell Pump -2	161	32.65	0.203	0.7	2	322.0	218.4	29051
3	Borewell Pump -3	188	32.80	0.174	0.6	4	752.0	438.9	58369
4	DM Feed pump	40	13	0.325	1.1	12	480.0	521.8	69402
5	Cold UGR To Cooling Process Pump	37	8	0.216	0.7	24	888.0	642.2	85418
6	New Imbibition	135	25	0.185	0.6	24	3240.0	2007.0	266931
7	Old Imbibition	122	24.6	0.202	0.7	24	2928.0	1974.9	262660

## 10.2 Annexure 2: Borewell water test reports

Sr. No.		Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection	Indian Standard 10500: 2012	
							Desirable	Permissible
1	Colour	Hazen		IS: 3025 (Part-4): 1983 Reaffirmed: 2017	<5.0	5 - 30	5	15
2	Odour	-		IS: 3025 (Part-5): 1983 Reaffirmed: 2017	Agreeable	Qualitative	Agreeable	Agreeable
3	pH	-		APHA 23 <sup>rd</sup> Ed. 2017-4500 H <sup>+</sup>	7.3	1 - 14	6.5 - 8.5	No Relaxation
4	Turbidity	NTU		APHA 23 <sup>rd</sup> Ed. 2017-2130 B	BDL	2 - 40	1	5
5	Total Dissolved Solids (TDS)	mg/l		IS: 3025 (Part-16): 1984 Reaffirmed: 2017	566.0	10 - 5000	500	2000
6	Calcium as Ca	mg/l		IS: 3025 (Part-40): 1991 Reaffirmed: 2019	54.50	2.0 - 600	75	200
7	Magnesium as Mg	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3500 Mg, B	34.99	0.1 - 200	30	100
8	Chloride as Cl	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-4500-Cl <sup>-</sup> B	22.02	2.0 - 2000	250	1000
9	Fluoride as F	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-4500 F <sup>-</sup> C	0.19	0.02 - 5.0	1.0	1.5
10	Sulphate as SO <sub>4</sub>	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-4500-SO <sub>4</sub> <sup>2-</sup>	46.90	1.0 - 500	200	400
11	Nitrate as NO <sub>3</sub>	mg/l		IS: 3025 (Part-34): 1986 Reaffirmed: 2019	BDL	1.0 - 70	45	No Relaxation
12	Alkalinity as CaCO <sub>3</sub>	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-2320 B	260.0	2.0 - 1000	200	600
13	Total Hardness as CaCO <sub>3</sub>	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-2340 C	280.0	5.0 - 800	200	600
14	Copper as Cu	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.03 - 10	0.05	1.5
15	Iron as Fe	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	0.13	0.05 - 20	0.3	No Relaxation
16	Manganese as Mn	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.02 - 5.0	0.1	0.3
17	Zinc as Zn	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.05 - 15	5	15
18	Cadmium as Cd	mg/l		APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.05 - 2.0	0.003	No Relaxation

Page 1 of 2

Regd. Address: 4/57, Vipul Khand, Gomti Nagar, Lucknow - 226010 (U.P.) Mob: 09897674227



## ENVIRONMENTAL AND TECHNICAL RESEARCH CENTRE

Office & Laboratory: 2/261, Vishwas Khand, Gomti Nagar, Lucknow- 226 010 (U.P.)

Email : ETRCLTH@YAHOO.IN, Web: www.etrclth.com

ISO 9001:2015, ISO 14001 : 2015, OHSAS 18001 : 2007 & NABL Accredited Laboratory



### Test Report Ref No. ETRC/GW/4454/2023

19	Lead as Pb	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.01 - 10	0.01	No Relaxation
20	Total Chromium	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.03 - 5.0	0.05	No Relaxation
21	Nickel as Ni	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.05 - 5.0	0.02	No Relaxation
22	Arsenic as As	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-3120 B (ICP-OES)	BDL	0.02 - 2.0	0.01	0.05
23	Mercury as Hg	µg/l	APHA 23 <sup>rd</sup> Ed. 2017-3112 B	BDL	0.5 - 1000	1.0	No Relaxation

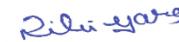
BDL=Below Detection Limit

..... END OF REPORT.....

- ETRC warrants that all analytical work is conducted professionally in accordance with all applicable standard laboratory practices and that this data reflects our best attempt to generate accurate results for the sample, mentioned in the report as above.
- The result relate only to the items tested.
- ETRC does not assume any liability for any claims or damages related to the quality of parameter analyzed in the results and/or the performance of the equipment constituting to the results.
- All disputes subject to Lucknow jurisdiction.
- This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
- Complain register is available in our laboratory.

  
Authorized Signatory  
(Sandeep Kr Verma)  
Lab-Incharge



  
Authorized Signatory  
(Ritu Garg)  
QM

Page 2 of 2



## 10.4 Annexure 4: CGWA NOC



भारत सरकार  
जल शक्ति मंत्रालय  
जल संसाधन, नदी विकास  
और पैदा संरक्षण विभाग  
केन्द्रीय भूमि जल प्राधिकरण  
Government of India  
Ministry of Jal Shakti  
Department of Water Resources,  
River Development & Ganga Rejuvenation  
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)

**NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION**

Project Name:	M/s Balrampur Chini Mills Ltd.		
Project Address:	M/s Balrampur Chini Mills Ltd., Sugar Division, Balrampur, Uttar Pradesh		
Village:	Bishunapur	Block:	Balrampur
District:	Balrampur	State:	Uttar Pradesh
Pig Code:	271201		
Communication Address:	M/s Balrampur Chini Mills ( Sugar Division), Village-Bishunapur, District-Balrampur, Sub-district -Balrampur, Uttar Pradesh - 271201		
Address of CGWB Regional Office :	Central Ground Water Board Northern Region, Bhujal Bhavan, Sector-B Sitapur Road Yojna, Ram Bank Chauraha, Lucknow, Uttar Pradesh - 226021		

1. NOC No.:	CGWA/NOC/IND/REN/1/2020/5665										
2. Application No.:	21-4/1131/UP/IND/2016	3. Category:	Industry								
4. Project Status:	Existing Project	5. NOC Type:	1st Renewal								
6. Valid from:	08/11/2018	7. Valid up to:	06/11/2021								
8. Ground Water Abstraction Permitted:											
Fresh Water		Saline Water		Dewatering		Total					
m <sup>3</sup> /day	m <sup>3</sup> /year	m <sup>3</sup> /day	m <sup>3</sup> /year	m <sup>3</sup> /day	m <sup>3</sup> /year	m <sup>3</sup> /day	m <sup>3</sup> /year				
3000.00	632500.00					3000.00	632500.00				
9. Details of ground water abstraction /Dewatering structures											
Total Existing No.:4						Total Proposed No.:0					
	DW	DCB	BW	TW	MP	DW	DCB	BW	TW	MP	
Abstraction Structure*	0	0	0	4	0	0	0	0	0	0	
*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit											
10. Quantum of ground water recharge/harvesting(m <sup>3</sup> /year):	133000.00										
11. Number of Piezometers (Observation wells) to be constructed/ monitored & Monitoring mechanism.											
	No. of Piezometers					Monitoring Mechanism					
						Manual	DWLR**	DWLR With Telemetry			
**DWLR - Digital Water Level Recorder	2					0	1	1			

(Compliance Conditions given overleaf)

Digitally signed by  
NANDAKUMARAN P  
Date: 2020.06.04 11:05:23 +05'30'

सदस्य (केन्द्रीय भूमि जल प्राधिकरण)  
Member (CGWA)

18/11, जामनगर हाउस, मंसिंह रोड, नई दिल्ली - 110011 / 18/11, Jamsagar House, Mansingh Road, New Delhi-110011  
Phone: (011) 23383561 Fax: 23382051, 23386743  
Website: cgwa-noc.gov.in

पानी बचाये - जीवन बचाये  
SAVE WATER - SAVE LIFE

## 10.5 Annexure 5: CGWA NOC of Borewells

3/28/22, 6:02 PM DownloadRegCertificate



**GROUND WATER DEPARTMENT**  
 (Namami Gange & Rural Water Supply Department)  
 Ministry of Jal Shakti  
 Government of Uttar Pradesh



**Form 8 (E)**  
 [See rules 15(2)]

**(RENEWAL OF AUTHORIZATION/ NO-OBJECTION CERTIFICATE FOR  
 SINKING OF EXISTING WELL FOR INDUSTRIAL/ COMMERCIAL/  
 INFRASTRUCTURAL OR BULK USER OF GROUND WATER)  
 AUTHORIZATION/ NO-OBJECTION CERTIFICATE NO:  
 REG018620**

**VALID FROM 28/12/2021 TO 27/12/2026**

<b>Registration No.: 202110000191</b>			
Name of the Owner	RAJEEV KUMAR AGARWAL		
Address of the Applicant	P.O. Balrampur, Distt- Balrampur, Uttar Pradesh	Application Form Serial No.	BLMP1021RIN0024
Date of Submission	11/10/2021	Specimen Signature	
Company Name	BALRAMPUR CHINI MILLS LTD SUGAR DIV. BISHUNPUR	Company Address	Village Bishunpur, Block & District: Balrampur
<b>Location Particulars</b>			
District	Balrampur	Block	Balrampur
Plot No./Khasra No.	Existing Land document attached.	Municipality/Corporation	No
Ward No./Holding No.			NA
<b>Particular of the Existing Well and Pumping Device</b>			
Date of Construction/Sinking of the Well	01/04/2007		

upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=Y1dx116SHmM= 1/4

3/28/22, 6:02 PM		DownloadRegCertificate	
Type of Well	Tube Well/Boring	Depth of the Well (In meter)	119.78
Purpose of well	Industrial	Assembly Size(For Tube Well)	
Strainer Position (For Tube Well)			
Type of Pump Used	Submersible	H.P. of the Pump	25.00
Operational Device	Electric Motor	Rate of Withdrawal (m <sup>3</sup> /hr.)	80.00
Date of Energization (In Case of Electric Pump)		01/04/2007	
Maximum Allowable Rate of Withdrawal (m <sup>3</sup> /hr.):	80.00	Maximum Allowable Running Hours Per Day:	2.00
Maximum Allowable Annual Extraction of Ground Water:			34720.00
Reason for renewal of N.O.C. एन.ओ.सी. के नवीनीकरण का कारण	CGWA/NOC/IND/REN/1/2020/5665 is valid upto 6/11/2021.		
Against Case			
<p>This No-Objection certificate authorizes the owner applicant (user) to sink a well in the location specified at Sl. (3) for extraction of ground water at a rate not exceeding that as shown at Sl. (3j), for Running Hours per day as shown at Sl. (3k), and for maximum allowable annual extraction of ground water as shown at Sl. (3k) and is valid subject to the observance of the conditions stated overleaf.</p> <p><b>Conditions</b></p> <ul style="list-style-type: none"> <li>• (1) In case of any change of ownership of the proposed well, fresh authorization has to be obtained.</li> <li>• (2) No change of location, design, rate of withdrawal and pumping device in respect of the proposed well as indicated at Sl. (2) and (3) of this certificate shall be made without prior permission of the Competent Authority. Any deviation in this regard shall lead to cancellation of this authorization.</li> <li>• (3) For the purpose of measuring and recording the quantity of ground water extracted, every said user shall affix digital water flow meters(conforming to BIS/ IS standards) having telemetry system in the abstraction structure, which record rate and quantum of extraction, at outlet of pumping devices and it shall be presumed that the quantity recorded by the meter has been extracted by the said user, until the contrary is proved. The rate of extraction of ground water from the well as shown in item 3(k) shall not exceed to the recorded rate from water meters</li> <li>• (4) The concerned Authority reserves the right to stop extraction of ground water from the well due to quality hazards or any other reasons, if the situation so demands.</li> <li>• (5) In case of any change of ownership of the existing well, fresh registration has to be obtained.</li> <li>• (6) No change of location, design, rate of withdrawal and pumping device in respect of the existing well as indicated at Sl. (2) and (3) of this certificate shall be made without prior permission of the Competent Authority. Any deviation in this regard shall lead to cancellation of this registration.</li> <li>• (7) n case, any of the particulars l information furnished by the applicant in his application for issuance of this registration is found to be incorrect during verification at any subsequent stage, this registration is liable for cancellation.</li> <li>• (8) The Certificate of Authorization/ NOC shall be valid for a period of five years from the date of issue. The applicant shall have to apply for renewal through a fresh application, at least ninety days prior to expiry of its validity.</li> <li>• (9) Construction of piezometers and installation of digital water level recorders with telemetry shall be mandatory for user. Depth and zone tapped of piezometer should be commensurate with that of the pumping well. The data, obtained from digital water level recorders shall be made available to this office on monthly basis.</li> <li>• (10) Guidelines for Installation of Piezometers and their Monitoring</li> </ul>			
upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=Y1dx116SHmM=			2/4

3/28/22, 6:02 PM

DownloadRegCertificate

- Piezometer is a borewell /tube well used only for measuring the water level by lowering the tape/ sounder or automatic water level measuring equipment. It is also used to take water sample for water quality testing whenever needed. General guidelines for installation of piezometers are as follows for compliance of NOC:
- The piezometer is to be installed/constructed at the minimum of 50 m distance from the pumping well through which ground water is being withdrawn. The diameter of the piezometer should be about 4" to 6".
- The depth of the piezometer should be same as is case of the pumping well from which ground water is being abstracted. If, more than one piezometer are installed the second piezometer should monitor the shallow ground water regime. It will facilitate shallow as well as deeper ground water aquifer monitoring.
- No. of piezometers to be constructed & Type of water level monitoring mechanism shall be as per below table:

S.No	Quantum of Ground water withdrawal (cum/day)	No.of piezometers required	Monitoring Mechanism	
			Manual	DWLR with Telemetry
1	< 10	0	0	0
2	11 - 50	1	1	0
3	50- 500	1	0	1
4	> 500	2	0	2

- The measuring frequency should be monthly and accuracy of measurement should be up to cm. the reported measurement should be given in meter up to two decimals.
- For measurement of water level sounder or automatic water level recorder (AWLR)/ Digital Automatic water level recorder (DWLR) with telemetry system should be used for accuracy.
- The measurement of water level in piezometer should be taken, only after the pumping from the surrounding tube wells has been stopped for about four to six hours.
- All the details regarding coordinates, reduced level (with respect to mean level), depth, zone taped and assembly lowered should be provided for bringing the piezometer into the Hydrograph Monitoring System for Ground Water Department, Uttar Pradesh, and for its validation.
- The ground water quality has to be monitored twice in a year during pre-monsoon (May/June) and post-monsoon (October/November) periods. Quality may be got analyzed from NABL approved lab. Besides, one sample (1 Lt. capacity bottle) to the concerned Director, Ground Water Department, Uttar Pradesh, for chemical analysis.
- A Permanent display board should be installed at piezometer/Tube wells site for providing the location, piezometer/ tube well number, depth and zone tapped of piezometer/tube well for standard referencing and identification.
- Any other site-specific requirement regarding safety and access for measurement may be taken care of.
- (11) Any other condition(s) that may be imposed by the concerned Authority.
- (12) In case, any of the particulars / information furnished by the applicant in his application for issuance of this permit is found to be incorrect during verification at any subsequent stage, this permit is liable for cancellation.
- **SPECIFIC CONDITIONS:**
- (A) **For Industrial User:** No Objection Certificate for ground water extraction by industries shall be granted subject to the following specific conditions:
  - i) No Objection Certificate shall be granted only in such cases where local government water supply agencies are not able to supply the desired quantity of water.
  - ii) All industries shall be required to adopt latest water efficient technologies so as to reduce dependence on ground water resources.
  - iii) All industries abstracting ground water in excess of 100 m<sup>3</sup>/d shall be required to undertake annual water audit through Confederation of Indian Industries (CII)/ Federation Indian Chamber of Commerce and Industry (FICCI)/ National Productivity Council (NPC) certified auditors and submit audit reports within three months of completion of the same to Ground Water Department, Uttar Pradesh. All such industries shall be required to reduce their ground water use by at least 20% over the next five years through appropriate means.
  - iv) Construction of observation well(s) (piezometer)(s) within the premises and installation of appropriate water level monitoring mechanism as mentioned in General Condition no.10 shall be mandatory for industries drawing/ proposing to draw more than 10 m<sup>3</sup>/day of ground water and. Monitoring of water level shall be done by the project proponent. The piezometer (observation well)

upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=Y1dx116SHmM=

3/4

3/28/22, 6:02 PM

DownloadRegCertificate

shall be constructed at a minimum distance of 50 m from the bore well/production well. Depth and aquifer zone tapped in the piezometer shall be the same as that of the pumping well/ wells. Monthly water level data shall be submitted online to the Ground Water Department, UP.

- v) The proponent shall be required to adopt roof top rain water harvesting/ recharge in the project premises. Industries which are likely to pollute ground water (chemical, pharmaceutical, dyes, pigments, paints, textiles, tannery, pesticides/ insecticides, fertilizers, slaughter house, explosives etc.) shall store the harvested rain water in surface storage tanks for use in the industry.
- vi) Injection of treated/ untreated waste water into aquifer system is strictly prohibited.
- vii) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution.
- (B) **Infrastructural User:** The No Objection Certificate for ground water abstraction will be granted subject to the following specific conditions:
  - i) In case of infrastructure projects that require dewatering, proponent shall be required to carry out regular monitoring of dewatering discharge rate (using a digital water flow meter) and submit the data online to Ground Water Department, UP as applicable. Monitoring records and results should be retained by the proponent for two years, for inspection or reporting as required by District Ground Water Management Council.
  - ii) Installation of Sewage Treatment Plants (STP) shall be mandatory for new projects, where ground water requirement is more than 20 m<sup>3</sup> /day. The water from STP shall be utilized for toilet flushing, car washing, gardening etc.

Date:28/03/2022

Place:Balrampur

**This certificate is electronically generated and does not require digital signature**

3/28/22, 6:03 PM

DownloadRegCertificate

**GROUND WATER DEPARTMENT**

(Namami Gange &amp; Rural Water Supply Department)

Ministry of Jal Shakti  
Government of Uttar Pradesh**Form 8 (E)**

[See rules 15(2)]

**(RENEWAL OF AUTHORIZATION/ NO-OBJECTION CERTIFICATE FOR  
SINKING OF EXISTING WELL FOR INDUSTRIAL/ COMMERCIAL/  
INFRASTRUCTURAL OR BULK USER OF GROUND WATER)****AUTHORIZATION/ NO-OBJECTION CERTIFICATE NO:  
REG018174****VALID FROM 28/12/2021 TO 27/12/2026**

<b>Registration No.: 202110000221</b>			
<b>Name of the Owner</b>	RAJEEV KUMAR AGARWAL		
<b>Address of the Applicant</b>	P.O. Balrampur, Distt- Balrampur, Uttar Pradesh	<b>Application Form Serial No.</b>	BLMP1021RIN0025
<b>Date of Submission</b>	13/10/2021	<b>Specimen Signature</b>	
<b>Company Name</b>	BALRAMPUR CHINI MILLS LTD SUGAR DIV. BISHUNPUR	<b>Company Address</b>	Village Bishunapur, Block & District: Balrampur
<b>Location Particulars</b>			
<b>District</b>	Balrampur	<b>Block</b>	Balrampur
<b>Plot No./Khasra No.</b>	Existing Land document attached.	<b>Municipality/Corporation</b>	No
<b>Ward No./Holding No.</b>			NA
<b>Particular of the Existing Well and Pumping Device</b>			
<b>Date of Construction/Sinking of the Well</b>	01/04/2007		

upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=V6vePw5m4jw=

1/4

3/28/22, 6:03 PM		DownloadRegCertificate	
Type of Well	Tube Well/Boring	Depth of the Well (In meter)	119.78
Purpose of well	Industrial	Assembly Size(For Tube Well)	
Strainer Position (For Tube Well)			
Type of Pump Used	Submersible	H.P. of the Pump	25.00
Operational Device	Electric Motor	Rate of Withdrawal (m <sup>3</sup> /hr.)	80.00
Date of Energization (In Case of Electric Pump)		01/04/2007	
Maximum Allowable Rate of Withdrawal (m <sup>3</sup> /hr.):	80.00	Maximum Allowable Running Hours Per Day:	1.00
Maximum Allowable Annual Extraction of Ground Water:			29200.00
Reason for renewal of N.O.C. एन.ओ.सी. के नवीनीकरण का कारण	CGWA/NOC/IND/REN/1/2020/5665 is valid upto 6/11/2021.		
Against Case			
<p>This No-Objection certificate authorizes the owner applicant (user) to sink a well in the location specified at Sl. (3) for extraction of ground water at a rate not exceeding that as shown at Sl. (3j), for Running Hours per day as shown at Sl. (3k), and for maximum allowable annual extraction of ground water as shown at Sl. (3k) and is valid subject to the observance of the conditions stated overleaf.</p> <p><b>Conditions</b></p> <ul style="list-style-type: none"> <li>• (1) In case of any change of ownership of the proposed well, fresh authorization has to be obtained.</li> <li>• (2) No change of location, design, rate of withdrawal and pumping device in respect of the proposed well as indicated at SL (2) and (3) of this certificate shall be made without prior permission of the Competent Authority. Any deviation in this regard shall lead to cancellation of this authorization.</li> <li>• (3) For the purpose of measuring and recording the quantity of ground water extracted, every said user shall affix digital water flow meters(conforming to BIS/ IS standards) having telemetry system in the abstraction structure, which record rate and quantum of extraction, at outlet of pumping devices and it shall be presumed that the quantity recorded by the meter has been extracted by the said user, until the contrary is proved. The rate of extraction of ground water from the well as shown in item 3(k) shall not exceed to the recorded rate from water meters</li> <li>• (4) The concerned Authority reserves the right to stop extraction of ground water from the well due to quality hazards or any other reasons, if the situation so demands.</li> <li>• (5) In case of any change of ownership of the existing well, fresh registration has to be obtained.</li> <li>• (6) No change of location, design, rate of withdrawal and pumping device in respect of the existing well as indicated at Sl. (2) and (3) of this certificate shall be made without prior permission of the Competent Authority. Any deviation in this regard shall lead to cancellation of this registration.</li> <li>• (7) n case, any of the particulars l information furnished by the applicant in his application for issuance of this registration is found to be incorrect during verification at any subsequent stage, this registration is liable for cancellation.</li> <li>• (8) The Certificate of Authorization/ NOC shall be valid for a period of five years from the date of issue. The applicant shall have to apply for renewal through a fresh application, at least ninety days prior to expiry of its validity.</li> <li>• (9) Construction of piezometers and installation of digital water level recorders with telemetry shall be mandatory for user. Depth and zone tapped of piezometer should be commensurate with that of the pumping well. The data, obtained from digital water level recorders shall be made available to this office on monthly basis.</li> <li>• (10) Guidelines for Installation of Piezometers and their Monitoring</li> </ul>			
upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=V6vePw5m4jw=			2/4

3/28/22, 6:03 PM

DownloadRegCertificate

- Piezometer is a borewell /tube well used only for measuring the water level by lowering the tape/ sounder or automatic water level measuring equipment. It is also used to take water sample for water quality testing whenever needed. General guidelines for installation of piezometers are as follows for compliance of NOC:
- The piezometer is to be installed/constructed at the minimum of 50 m distance from the pumping well through which ground water is being withdrawn. The diameter of the piezometer should be about 4" to 6".
- The depth of the piezometer should be same as is case of the pumping well from which ground water is being abstracted. If, more than one piezometer are installed the second piezometer should monitor the shallow ground water regime. It will facilitate shallow as well as deeper ground water aquifer monitoring.
- No. of piezometers to be constructed & Type of water level monitoring mechanism shall be as per below table:

S.No	Quantum of Ground water withdrawal (cum/day)	No.of piezometers required	Monitoring Mechanism	
			Manual	DWLR with Telemetry
1	< 10	0	0	0
2	11 - 50	1	1	0
3	50- 500	1	0	1
4	> 500	2	0	2

- The measuring frequency should be monthly and accuracy of measurement should be up to cm. the reported measurement should be given in meter up to two decimals.
- For measurement of water level sounder or automatic water level recorder (AWLR)/ Digital Automatic water level recorder (DWLR) with telemetry system should be used for accuracy.
- The measurement of water level in piezometer should be taken, only after the pumping from the surrounding tube wells has been stopped for about four to six hours.
- All the details regarding coordinates, reduced level (with respect to mean level), depth, zone taped and assembly lowered should be provided for bringing the piezometer into the Hydrograph Monitoring System for Ground Water Department, Uttar Pradesh, and for its validation.
- The ground water quality has to be monitored twice in a year during pre-monsoon (May/June) and post-monsoon (October/November) periods. Quality may be got analyzed from NABL approved lab. Besides, one sample (1 Lt. capacity bottle) to the concerned Director, Ground Water Department, Uttar Pradesh, for chemical analysis.
- A Permanent display board should be installed at piezometer/Tube wells site for providing the location, piezometer/ tube well number, depth and zone tapped of piezometer/tube well for standard referencing and identification.
- Any other site-specific requirement regarding safety and access for measurement may be taken care of.
- (11) Any other condition(s) that may be imposed by the concerned Authority.
- (12) In case, any of the particulars I information furnished by the applicant in his application for issuance of this permit is found to be incorrect during verification at any subsequent stage, this permit is liable for cancellation.
- **SPECIFIC CONDITIONS:**
- (A) **For Industrial User:** No Objection Certificate for ground water extraction by industries shall be granted subject to the following specific conditions:
  - i) No Objection Certificate shall be granted only in such cases where local government water supply agencies are not able to supply the desired quantity of water.
  - ii) All industries shall be required to adopt latest water efficient technologies so as to reduce dependence on ground water resources.
  - iii) All industries abstracting ground water in excess of 100 m<sup>3</sup>/d shall be required to undertake annual water audit through Confederation of Indian Industries (CII)/ Federation Indian Chamber of Commerce and Industry (FICCI)/ National Productivity Council (NPC) certified auditors and submit audit reports within three months of completion of the same to Ground Water Department, Uttar Pradesh. All such industries shall be required to reduce their ground water use by at least 20% over the next five years through appropriate means.
  - iv) Construction of observation well(s) (piezometer)(s) within the premises and installation of appropriate water level monitoring mechanism as mentioned in General Condition no.10 shall be mandatory for industries drawing/ proposing to draw more than 10 m<sup>3</sup>/day of ground water and. Monitoring of water level shall be done by the project proponent. The piezometer (observation well)

upgwdonline.in/apps/ApplicationForm/DownloadRegCertificate?RegistrationID=V6vePw5m4jw=

3/4

3/28/22, 6:03 PM

DownloadRegCertificate

shall be constructed at a minimum distance of 50 m from the bore well/production well. Depth and aquifer zone tapped in the piezometer shall be the same as that of the pumping well/ wells. Monthly water level data shall be submitted online to the Ground Water Department, UP.

- v) The proponent shall be required to adopt roof top rain water harvesting/ recharge in the project premises. Industries which are likely to pollute ground water (chemical, pharmaceutical, dyes, pigments, paints, textiles, tannery, pesticides/ insecticides, fertilizers, slaughter house, explosives etc.) shall store the harvested rain water in surface storage tanks for use in the industry.
- vi) Injection of treated/ untreated waste water into aquifer system is strictly prohibited.
- vii) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution.
- (B) **Infrastructural User:** The No Objection Certificate for ground water abstraction will be granted subject to the following specific conditions:
  - i) In case of infrastructure projects that require dewatering, proponent shall be required to carry out regular monitoring of dewatering discharge rate (using a digital water flow meter) and submit the data online to Ground Water Department, UP as applicable. Monitoring records and results should be retained by the proponent for two years, for inspection or reporting as required by District Ground Water Management Council.
  - ii) Installation of Sewage Treatment Plants (STP) shall be mandatory for new projects, where ground water requirement is more than 20 m<sup>3</sup> /day. The water from STP shall be utilized for toilet flushing, car washing, gardening etc.

Date:28/03/2022

Place:Balrampur

**This certificate is electronically generated and does not require digital signature**

## 10.6 Annexure 6: CPU inlet &amp; outlet water test report

		<b>ENVIRONMENTAL AND TECHNICAL RESEARCH CENTRE</b> Office & Laboratory: 2/261, Vishwas Khand, Gomti Nagar, Lucknow- 226 010 (U.P.) Email : ETRCLTH@YAHOO.IN, Web: www.etrcindia.com ISO 9001:2015, ISO 14001 : 2015, OHSAS 18001 : 2007 & NABL Accredited Laboratory			
ETRC/PM14/TEST-REP/FT/17					
<b>TEST REPORT</b>					
<b>WATER ANALYSIS</b>					
<b>Test Report Ref No.</b> ETRC/WW/4455/2023			<b>Date of Report:</b> 22.06.2023		
<b>Name /Address/Type of Industry</b>			<b>M/s Balrampur Chini Mills Limited</b> <b>Unit: Balrampur (Chemical Division)</b> <b>Village: Bishunipur, Tehsil: Balrampur</b> <b>District: Balrampur (U.P.) - 271201</b>		
<b>SAMPLE DETAILS</b>					
1	Water/ Waste Water	Waste Water	5	Packing Condition	Sealed
2	Sample Description	CPU Inlet	6	Sample Collected By	Industry self
3	Sample received date	06.06.2023	7	Analysis Start Date	06.06.2023
4	Sample Quantity	2.0 liters	8	Analysis End Date	09.06.2023
<b>TEST RESULT</b>					
Sr. No.	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection
1	pH	-	APHA 23 <sup>rd</sup> Ed. 2017-4500H <sup>+</sup>	3.3	1 - 14
2	Total Dissolved Solid (TDS)	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	324.0	10 - 40000
3	Total Suspended Solid (TSS)	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-2540 D	BDL	5.0 - 20000
4	Bio chemical Oxygen Demand (BOD)	mg/l	IS 3025 (Part-44): 1993 Reaffirmed: 2019	760.0	1.0 - 150000
5	Chemical Oxygen Demand (COD)	mg/l	IS: 3025 (Part-58): 2006 Reaffirmed: 2017	3280.0	2.0 - 600000
BDL = Below Detection Limited					
..... <b>END OF REPORT</b> .....					
<ul style="list-style-type: none"> <li>ETRC warrants that all analytical work is conducted professionally in accordance with all applicable standard laboratory practices and that this data reflects our best attempt to generate accurate results for the sample, mentioned in the report as above.</li> <li>The result relate only to the items tested.</li> <li>ETRC does not assume any liability for any claims or damages related to the quality of parameter analyzed in the results and/or the performance of the equipment constituting to the results.</li> <li>All disputes subject to Lucknow jurisdiction.</li> <li>This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.</li> <li>Complain register is available in our laboratory.</li> </ul>					
 <b>Authorized Signatory</b> <b>(Sandeep Kr Verma)</b> <b>Lab-Incharge</b>				 <b>Authorized Signatory</b> <b>(Ritu Garg)</b> <b>QM</b>	
Regd. Address: 4/57, Vipul Khand, Gomti Nagar, Lucknow - 226010 (U.P.) Mob: 09897674227					



## ENVIRONMENTAL AND TECHNICAL RESEARCH CENTRE

Office & Laboratory: 2/261, Vishwas Khand, Gomti Nagar, Lucknow- 226 010 (U.P.)  
 Email : ETRCLTH@YAHOO.IN, Web: www.etrcindia.com  
 ISO 9001:2015, ISO 14001 : 2015, OHSAS 18001 : 2007 & NABL Accredited Laboratory



ETRC/PM14/TEST-REP/FT/17

### TEST REPORT WATER ANALYSIS

Test Report Ref No. ETRC/WW/4456/2023	Date of Report: 22.06.2023
Name /Address/Type of Industry	M/s Balrampur Chini Mills Limited Unit: Balrampur (Chemical Division) Village: Bishunipur, Tehsil: Balrampur District: Balrampur (U.P.) - 271201

### SAMPLE DETAILS

1	Water/ Waste Water	Waste Water	5	Packing Condition	Sealed
2	Sample Description	CPU Outlet	6	Sample Collected By	Industry self
3	Sample received date	06.06.2023	7	Analysis Start Date	06.06.2023
4	Sample Quantity	2.0 liters	8	Analysis End Date	09.06.2023

### TEST RESULT

Sr. No.	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection
1	pH	-	APHA 23 <sup>rd</sup> Ed. 2017-4500H <sup>+</sup>	6.5	1 - 14
2	Total Dissolved Solid (TDS)	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	190.0	10 - 40000
3	Total Suspended Solid (TSS)	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-2540 D	BDL	5.0 - 20000
4	Bio chemical Oxygen Demand (BOD)	mg/l	IS 3025 (Part-44): 1993 Reaffirmed: 2019	1.2	1.0 - 150000
5	Chemical Oxygen Demand (COD)	mg/l	IS: 3025 (Part-58): 2006 Reaffirmed: 2017	8.0	2.0 - 600000

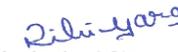
BDL = Below Detection Limited

..... END OF REPORT.....

- ETRC warrants that all analytical work is conducted professionally in accordance with all applicable standard laboratory practices and that this data reflects our best attempt to generate accurate results for the sample, mentioned in the report as above.
- The result relate only to the items tested.
- ETRC does not assume any liability for any claims or damages related to the quality of parameter analyzed in the results and/or the performance of the equipment constituting to the results.
- All disputes subject to Lucknow jurisdiction.
- This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
- Complain register is available in our laboratory.

  
 Authorized Signatory  
 (Sandeep Kr Verma)  
 Lab-Incharge



  
 Authorized Signatory  
 (Ritu Garg)  
 QM

## 10.7 Annexure 7: ETP Test Reports



## ENVIRONMENTAL AND TECHNICAL RESEARCH CENTRE

Office & Laboratory: 2/261, Vishwas Khand, Gomti Nagar, Lucknow- 226 010 (U.P.)  
 Email : ETRCLTH@YAHOO.IN, Web: www.etrcltds.com  
 ISO 9001:2015, ISO 14001 : 2015, OHSAS 18001 : 2007 & NABL Accredited Laboratory



ETRC/PM14/TEST-REP/FT/17

### TEST REPORT WATER ANALYSIS

Test Report Ref No. ETRC/MW/3824/2023	Date of Report: 17.01.2023
Name /Address/Type of Industry	M/s Balrampur Chini Mills Limited Unit: Balrampur Sugar Division P.O.: Balrampur District: Balrampur (U.P.) - 271201

#### SAMPLE DETAILS

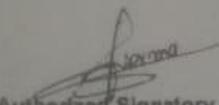
1	Water/ Waste Water	Waste Water	5	Packing Condition	Sealed
2	Sample Description	ETP Inlet	6	Sample Collected By	Industry Self
3	Sample received date	13.01.2023	7	Analysis Start Date	13.01.2023
4	Sample Quantity	2.0 liters	8	Analysis End Date	16.01.2023

#### TEST RESULT

Sr. No.	Test Parameter	Unit	Protocol/Test Method	Result	Range of testing /limit of detection
1	pH	-	APHA 23 <sup>rd</sup> Ed. 2017-4500H <sup>+</sup>	6.8	1 - 14
2	Total Dissolved Solid (TDS)	mg/l	IS: 3025 (Part-16): 1984 Reaffirmed: 2017	1756.0	10 - 40000
3	Total Suspended Solid (TSS)	mg/l	APHA 23 <sup>rd</sup> Ed. 2017-2540 D	155.0	5.0 - 20000
4	Bio chemical Oxygen Demand (BOD)	mg/l	IS 3025 (Part-44): 1993 Reaffirmed: 2019	312.0	1.0 - 150000
5	Chemical Oxygen Demand (COD)	mg/l	IS: 3025 (Part-58): 2006 Reaffirmed: 2017	1064.0	2.0 - 600000

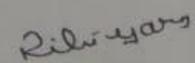
..... END OF REPORT.....

- ETRC warrants that all analytical work is conducted professionally in accordance with all applicable standard laboratory practices and that this data reflects our best attempt to generate accurate results for the sample, mentioned in the report as above.
- The result relate only to the items tested.
- ETRC does not assume any liability for any claims or damages related to the quality of parameter analyzed in the results and/or the performance of the equipment constituting to the results.
- All disputes subject to Lucknow jurisdiction.
- This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
- Complain register is available in our laboratory.



Authorized Signatory  
(Sandeep Kr Verma)  
Lab-Incharge





Authorized Signatory  
(Ritu Garg)  
QM



## UTTAR PRADESH POLLUTION CONTROL BOARD

Building. No TC-12V Vibhuti Khand, Gomti Nagar, Lucknow-226010

## TEST REPORT: WASTE WATER LABORATORY

Ref No: 24317692/Basti/2024/paybasis

Date:01/02/2024

- 1- Name of Industry: Balrampur Chini Mills Limited, Unit - Balrampur,, PO Balrampur, Distt Balrampur (UP) - 271201
- 2- Address of Industry: PO Balrampur, Distt Balrampur (UP) - 271201
- 3- District: Balrampur
- 4- Description about sampling point: Final Outlet of ETP
- 5- Type of Sample (Grab/Composite/Integrated): Grab
- 6- Sample Collected By: Dr T N Singh RO & Parashar Kumar Pandey L.A.
- 7- Colour and Odour: - -
- 8- Quantity and Packing: 2 Litr Plastic Jerican & 1 Liter Glass Bottle
- 9- Date of Sample Collection: 16/01/2024
- 10- Analyis Indented by: RO Basti
- 11- Date of sample receipt in Lab: 16/01/2024

Parameter/Method Name	Unit	Results	Standard	Detection Range
pH, APHA 24th Ed. 4500B: 2023	-	7.60	6.5-8.5	02-12
*Oil_Grease	mg/l	8.0	10	-
Suspended Solids , APHA 24th Ed. 2540 D Total Suspended Solids dried at 103-105 °C 2023	mg/l	26.0	30	10-20000 mg/l
BOD, APHA 24th Ed. 3 day 27 °C IS 3025 ( Part 44): 1993 Bio 2023	mg/l	20.0	30	1.0 -50000 mg/l
COD, APHA 24th Ed. 5220 B Open Reflux Method 2023	mg/l	132.0	250	5.0 -100000 mg/l

Reference- (1) General Standards for discharge of environmental pollutants are as part-A Effluent (Schedule-VI). The Environment (Protection) Rules,1986 source: [www.cpcb.nic.in/GeneralStandards.pdf](http://www.cpcb.nic.in/GeneralStandards.pdf). Besides these standards, refer EPA standards for specific purpose

\*Non-NABL Parameters.

Note : 1 The results in the Test Report relate only to the items tested: 2. The report shall not be reproduced-except in full, without the written permission of laboratory. 3. The test report pertains to the sample as received in Lab.

Remark: NA

Analysed by-  
[Reeta Keshav(SA)]

Authorized by  
SAMRENDRA  
SINGH  
Samrendra Singh (ASO)

Digitally signed by SAMRENDRA  
SINGH  
Date: 2024.02.01 18:58:55 +05'30'

RAM  
GOPAL  
Chief Environmental Officer  
Central Laboratory

Digitally signed  
by RAM GOPAL  
Date: 2024.02.01  
18:59:10 +05'30'

**General Standards for Discharge of Environmental Pollutants Part -A:Effluents (Schedule - VI) The Environment(Protection) Rules, 1986**

1	Parameter	Standards			
		Inland Surface water	Public Sewers	Land for Irrigation	Marine coastal areas
		a	b	c	d
1	Color and Odor	All efforts should be made to remove colour and unpleasant odour as far as practicable			
2	Suspended Solids mg/l, Max	100	600	200	(a) for process waste water- 100(b) For cooling water effluent 10 percent above total suspended matter of influent.
3	Particulate size of suspended solids	Shall pass 850 micron IS Sieve	-	-	(a) Floatableaa solids, max. 3 mm
4	2(***)	*	*	*	*
5	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6	Temperature	Shall not exceed 5°C above receiving water temperature	-	-	Shall not exceed 5°C above receiving water temperature
7	Oil and Grease Mg/l Max.	10	20	10	20
8	Total residual chorine mg/l Max	1	-	-	1
9	Ammonical Nitrogen(as N), mg/l Max	50	50	-	50
10	Total Kjeldahl Nitrogen(as NH3) mg/l,Max	100	-	-	100
11	Free ammonia (as NH3)mg/l, Max	5	-	-	5
12	3Biochemical Oxygen Demand 1[ 3 days at 270C] mg/l, Max	30	350	100	100
13	chemical Oxygen Demand, mg/l, Max	250	-	-	250
13	chemical Oxygen Demand, mg/l, Max	250	-	-	250
14	Arsenic(as As), mg/l, max	0.2	0.2	0.2	0.2
15	Murcury(as Hg), mg/l, max	0.01	0.01	-	0.01
16	Lead (as Pb), mg/l, max	0.1	1	-	2
17	Cadmium (as Cd), mg/l, max	2	1	-	2
18	Hexavalentchromium (as Cr+6), mg/l, max	0.1	2	-	1
19	Total chromium (as Cr)mg/l, max	0.1	2	-	1
20	Copper(as Cu), mg/l, max	3	3	-	3
21	Zinc(as Zn), mg/l, max	5	15	-	5
22	Selenium (as Se) mg/l, max	0.05	0.05	-	0.05
23	Nickel (as Ni) mg/l, max	3	3	-	5
24	2(***)	*	*	*	*
25	2(***)	*	*	*	*
26	2(***)	*	*	*	*
27	Cyanide (as CN), mg/l, max	0.2	2	0.2	0.2
28	2(***)				
29	Fluoride (as F) mg/l, max	2	15	-	15
30	Dissolved Phosphates (as P), mg/l, max	5	-	0	-
31	2 (***)	*	*	*	*
32	Sulphide (as S), mg/l, max	2	-	-	5
33	Phenolic Compounds (as C6H5OH) mg/l, max	1	5	-	5
34	Radioactive materials: (a)Alpha emitter micro curie/ml (b)Beta emitter micro curie/ml	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-8</sup> 10 <sup>-7</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>
35	Radioactive materials: (a)Alpha emitter micro curie/ml (b)Beta emitter micro curie/ml	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-8</sup> 10 <sup>-7</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>
35	Bio-assay test	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent

36	Manganese (as Mn)	2 mg/l	2 mg/l	-	2 mg/l
37	Iron (as Fe)	3 mg/l	3 mg/l	-	3 mg/l
38	Vanadium (as V)	0.2 mg/l	0.2 mg/l	-	0.2 mg/l
39	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l
40	2 (***)	*	*	*	*

1. Schedule VI inserted by Rule 2 (d) of the Environment(Protection) Second Amendment Rules, 1993 notified vide G.S.R. 422 (E) dated 19.05.1993 published in the Gazette no. 174 dated 19.05.1993.
2. Omitted by Rule 2 (d)(i) of the Environment(Protection) Third Amendment Rules, 1993 vide Notification No. G.S.R. 801 (E), dated 31.12.1993.
3. Substituted by Rule 2 of the Environment(Protection) Amendment Rules, 1996 notified by G.S.R 176, dated 02.04.1996 may be read as BOD (3days at 270C) whenever BOD 05 days 200C occurred.
4. Besides these standards, refer EPA standards for specific industry Source (1):  
<https://cpcb.nic.in/displaypdf.php?id=R2VuZXJhbFN0YW5kYXJkcy5wZGY=>  
 (2) [cpcb.nic.in/Industry\\_Specific\\_Standards.php](http://cpcb.nic.in/Industry_Specific_Standards.php)



**CENTRAL LABORATORY**  
**UTTAR PRADESH POLLUTION CONTROL BOARD**  
 Building. No TC-12V Vibhuti Khand, Gomti Nagar, Lucknow-226010

**TEST REPORT: WASTE WATER LABORATORY**

Ref No: 24317781/Basti/2024/paybasis

Date:01/02/2024

- 1- **Name of Industry:** Balrampur Chini Mills Limited, Unit - Balrampur,, PO Balrampur, Distt Balrampur (UP) - 271201
- 2- **Address of Industry:** PO Balrampur, Distt Balrampur (UP) - 271201
- 3- **District:** Balrampur
- 4- **Description about sampling point:** Outlet of Secondary Clarifire
- 5- **Type of Sample (Grab/Composite/Integrated):** Grab
- 6- **Sample Collected By:** Dr T N Singh RO & PARASHAR KUMAR PANDEY L.A.
- 7- **Colour and Odour:** - -
- 8- **Quantity and Packing:** 2 Litr plastic jerican & 1litr glas bottle
- 9- **Date of Sample Collection:** 16/01/2024
- 10- **Analys Indented by:** RO Basti
- 11- **Date of sample receipt in Lab:** 16/01/2024

Parameter/Method Name	Unit	Results	Standard	Detection Range
pH, APHA 24th Ed. 4500B: 2023	-	7.68	-	02-12
*Oil_Grease	mg/l	10.0	-	-
Suspended Solids , APHA 24th Ed. 2540 D Total Suspended Solids dried at 103-105 °C 2023	mg/l	28.0	-	10-20000 mg/l
BOD, APHA 24th Ed. 3 day 27 °C IS 3025 ( Part 44): 1993 Bio 2023	mg/l	24.0	-	1.0 -50000 mg/l
COD, APHA 24th Ed. 5220 B Open Reflux Method 2023	mg/l	178.0	-	5.0 -100000 mg/l

Reference- (1) General Standards for discharge of environmental pollutants are as part-A Effluent (Schedule-VI). The Environment (Protection) Rules,1986 source: [www.cpcb.nic.in/GeneralStandards.pdf](http://www.cpcb.nic.in/GeneralStandards.pdf). Besides these standards, refer EPA standards for specific purpose

\*Non-NABL Parameters.

Note : 1 The results in the Test Report relate only to the items tested: 2. The report shall not be reproduced-except in full, without the written permission of laboratory. 3. The test report pertains to the sample as received in Lab.

Remark: NA

**Analysed by-**  
**[Reeta Keshav(SA)]**

**Authorized by**  
**SAMRENDRA SINGH**  
 Samrendra Singh (ASO)

Digitally signed by SAMRENDRA SINGH  
 Date: 2024.02.01 19:00:45  
 +05'30'

**RAM GOPAL**  
 Chief Environmental Officer  
 Central Laboratory

Digitally signed  
 by RAM GOPAL  
 Date: 2024.02.01  
 19:00:57 +05'30'

**General Standards for Discharge of Environmental Pollutants Part -A:Effluents (Schedule - VI) The Environment(Protection) Rules, 1986**

1	Parameter	Standards			
		Inland Surface water	Public Sewers	Land for Irrigation	Marine coastal areas
		a	b	c	d
1	Color and Odor	All efforts should be made to remove colour and unpleasant odour as far as practicable			
2	Suspended Solids mg/l, Max	100	600	200	(a) for process waste water- 100(b) For cooling water effluent 10 percent above total suspended matter of influent.
3	Particulate size of suspended solids	Shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, max. 3 mm
4	2(***)	*	*	*	*
5	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6	Temperature	Shall not exceed 5°C above receiving water temperature	-	-	Shall not exceed 5°C above receiving water temperature
7	Oil and Grease Mg/l Max.	10	20	10	20
8	Total residual chlorine mg/l Max	1	-	-	1
9	Ammonical Nitrogen(as N), mg/l Max	50	50	-	50
10	Total Kjeldahl Nitrogen(as NH <sub>3</sub> ) mg/l,Max	100	-	-	100
11	Free ammonia (as NH <sub>3</sub> )mg/l, Max	5	-	-	5
12	3Biochemical Oxygen Demand [ 3 days at 270C] mg/l, Max	30	350	100	100
13	chemical Oxygen Demand, mg/l, Max	250	-	-	250
13	chemical Oxygen Demand, mg/l, Max	250	-	-	250
14	Arsenic(as As), mg/l, max	0.2	0.2	0.2	0.2
15	Murcury(as Hg), mg/l, max	0.01	0.01	-	0.01
16	Lead (as Pb), mg/l, max	0.1	1	-	2
17	Cadmium (as Cd), mg/l, max	2	1	-	2
18	Hexavalentchromium (as Cr+6), mg/l, max	0.1	2	-	1
19	Total chromium (as Cr)mg/l, max	0.1	2	-	1
20	Copper(as Cu), mg/l, max	3	3	-	3
21	Zinc(as Zn), mg/l, max	5	15	-	5
22	Selenium (as Se) mg/l, max	0.05	0.05	-	0.05
23	Nickel (as Ni) mg/l, max	3	3	-	5
24	2(***)	*	*	*	*
25	2(***)	*	*	*	*
26	2(***)	*	*	*	*
27	Cyanide (as CN), mg/l, max	0.2	2	0.2	0.2
28	2(***)				
29	Fluoride (as F) mg/l, max	2	15	-	15
30	Dissolved Phosphates (as P), mg/l, max	5	-	0	-
31	2 (***)	*	*	*	*
32	Sulphide (as S), mg/l, max	2	-	-	5
33	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l, max	1	5	-	5
34	Radioactive materials: (a)Alpha emitter micro curie/ml (b)Beta emitter micro curie/ml	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-8</sup> 10 <sup>-7</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>
35	Radioactive materials: (a)Alpha emitter micro curie/ml (b)Beta emitter micro curie/ml	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-8</sup> 10 <sup>-7</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>
35	Bio-assay test	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent	90% survival of fish after 96 hours in 100 % effluent

36	Manganese (as Mn)	2 mg/l	2 mg/l	-	2 mg/l
37	Iron (as Fe)	3 mg/l	3 mg/l	-	3 mg/l
38	Vanadium (as V)	0.2 mg/l	0.2 mg/l	-	0.2 mg/l
39	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l
40	2 (***)	*	*	*	*

1. Schedule VI inserted by Rule 2 (d) of the Environment(Protection) Second Amendment Rules, 1993 notified vide G.S.R. 422 (E) dated 19.05.1993 published in the Gazette no. 174 dated 19.05.1993.

2. Omitted by Rule 2 (d)(i) of the Environment(Protection) Third Amendment Rules, 1993 vide Notification No. G.S.R. 801 (E), dated 31.12.1993.

3. Substituted by Rule 2 of the Environment(Protection) Amendment Rules, 1996 notified by G.S.R 176, dated 02.04.1996 may be read as BOD (3days at 270C) whenever BOD 05 days 200C occurred.

4. Besides these standards, refer EPA standards for specific industry Source (1):

<https://cpcb.nic.in/displaypdf.php?id=R2VuZXJhbFN0YW5kYXJkcy5wZGY=>

(2) [cpcb.nic.in/Industry\\_Specific\\_Standards.php](http://cpcb.nic.in/Industry_Specific_Standards.php)

# 859 Proof of Service

Manav Sewa Sansthan and anr vs Union Of India and Ors

Rahul Chaudhry <rahul@artlo.in>

149

Sat 2/3/2024 12:37 PM

To:litigation.life@gmail.com <litigation.life@gmail.com>;hk9548707@gmail.co <hk9548707@gmail.co>;info@uppcb.in <info@uppcb.in>

Cc:Himani Bhadauria <himani@artlo.in>;Prince <prince@artlo.in>

📎 1 attachments (15 MB)

MANAV SEWA SANTHAN RESPONSE R4.pdf;

Dear sir,

please find attached herewith the scanned copy of the Response alongwith annexures on behalf of Respondent No 4 i.e. Balrampur Chinni Mills Ltd, in OA No 912/2023 case titled as Manav Sewa Sansthan and anr vs Union Of India and Ors. pending before the Hon'ble National Green Tribunal, Principal Bench, New Delhi.

Rahul Choudhary

Clerk

ARTLO

email :rahul@artlo.in

website : [www.artlo.in](http://www.artlo.in)

NEW DELHI :

# A-25/12, Deodar Marg, DLF Phase 1, Gurgaon 122001, India

Mob : +91 9643014849

Tel : +91 124 6469005

Fax: +91 124 4210005

CHANDIGARH :

#844 , Sector-8 ,Panchkula-134109

Chamber No-19 ,New Bar Room ,

High Court Complex, Chandigarh

Tel: +91 172 2562681

Disclaimer : This e-mail is confidential. It may also be legally privileged.If you are not the addressee you may not copy, forward, disclose or use any part of it. If you have received this message in error, please delete it and all copies from your system and notify us at [artlo@artlo.in](mailto:artlo@artlo.in) or the sender immediately by return e-mail.