Report on Laxmi Taal, Jhansi in compliance of Hon'ble National Green Tribunal Order in Execution Application No. 38/2022 (in Original Application No. 165/2021) dated 10.10.2023

Hon'ble NGT wide order dated 03.01.2024 has given following directions:-

"7. Hence, Vice Chairman, Jhansi Municipal Corporation is directed to file further reports in terms of direction already issued and quoted above. Along with the report, water quality analysis report reflecting the quality of water in Laxmi Taal as well as treated effluents of 26 mld STP be also filed."

In compliance of Hon'ble NGT Order quoted above, a ten members committee headed by Divisional Forest Officer, Jhansi including Professors from Bundelkhand University (Water and Environment Experts), Geophysicist, Ground Water Department, Deputy Director, Fisheries Department, Chief Engineer, Jhansi Nagar Nigam, Executive Engineer, Irrigation Department, Executive Engineer, Jal Nigam and Nodal Head, Project Management Consultant of Jhansi Smart City Limited was constituted by District Magistrate, Jhansi.

The committee has produced a detailed report. They have studied the historical aspect of Laxmi Taal based a various research studies and reports about water balance, viz water recharge resource, ecological balance, water storage capacity and quality of water. The report consists of three major sections:-

- 1- Analysis of Laxmi Taal before restoration based on Technical Studies
- 2- Recommendations of Experts for improvement of Laxmi Taal based on their technical studies before restoration Project undertaken by the Smart City, Jhansi.
- 3- Analysis of DPR in line with the above recommendations and Physical Verification of Laxmi Taal and its outcomes.

It is submitted before Hon'ble NGT that as per committee report point 1.4 (page-8), water sources which contributes to Laxmi Taal surface water are as follows:-

- 1- Nala discharge contributes maximum is about 98.49% of total water capacity.
- 2- Precipitation contributes 1.49% whereas.
- 3- Surface water contributes only 0.02% of the total water storage capacity of the Laxmi Taal.

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Further with respect to boundary wall and pathway committee has given following observations in para 3.6 (page-21):-

"Looking at the data obtained from various studies as shown above, the surface runoff water constitutes only 0.02% of the total water recharge of Laxmi Taal. However, direct flow of surface runoff water in Laxmi Taal is susceptible to various contaminations and pollutants causing eutrophication and pollution of the water body. Expert studies have highlighted the need of tapping this surface runoff and treating it before its discharge in the water body. Therefore, an elevated boundary wall could prevent the direct inflow of surface water into the water body. Further, there is drainage system built around the periphery of Laxmi Taal and sloping pattern has been designed to collect water inflow around the periphery directly in the drainage system followed by treatment of collected water via STP before discharge. Also, there is no impact in the catchment area of Laxmi Taal. Moreover, this lake is now located in the posh area of the city where land cost is very high. Therefore, there is a very high probability of encroachment in the long run. Construction of the boundary wall will also prevent encroachment of this prime land. Further, pathways built around the ponds allow scope of community participation and developing it as a tourism spot. Since, the surface runoff is already tapped through drainage system without influencing catchment area; this pathway doesn't have any negative impact on the water body. Further, this recreational area will help public to take a walk around and appreciate the beauty of this lake and its eco-system. This community participation will increase the awareness about nature and its perseverance. Hence, after looking this entire project holistically, both boundary wall and pathways are in line with the recommendations of various experts in their studies and in the long-term sustainability of this project."

Also, regarding water quality the committee has given following observations as water quality as para 3.7 (page-22):-

"Water quality reports for the levels of Total Coliform and Fecal Coliform in water samples taken from Laxmi Taal and the Sewage Treatment Plant (STP) was obtained from UPPCB. Both the total and fecal coliform counts at the STP's input which are directly coming from the Nalas are noticeably high, with 260,000 MPN/100 ml and 140,000 MPN/100 ml, respectively. After treatment of the waste water, the output of the STP shows a significant reduction in total and fecal coliform levels, both the values were found to be below detective levels. The report has already been submitted by Nagar Nigam Jhansi before Hon'ble NGT which have been taken on record. In respect of surface water of Laxmi Taal, total and fecal coliform levels in the surface water of Laxmi Taal were measured at 14,000 MPN/100 ml and 7,000 MPN/100 ml, respectively as per UPPCB report dated 02nd Feb, 2024. It may be noted that as per CPCB Envis (2012) report the average fecal coliform in Laxmi Pond water

was recorded at 18000MPN/100ml which was much higher than the current level. Therefore, it is evident that after the Laxmi Taal renovation project has been undertaken, both BOD and fecal coliform levels of the surface water of Laxmi Taal have improved, however, the value is still on higher side. It is mainly because the water inside the Taal was highly polluted before the restoration project was undertaken. Now since, filtered water from STP is being discharged into the pond, the quality of water will improve over a period of time, once the volume of treated water in the Laxmi Taal increases. However, for achieving faster results, in-situ treatment methods of pond water may be adopted which may have considerable financial implications."

On religious structures, committee has given following observations in para 3.8 (page-22):-

"As per various studies quoted above, interaction with local people and observation of constructed religious structures it appears that these religious structures have co-existed along with Laxmi Taal for centuries together. Further it is also highlighted that out of approximate 33 ha area of Laxmi Taal, these structures have been built on a mere 350 m2 (0.035 ha approximate). Further, it would attract crowd which will indirectly promote community participation. Also, no negative ecological impacts were observed because of these structures on Laxmi Taal."

Therefore, in view of the above, it is humbly submitted that boundary wall is not impacting catchment area and pathway helps in promoting Laxmi Taal as a tourist spot.

It is further submitted that detailed analysis of the report has found that the project undertaken to renovate Laxmi Taal has drastically improved the surface water quality as well as ecology of the pond. Various photographs depicted in the report portrays the work done for renovation of Laxmi Taal.

Thus, in view of the above and detailed report of the committee, Hon'ble NGT may kindly be pleased to discharge the Execution Application No. 38/2022 (in Original Application No. 165/2021) dated 10.10.2023.

Enclosure.: As above.

(Satya Prakash) Municipal Commissioner Jhansi Municipal Corporation, Jhansi Committee Report on Laxmi Taal, Jhansi in compliance of Hon'ble National Green Tribunal Order in Execution Application No. 38/ 2022 IN (Original Application No. 165/2021) dated 10.10.2023

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CONTENTS

Abstract6
Section -1: Analysis of Laxmi Taal before its restoration on the basis of
various technical studies
1.1 Introduction of Laxmi Taal
1.2 Historical Significance of Laxmi Taal7
1.3 Surroundings of Laxmi Taal
1.4 Water balance of Laxmi Taal8
1.5 Water Quality status of Laxmi Taal9
1.6 Source of contamination
1.7 Siltation in Laxmi Taal
1.8 Ecology condition of Laxmi Taal10
Section-2: Recommendation of expert's based on various studies done
before restoration
2.1 Solutions suggested by experts for improving water quality of Laxmi Taal12
Section 3: Analysis of DPR and physical verification of Laxmi Taal &
its outcomes
3.1 Evaluation of DPR prepared by Smart City as per expert opinion14
3.2 Current Water Status of Laxmi Taal15
3.3 Current status of Flora and Fauna
3.4 Biological Analysis of Laxmi Taal
3.5 Fencing and hole in wall
3.6 Committee Recommendation on Elevated Boundary Wall and Pathways21
3.7 Post analysis of untreated water
3.8 Observation on Religious structures built in the vicinity of Laxmi Taal22
3.9 Conclusion

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LIST OF FIGURES

Figure 1: Graph of water recharge source distribution8
Figure 2: Photographs of Laxmi Taal before restoration
Figure 3: Drains around the Laxmi Taal for collecting runoff water from catchment area and connecting drains with SPS1 and SPS2
Figure 4: Current view of Laxmi Taal18
Figure 5: Presence of Migratory Birds at Laxmi Taal19
Figure 6: Fencing and 300mm x 230 mm hole in the wall20
Figure 7: Photograph of the pathway at Laxmi Taal21
Figure 8: Photographs of religious and historical monuments around Laxmi Taal25

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S

LIST OF TABLES

Table 1: Flow of discharged material through 6 Nalas into Laxmi Taal (liter/sec)10
Table 2: The result of the physicochemical properties of Laxmi Taal water sample16

ANNEXURE

Annexure 1: UPPCB Test Report for Inlet of STP	26
Annexure 2: UPPCB Test Report for Outlet of STP	27
Annexure 3: UPPCB Test Report for Surface Water of Laxmi Taal	28
Annexure 4: UPPCB Test Report for Surface Water of Laxmi Taal	29

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Abstract

Laxmi Taal has historically been central nervous system of water body for Jhansi city. It is a pond with 36 Ha of spread which acted like water reservoir for this city since historic time. This report aims to study the historical aspects of this pond from various studies and reports, its water balance viz water recharge sources, ecological balance, water storage capacity and quality of water. It also aims to study how over a period of time this water body got deteriorated over time both biologically as well as physically.

Further Smart City Jhansi has now renovated this project. So, analysis has also been done about this renovation project component, its outcomes and its impact on Laxmi Taal. This report contains following major sections:

- 1. Analysis of Laxmi Taal before restoration based on Technical Studies
- 2. Recommendations of Experts for improvement of Laxmi Taal based on their technical studies before restoration Project undertaken by the Smart City, Jhansi.
- 3. Analysis of DPR in line with the above recommendations and Physical Verification of Laxmi Taal and its outcomes.

Section-1: Analysis of Laxmi Taal before its restoration on the basis of various technical studies

1.1 Introduction of Laxmi Taal

Laxmi Taal is one of the oldest fresh water lakes in Jhansi. Laxmi Taal is a freshwater urban lake that is shallow and covers an area of around 0.162 km² in Jhansi. Laxmi Taal is located outside the city wall and faces Kaimasan Hill. Laxmi Taal is situated between longitudes 78°35'20" - 78°35'45"E and latitudes 25°27'20" - 25°27'50"N with a catchment area of 2370 hectares. It is a vital component of Jhansi city's historical, cultural, and recreational life, with temples around its whole perimeter. Laxmi Taal is 32.52 hectares in size and has an average depth of 2.5 meters (Pandey et al., 2019).

1.2 Historical Significance of Laxmi-Taal

Laxmi Taal is a lake located in Jhansi since ancient time. It was constructed in the early 1700s and served as the primary water supply for the thriving city. Laxmi Taal is a lake that holds great significance for the people of Jhansi, as legends abound about it. Nowadays people like to visit Laxmi Taal of Jhansi, although its condition was bad. There are historically important parks, monuments and temples around it.

On the shores of the lake, near the Lakshmi Gate, sits the Mahalakshmi temple. Additionally situated on the opposite end of Laxmi Taal is Narayan Bagh, a garden/park. Raja Gangadhar Rao's final ceremonies are said to have taken place here, close to the Laxmi Taal. The Raja Gangadhar Rao ki Chhatri's proximity to the Laxmi Taal can be explained by this. Since this lake has been associated with numerous monarchs and rulers who have ruled Jhansi since the beginning of time, it has enormous historical value (https://www.jhansionline.in/city-guide/lakshmi-tal-in-jhansi).

1.3 Surroundings of Laxmi Taal

The surroundings of Laxmi Taal in Jhansi are adorned with a rich tapestry of historical, religious, and cultural landmarks such as Hazarat Khaki Sah masjid, Atkhamba Mandir, Raja ki Samadhi, Radhagovind ki Bagiya and Narayan Bagh.

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1.4 Water balance of Laxmi Taal

Understanding the dynamics of water input and outflow, which have a direct impact on the sustainability and health of the pond, requires an understanding of the water balance of Laxmi Taal in Jhansi. Examining the different water input sources and water loss mechanisms will allow one to analyse Laxmi Taal's water balance. The complete data for calculation of discharge water in Laxmi Taal has been calculated with the help of published research papers (Panwar, 2008, Liansangpuii et al., 2022).

Originally three water recharge sources were available for Laxmi Taal:

- 1. Nala discharge (Untreated water): The primary source of water flow into Laxmi Taal was water coming out from nearby drains. About 16.528 MLD of untreated water entered the pond, bringing with it pollutants and contaminants from industrial, domestic and other sources.
- 2. **Precipitation:** Water flows into the pond through rainfall. Due to rainfall in 2007, about 0.25 MLD of water was accumulated in Laxmi Taal. Although this water is naturally occurring, it may carry atmospheric pollutants, emphasizing the importance of monitoring its quality.
- 3. **Surface runoff:** A small but notable contribution comes from surface runoff, with approximately 0.0027 MLD of water entering the pond in 2007. This runoff, originating from impervious surfaces, carries pollutants and increases overall water volume.

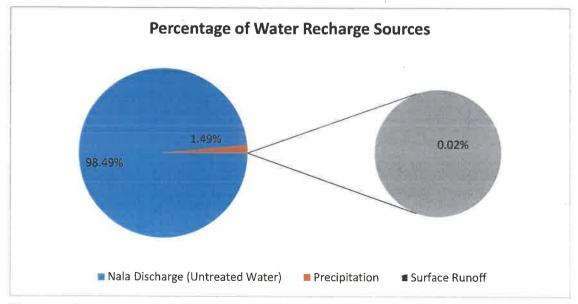


Figure 1: Graph of water recharge source distribution

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1.5 Water Quality status of Laxmi Taal

Water quality status refers to the overall condition or health of water in a particular environment. It is determined by analysing various physical, chemical, and biological characteristics of the water. These evaluations aid in determining if water is appropriate for its intended purposes, including drinking, recreation, farming, and the maintenance of aquatic life.

• BOD (Biological Oxygen Demand)

BOD stands for Biological Oxygen Demand. In simple terms, it is a measure of how much oxygen is needed by microorganisms (tiny living things) to break down organic matter in water. Many researchers have worked on the water quality of Laxmi Taal and have also shared their suggestions in their studies to improve the water quality of Laxmi Taal. Sandeep Arya et al., (2011) in their study recorded the highest value of BOD (9.8 mg/litre) while Sharma and Singh (2015) in their study recorded the average value of BOD as 52.4 mg/litre. Both the research findings indicate that the BOD value of water of Laxmi Tal was not within the permissible limits.

Fecal Coliform

Fecal coliform in water is a sign of possible fecal contamination since it implies the presence of potentially dangerous microbes linked to feces. Within the fecal coliform group, Escherichia coli (E. coli) is the most commonly used indicator. It is a bacterium that is found in large quantities in the intestines of humans and other animals. It is essential to monitor fecal coliform levels in water while evaluating its quality, particularly when determining whether or not it is acceptable to consume and engage in recreational activities. As per **CPCB Envis (2012)** report the average fecal coliform in Laxmi pond water was recorded at 18000MPN/100ml which was not within the permissible limits.

1.6 Source of contamination

Originally intended to be a rain feed tank, Laxmi Taal has been used for agricultural and municipal trash disposal for a few years now. Through the six Nalas—Laxmi gate Nala, Badagaon Nala, Bagla Nala, Kasai mandi Nala, Kubarau Nala, and Joshiygana Nala—a densely populated region of the city is making its way into Laxmi Taal. Sludge gathered from 19 places is dumped into the pond by these Nalas. The pond's water is extremely contaminated (Panwar, 2008). The flow rate from each of the six Nalas that were chosen to represent the volume of waste water released into Laxmi Taal from different sources is shown in Table 1:

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Table 1: Flow of discharged material through 6 Nalas into Laxmi Taal (liter/sec)

Sr. No.	Nalas	Flow LPS (Liter/sec)	
1	Kuberau Nala	32.2	
2	Kasai Mandi Nala	53.7	
3	Laxmigate Nala	40	
4	Joshiyana Nala	14.5	
5	Bangla Ghat Nala	22.3	
6	Budagaon Nala	28.6	

Source: Jal Nigam Jhansi, 2006, and Panwar, 2008

1.7 Siltation in Laxmi Taal

- -Siltation in Laxmi Taal, Jhansi, is likely caused by a combination of natural and human-induced factors. Siltation refers to the gradual accumulation of fine sediment, or silt, in a water body, leading to changes in water depth, reduced water quality, and potential ecological impacts. Here are several reasons for siltation in Laxmi Taal:
 - Soil erosion: Erosion from the surrounding catchment area, especially during heavy rainfall or storm events, can result in the transport of soil particles into Laxmi Taal. This is a natural process where water carries eroded soil into the pond.
 - Nala Discharge (Untreated water): The discharge of untreated water from nearby nalas into Laxmi Taal may contain a significant amount of sediments. This influx of sediment-laden water contributes to siltation over time.
 - Increased Impervious Surfaces: Urbanization and construction activities in the vicinity
 of Laxmi Taal can lead to the creation of impervious surfaces such as roads and
 pavements. This accelerates surface runoff, carrying sediments into the pond.

1.8 Ecology condition of Laxmi Taal

Weeds were well developed and caused eutrophication in Laxmi Taal (Sharma & Singh, 2016). Laxmi Taal was home to a variety of common biological growths, such as Cyperusrotundus, Cyperusalopecuroides, Ipomeaauatica (water spinach), Azolapinnata, Typhaangustifolia (cattail), Echhoriacrassipes (water hyacinth), and Spirodelasps. (duck weed). Because Narayan Bagh is located on the other side of Laxmi Taal, this location is known as a bird watching spot. In this Taal and surrounding area, it was common to see native and migratory birds (Panwar, 2008). Due to pollution of Laxmi Taal, a decline in the number of birds has been observed here.

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Figure 2: Photographs of Laxmi Taal before restoration.

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Section-2: Recommendation of expert's based on various studies done before restoration

2.1 Solutions suggested by experts for improving water quality of Laxmi Taal

Improving the water quality of Laxmi Taal in Jhansi requires a comprehensive approach that addresses various sources of contamination and promotes sustainable water management practices. While specific recommendations may vary based on detailed assessment, the following suggestions have been made by experts to improve the water quality of Laxmi Taal:

- Tap Nalas and discharge treated water only: There is a need to implement a comprehensive waste water management plan to utilize the drains that contribute maximum to the water level of Laxmi Taal. Treat the collected water effectively before releasing it into the pond. This approach ensures that only treated and purified water enters the water body, thereby reducing the impact of pollutants.
- Tap surface runoff: Investigate environmentally friendly ways to obtain surface water for Laxmi Taal. This could entail collecting rainfall, encouraging natural replenishment, and sensibly using surface water to keep the pond's water level steady. An ecologically sound surface water tapping system can support Laxmi Taal's ecosystem. If surface runoff goes directly into the pond there is a risk of eutrophication and other harmful pollutants that will affect the aquatic ecosystem. Therefore, surface water should first be collected through drains and then treated and discharged into the pond.
- Prevent encroachment: Take action to stop encroachment in the vicinity of Laxmi Taal.
 To safeguard buffer zones and the natural ecosystem, clearly define and enforce limits.
 This reduces the possibility of pollution from surrounding activity, protects the pond's ecosystem, and helps maintain the pond's integrity.
- **Develop it as tourism place:** Examine the possibilities for developing an environmentally friendly tourism sector near Laxmi Taal. To attract citizens, build attractive pathways, recreational areas, and informative signage. In addition to increasing the area's economic worth, responsible tourism can foster an understanding for Laxmi Taal's cultural and environmental significance.
- **Desiltation to improve storage capacity:** To increase the water storage capacity of Laxmi Taal, desilting projects should be initiated to remove the accumulated sediment. It improves stops the release of sediments rich in nutrients, improving water retention, lowering siltation, and maintaining higher water quality.

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• Bunds to prevent siltation rate: Laxmi Taal should have an embankment or bund built around it to slow down soil erosion and siltation. By acting as a physical barrier and lowering sediment movement, it maintains ecological balance and water quality.

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Section 3: Analysis of DPR and physical verification of Laxmi Taal & its outcomes

3.1 Evaluation of DPR prepared by Smart City as per expert opinion:

• Tapped all Nalas: As per experts' opinion, Jhansi Smart City tapped all the seven drains and connected them to the STP plant for treatment. After treatment, this treated water is released into Laxmi Taal. This approach is a major step in a suitable way to reduce the direct untreated water discharge into the pond from Kuberau Nala, Kasai Mandi Nala, Laxmigate Nala, Joshiyana Nala, Banglaghat Nala, Dhimaryana Nala, and Om Shanti Nagar Nala. The DPR shows initiative in tackling the main cause of pollution influencing the pond's water quality by directing these nalas via the sewage treatment plant. In accordance with best practices in wastewater management, these nalas have been redirected for treatment, guaranteeing that the water discharged into Laxmi Taal satisfies acceptable environmental criteria.

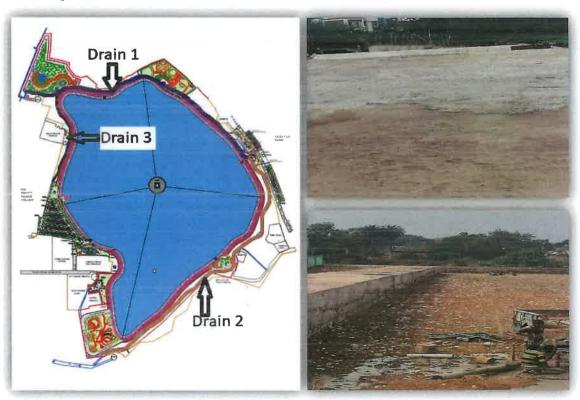


Figure 3: Drains around the Laxmi Taal for collecting runoff water from catchment area and connecting drains with SPS1 and SPS2

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Tapped surface runoff: The Jhansi Smart City shows a commitment to reducing any
pollution concerns connected with untreated water by capturing and treating runoff
before it enters the water body. This calculated detour is in line with best practices for
managing urban water resources and demonstrates an eco-friendly strategy aimed at
preserving the habitat and ecosystem of the pond without change in catchment area of
Laxmi Taal.

Bunds are built around water bodies to prevent other contaminants from entering water bodies by surface runoff. These Bunds act as effective barriers, reducing the flow of sediment and pollutants into the pond. This strategy is in line with sustainable environmental practices, aimed at preserving water quality and enhancing the storage capacity of Laxmi Taal.

- Stopped encroachment: It is noteworthy that a boundary wall has been built around the entire pond area as it deals with the important issue of protecting the water body from inappropriate land use. This action not only physically prevents encroachment but also reaffirms the dedication towards preserving the ecological purity of Laxmi Taal.
- Desilting work done to improve storage capacity: The water storage capacity before the desilting process was measured at 569220.37 m³. After desilting work, its capacity has increased to 1727000 m³. This incredible increase shows how well the desilting project reduces problems associated with sedimentation by enabling the pond to hold much larger amounts of water. The desilting operation also removed water hyacinth which is responsible for disturbance in the aquatic ecosystem. Enhancing Laxmi Taal's water quality, ecological health, and general sustainability is in line with the goal of the DPR's effective implementation.
- **Developed as a tourist destination:** Pathways are constructed around the water bodies, on which the public as well as tourists could roam in the morning and evening. The central island with the statue of Rani Lakshmi Bai has been constructed to give it historical importance and to increase public sentiment for its conservation.

3.2 Current Water Status of Laxmi Taal

There has been no disturbance to the catchment area and even after completion of the project the catchment area is 2370 hectares. During the entire project, 5738.26 m³ of silt has been cleaned, increasing the storage capacity of Laxmi Taal to 1727000 m³. Various physicochemical parameters were analysed to determine the water quality status of Laxmi Taal. The results of physicochemical properties are shown in the *Table 2*. All the water samples were analysed at the

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UPPCB laboratory. In the present investigation the BOD value was recorded at 4.5 mg/l, whereas in the previous study it was observed at 37 mg/l (CPCB Envis, 2012). The results concluded that the BOD levels in the water samples were found to be close to the water quality norms set by CPCB but it met the WHO standards.

Similarly, total and fecal coliform levels in the surface water of Laxmi Taal were measured at 14,000 MPN/100 ml and 7,000 MPN/100 ml, respectively as per UPPCB report dated 02nd Feb, 2024. It may be noted that as per CPCB Envis (2012) report the average fecal coliform in Laxmi Pond water was recorded at 18000MPN/100ml which was much higher than the current level. Therefore, it is evident that after the Laxmi Taal renovation project has been undertaken, both BOD and fecal coliform levels of the surface water of Laxmi Taal have improved, however, the value is still on higher side. It is mainly because the water inside the Taal was highly polluted before restoration project was undertaken. Now, since, filtered water from STP is being discharged into the pond, the quality of water will improve over a period of time, once the volume of treated water in the Laxmi Taal increases.

Table 2: The result of the physicochemical properties of Laxmi Taal water sample.

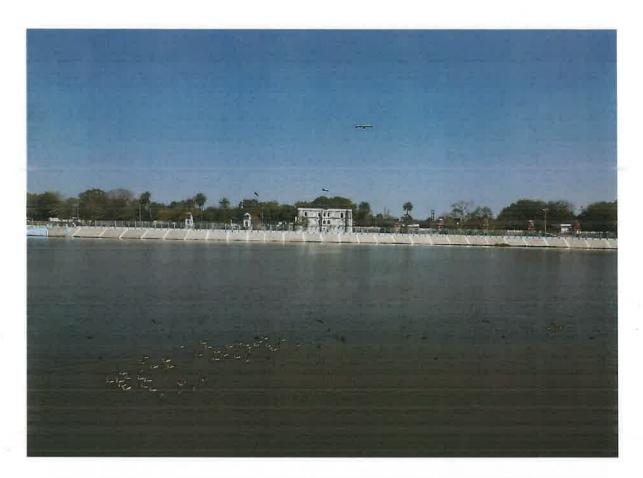
Parameters	Unit	As per CPCB	Surface Water	Water Quality	WHO
		Envis 2012	Current Result	Criteria	Drinking
		report	as per UPPCB		water
					Standard
BOD	mg/l	37	4.5	<3 mg/l	6 mg/l
Fecal	MPN/100 ml	18000	7000	<2500 MPN/100	(20)
coliform				ml	
Total	MPN/100 ml	70250	14000	<5000 MPN/100	<u> </u>
coliform				ml	

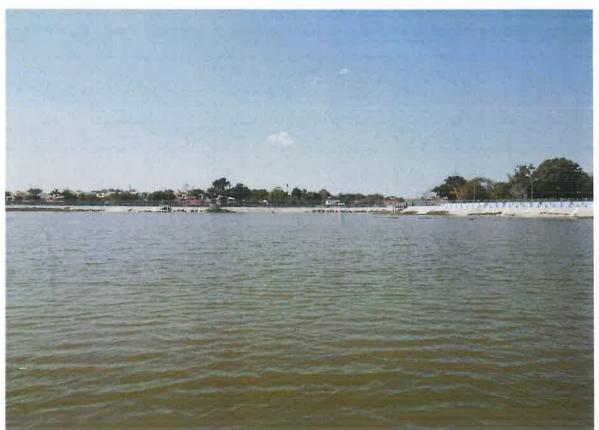


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Figure 4: Current view of Laxmi Taal

3.3 Current status of Flora and Fauna

The pond's water quality has improved significantly as a result of the restoration efforts, and the overall rate of eutrophication has decreased. A key factor in preserving a cleaner aquatic ecosystem has been the total stoppage of untreated water flow into the pond, with only treated water being released for water balance and replenishment. This has led to a decrease in the levels of Biological Oxygen Demand (BOD) and an increase in the levels of Dissolved Oxygen (DO), which has improved the habitat for aquatic life.

Furthermore, Laxmi Taal's biodiversity has benefited from the decline in pollution levels. Due to the contaminated water, migratory birds and native species that had previously vanished have begun to return in search of food. The return of avian life to the area is a strong sign of the area's ecological recovery and shows how well the restoration efforts have done in making Laxmi Taal a more pleasant and sustainable environment for the flora and wildlife.

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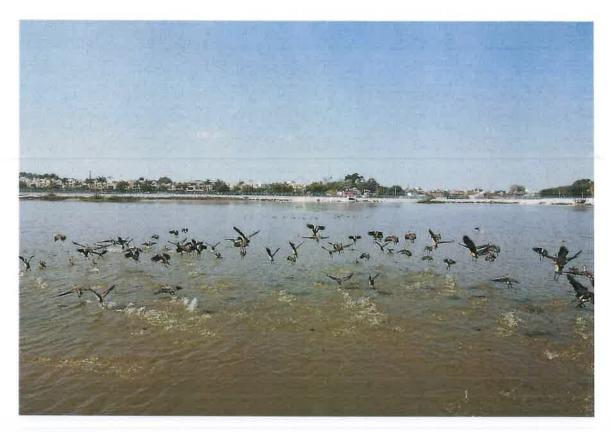




Figure 5: Presence of Migratory Birds at Laxmi Taal

3.4 Biological analysis of Laxmi Taal

According to Laxmi Taal's biological analysis, restoration activities appear to be developing effectively. An encouraging reaction to better water quality is shown by the variety of algae and phytoplankton that are present in the pond. An intact aquatic environment is indicated by the presence of macroinvertebrates and a variety of fish species, which shows how the restoration has improved biodiversity. The complexity of the habitat is increased when aquatic plants are present. Notably, the pond's natural balance has been restored, indicating better circumstances for bird life, as seen by the return of native birds and several migratory species. Overall, the biological markers, which include the varied fauna and flora, point to Laxmi Taal's good trajectory and demonstrate how restoration efforts have been successful in reviving this body of water after it had previously faced environmental difficulties.

3.5 Fencing and hole in wall

In order to protect Laxmi Taal from the entry of undesired pollutants, the decision was made to construct fencing and drill holes in the wall surrounding the pond. By serving as a physical barrier, the fencing restricts people from throwing trash and other contaminants into the pond. Though, sloping pattern has been made in such a way that the surface water first flows down to the drain and after filtration it is discharged in to the pond. However, additional holes measuring 300 mm x 230 mm, made every 40 metres have been made so that water flowing from walking track portion may directly go to Laxmi Taal through controlled wired mesh. The project intends to maintain the pond's water quality and ecological integrity by combining the protective barrier of the fencing with well-placed holes, thus aiding in the sustainable and healthful management of Laxmi Taal.



Figure 6: Fencing and 300mm x 230 mm hole in the wall

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3.6 Committee recommendation on elevated boundary wall and pathways:

Looking at the data obtained from various studies as shown above, the surface runoff water constitutes only 0.02% of the total water recharge of Laxmi Taal. However, direct flow of surface runoff water in Laxmi Taal is susceptible to various contaminations and pollutants causing eutrophication and pollution of the water body. Expert studies have highlighted the need of tapping this surface runoff and treating it before its discharge in the water body. Therefore, an elevated boundary wall could prevent the direct inflow of surface water into the water body. Further, there is drainage system built around the periphery of Laxmi Taal and sloping pattern has been designed to collect water inflow around the periphery directly in the drainage system followed by treatment of collected water via STP before discharge. Also, there is no impact in the catchment area of Laxmi Taal. Moreover, this lake is now located in the posh area of the city where land cost is very high. Therefore, there is a very high probability of encroachment in the long run. Construction of the boundary wall will also prevent encroachment of this prime land.

Further, pathways built around the ponds allow scope of community participation and developing it as a tourism spot. Since, the surface runoff is already tapped through drainage system without influencing catchment area; this pathway doesn't have any negative impact on the water body. Further, this recreational area will help public to take a walk around and appreciate the beauty of this lake and its eco-system. This community participation will increase the awareness about nature and its perseverance. Hence, after looking this entire project holistically, both boundary wall and pathways are in line with the recommendations of various experts in their studies and in the long-term sustainability of this project.



Figure 7: Photograph of the pathway at Laxmi Taal

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3.7 Post analysis of untreated water

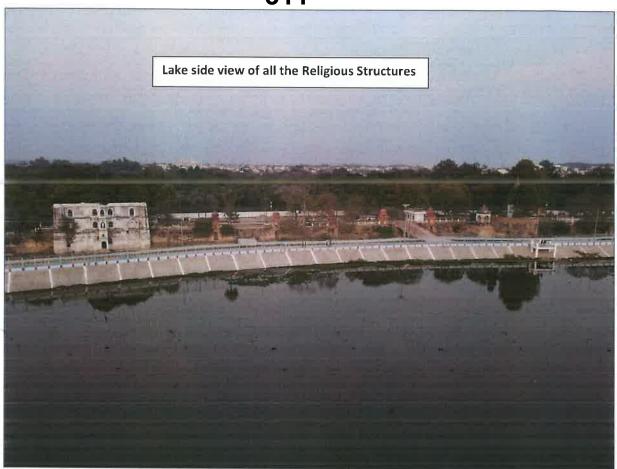
Water quality reports for the levels of Total Coliform and Fecal Coliform in water samples taken from Laxmi Taal and the Sewage Treatment Plant (STP) was obtained from UPPCB. Both the total and fecal coliform counts at the STP's input which are directly coming from the Nalas are noticeably high, with 260,000 MPN/100 ml and 140,000 MPN/100 ml, respectively.

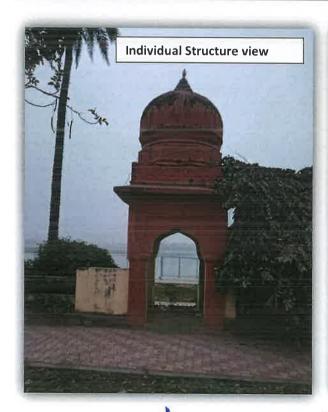
After treatment of the waste water, the output of the STP shows a significant reduction in total and fecal coliform levels, both the values were found to be below detective levels. The report has already been submitted by Nagar Nigam Jhansi before Hon'ble NGT which have been taken on record.

In respect of surface water of Laxmi Taal, total and fecal coliform levels in the surface water of Laxmi Taal were measured at 14,000 MPN/100 ml and 7,000 MPN/100 ml, respectively as per UPPCB report dated 02nd Feb, 2024. It may be noted that as per CPCB Envis (2012) report the average fecal coliform in Laxmi Pond water was recorded at 18000MPN/100ml which was much higher than the current level. Therefore, it is evident that after the Laxmi Taal renovation project has been undertaken, both BOD and fecal coliform levels of the surface water of Laxmi Taal have improved, however, the value is still on higher side. It is mainly because the water inside the Taal was highly polluted before the restoration project was undertaken. Now since, filtered water from STP is being discharged into the pond, the quality of water will improve over a period of time, once the volume of treated water in the Laxmi Taal increases. However, for achieving faster results, in-situ treatment methods of pond water may be adopted which may have considerable financial implications.

3.8 Observation on Religious structures built in the vicinity of Laxmi Taal

As per various studies quoted above, interaction with local people and observation of constructed religious structures it appears that these religious structures have co-existed along with Laxmi Taal for centuries together. Further it is also highlighted that out of approximate 33 ha area of Laxmi Taal, these structures have been built on a mere 350 m² (0.035 ha approximate). Further, it would attract crowd which will indirectly promote community participation. Also, no negative ecological impacts were observed because of these structures on Laxmi Taal.





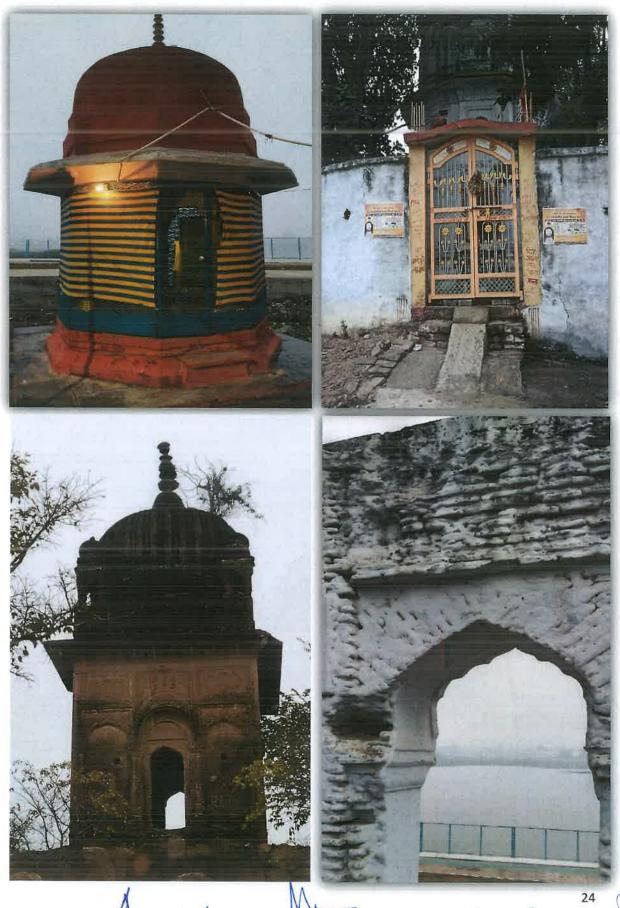


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Figure 8: Photographs of religious and historical monuments around Laxmi Taal

3.9 Conclusion

Laxmi Taal restoration and management have advanced significantly as a result of the current project, highlighting the significance of sustainable approaches for conserving water ecosystems. The improvement of Laxmi Taal's water quality and ecological health has been attributed to the implementation of various measures, including desiltation, bund construction, tapping nalas for treated water discharge, and tourism development. The reduction in eutrophication, the discontinuation of untreated water release, and the subsequent decrease in BOD levels reflect positive outcomes from these efforts. The successful reintroduction of both native and migratory birds also represents the restoration of this important ecosystem. Even though the initiative has been a great success, community involvement and sustained monitoring are essential to Laxmi Taal's survival. This project emphasises the need of cooperative efforts to protect priceless water bodies for present and future generations, serving as a model for holistic water management.

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Annexure 1:



REGIONAL LABORATORY KANPUR UTTAR PRADESH POLLUTION CONTROL BOARD

5243,Sadbhavana nagar,Awas vikas phase-3,Kalyanpur,Kanpur-17

TEST REPORT: WASTE WATER LABORATORY

Ref No: 24549993/Kanpur Nagar/2024

Date:02/02/2024

- 1- Name of Industry: 26 MLD STP Laxmi tal, Narayan Bagh Road, Jhansi
- 2- Address of Industry: Narayan Bagh Road, Jhansi
- 3- District: Jhansi
- 4- Description about sampling point: Inlet of STP
- 5- Type of Sample (Grab/Composite/Integrated): Grab
- 6- Sample Collected By: Rishi Kumar Kushwaha LA & NA NA
- 7- Colour and Odour: Black Foul smell
- 8- Quantity and Packing: MPN Bottel
- 9- Date of Sample Collection: 23/01/2024
- 10- Analyis Indented by: RO Jhansi
- 11- Date of sample receipt in Lab: 23/01/2024

Parameter/Method Name	Unit	Results	Standard	Detection Range
Total Coliform, APHA 9221 24th Ed. : 2023	MPN/100 ml	260000	76	<1.8 MPN/100 ml & above
Fecal Coliform, 9221 E Fecal Coliform Procedure	MPN/100 ml	140000	66	<1.8 MPN/100 ml & above

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. Besides these standards, refer EPA standards for specific purpose

*Non-NABL Parameters.

Note: 1 The results in the Test Report relate only to the nemts 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-[Jyotima Gautam(JRF)]

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Annexure 2:

Regional Laboratory

Regional Laboratory

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U.P. POLLUTION CONTROL BOARD

AVAS VIKAS COLONY (TALPURA YOJNA) KANPUR ROAD, JUANSI

ANALYSIS REPORT

Name of Effluent Generator Institute (26 MLD S1P of Laxmi Tal, Jhausi.
 Name of S1P Representative (Mr. Dhamweer Singh(Supervisor).

2. Name of STF received 3. Sample collected by

: A K Sharma(SA)& Arun Kumur Mishra(ASO)

4 Date of Sample Collection

: 05/10/2023

5. Sampling Point

: Outlet of STP(4 MLD) after sand and charcoal

filtration)

6 Sample Method

: Cirab

<u>S.N.</u>		Value	Standard Limit as per MoEF and CC Notification October 2017
2	Colour	Colourless	All efforts should be made to
	Odour	Odourless	remove colour and unpleasant odour as far as practicable.
3.	rii	7.60	0,5.00
4	Biochemical Oxygen Demand (B O D 130 c)	4.00	
5.	Chemical Oxygen Demand	10.00	30 mg/1
6	Total Suspended Solid	BDI	
7,	Intal Dissolved Solid	673.00	<100 mg/l
S.	Faccal Coliform (MPN Index/100 ml)	BDL	
91	Iotal Coliform (MPN Index 100 ml)	BDL	<1000
lyzed	By:	1000	-

Assistant Selentific Officer

Regional Officer

Annexure 3:



REGIONAL LABORATORY KANPUR UTTAR PRADESH POLLUTION CONTROL BOARD

5243,Sadbhavana nagar,Awas vikas phase-3,Kalyanpur,Kanpur-17

TEST REPORT: WATER LABORATORY(SURFACE WATER)

Ref no-24549983/Kanpur Nagar/2024

1- Sample Location: Laxmi Pond

2- District: Jhansi

3- Address: Near Narayan Bagh Jhansi

4- Sample Source: Pond

5- Type of sample : Surface Water

6- Sample Collected By : Rishi Kumar Kushwaha , LA

7- Odour: None

8- Quantity and Packing: MPN Bottel
9- Date of Sample Collection: 23/01/2024
10- Analyis Indented by: RO Kanpur Nagar

11- Date of sample receipt in Lab: 23/01/2024

Parameter	Unit	Results	Detection Range
Total Coliform, APHA 9221 24th Ed.: 2023	MPN/100 ml	14000	<1.8 MPN/100 ml d
Facal Colifionn, APHA 9221 24th Ed.: 2023	MPN/100 ml	7000	<1.8 MPN/100 ml &

*Non-MABL Pagameters

Note: 1 The condits 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 inhomatory. 3. The long committees to the annual as concluded in Eath.

Remark: + - NA

Analysed by [Jyotima Gautam(JRF)]

Authorized by
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YOGENDHA
KUMAR DWIVEDI
One: PRANTICE ISSUE
Yogendra Kr Dwivedi (SA)

Date:02/02/2024

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Annexure 4:



REGIONAL LABORATORY JHANSI UTTAR PRADESH POLLUTION CONTROL BOARD

Avas Vikas Colony, Talpura Yojna, Kanpur Road, Jhansi

TEST REPORT: WATER LABORATORY(SURFACE WATER) Date:05/02/2024

Ref no-24274811/Jhansi/2024

1- Sample Location: Laxmi Pond

2- District: Jhansi

3- Address: Near Narayan Bagh Jhansi

4- Sample Source: Pond

5- Type of sample : Surface Water

6- Sample Collected By : Abhishek Kumar, LA

7- Odour: None

8- Quantity and Packing: 2 Litre Plastic Jerian, BOD Bottle

9- Date of Sample Collection: 04/01/2024

10- Analyis Indented by : RO Jhansi

11- Date of sample receipt in Lab: 04/01/2024

we construct was	Unit	Results	Detection Range
Parameter	Onic	7.19	02-12
pH, APHA24th Ed.4500-B: 2023	(*)	20	1-500NTU
Turbidity, APHA24th Ed 2130B	N.T.U		5-10000 Hazen
Colour, APHA 24th Ed. 2120B: 2023	Hazen	Colorless	
Conductivity, APHA 24th Ed. 2510B :2023	μS/cm	941	0.1-10000 μS/cm
Suspended Solids , APHA 24th Ed. 2540 D Total Suspended Solids dried at 103-105 °C 2023	mg/l	64.00	5.0 -10000 mg/l
Dissolved Solids, APHA 24th Ed. 2540 °C Total Dissolved Solids dried at 180 °C 2023	mg/l	689.00	5.0 -10000 mg/l
	mg/l	753.00	5.0 -15000 mg/l
Total Solids, APHA24th Ed2540B: 2023 Hardness, APHA 24th Ed. 2340 °C EDTA	mg/l	282.0	10.0 -5000 mg/l
Titrimetric Method 2023	mg/l	180.0	10.0 -1000 mg/l
Calcium, APHA 24th Ed. 3500Ca-B:2023	mg/l	102.0	10-1000 mg/l
Magnesium, APHA 24th Ed 3500Mg B: 2023		35.0	3.0 - 500 mg/l
Chloride, APHA24th Ed 4500-Cl- B: 2023	mg/l	72.0	20-5000 mg/l
Alkalinity, APHA 24th Ed. 2320:2023	mg/l	4.5	
BOD, APHA 24th Ed. 3 day 27 °C IS 3025 (Part 44): 1993 Bio 2023	mg/l		1.0 -1000 mg/l
COD, APHA 24th Ed. 5220 B Open Reflux	mg/l	11.52	4.0 -1000 mg/l
Method 2023	mg/l	6.6	0.2-14.0 mg/l
D.O., APHA 24th Ed. 4500-OB Iodometric Method 2023	i)	14.0	4 - 70 °C
Temp, APHA 2550 B (2-74) 24th Edition 2023, Laboratory and field Methods	°C		7-70 C

Note: I 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

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• https://cpcb.nic.in/water-quality-criteria/

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झाँसी नगर निगम, झाँसी कार्यालय नगर आयुक्त, झाँसी

स्वच्छ झाँसी।

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संख्या 4811

/पी०ए० / न०आ० / न०नि० / 2023-24

दिनांकः ।

12/01/,2024

कार्यालय ज्ञाप

कृपया मा० एन०जी०टी० में प्रचलित वाद संख्या 38/2022 (मूल वाद संख्या 165/2021) में दिनांक 10.10.2023 को प्रस्तर संख्या 07 में निम्न आदेश पारित किया गया है "The report also contains photograph of Laxmi Tal taken at the time of spot inspection which reveals that an elevates boundary wall to support the steel fencing surrounding Laxmi Tal has been constructed. The same is likely to effect the catchment area into the Tal and may have adverse effect on the survival of the Tal. Therefore, the Commissioner, Municipal Corporation, Jhansi is directed to submit the report in respect of the construction of the elevated boundary wall and path way surrounding the buffer zone Laxmi Tal and its likely adverse effect on the Tal or expected benefits thereform."

उक्त आदेश के अनुपालन में जिलाधिकारी महोदय के आदेश दिनांक 12.01.2024 के द्वारा निम्न

प्रकार समिति का गठन किया गया है:-

1. श्री एम0पी0 गौतम, प्रभागीय वनाधिकारी, झाँसी — अध्यक्ष

2. श्री एस०के० सिंह, मुख्य अभियंता, नगर निगम, झाँसी। (संयोजक-सदस्य)

3. श्री उमेश कुमार, अधिशासी अभियंता, सिचाँई विभाग, झाँसी। (सदस्य)

4. श्री मुकेश पाल, अधिशासी अभियंता, जल निगम, झाँसी। (सदस्य)

5. श्री ज्ञानेन्द्र सिंह, उप निदेशक मत्स्य, झाँसी। (सदस्य)

6. श्री के0बी0 सिंह, नोडल हेड PMC, JSCL (सदस्य)

7. श्री मनोज कुमार कनौजिया सहायक भू-भौतिकीविद, झाँसी। (सदस्य)

8. प्रो० एस०पी० सिंह जल विज्ञानी, बुन्देलखण्ड विश्वविद्यालय झाँसी। (सदस्य)

9. प्रो० एम०एम० सिंह जल विज्ञानी, बुन्देलखण्ड विश्वविद्यालय झाँसी। (सदस्य)

10. डा० विनीत कुमार पर्यावरण विज्ञान, बुन्देलखण्ड विश्वविद्यालय झाँसी। (सदस्य)

उक्त समिति प्रचलित वाद से सम्बन्धित प्रकरण पर मा० एन०जी०टी० के आदेश के अनुरूप अध्ययन कर तथा तद्नुरूप आवश्यक कार्यवाही कर तीन सप्ताह में अपनी आख्या अधोहस्ताक्षरी को प्रस्तुत करेगीं।

> नगर आयुक्त अङ्ग्राँसी नगर निगम, झाँसी

पृष्ठांकन दिनांक तदैव। प्रतिलिपि:-

1. कुलपति महोदय, बु०वि०, झाँसी को सूचनार्थ प्रेषित।

2. जिलाधिकारी महोदय के आदेश दिनांक 12.01.2024 के क्रम में सादर सूचनार्थ प्रेषित।

3. अपर नगर आयुक्त को आवश्यक कार्यवाही हेतु प्रेषित।

4. सम्बन्धित गठित समिति के सदस्यों को अनुपालनार्थ प्रेषित।

नगर आयुक्त झाँसी नगर निगम, झाँसी हरित झाँसी।



झाँसी नगर निगम, झाँसी कार्यालय नगर आयुक्त, झाँसी OFFICE OF THE MUNICIPAL COMMISSIONER, JHANSI

स्वच्छ झाँसी।

e-mail: nagarayukta@jnnjhansi.com

Office Contact No:0510-2332097

पी०ए० /(वन०आ० / न०नि० / 2023-24 संख्या ६५०१

दिनांक: 03/02/,2024

्रश्री संजय कुमार मल्ल प्रभागीय वनाधिकारी, झाँसी

मा० एन०जी०टी० में प्रचलित वाद संख्या 38/2022 (मूल वाद संख्या 165/2021) के प्रस्तर संख्या 07 के अनुपालन में जिलाधिकारी महोदय के आदेश दिनांक 12.01.2024 के द्वारा प्रभागीय वनाधिकारी की अध्यक्षता में 10 सदस्यीय समिति का गठन किया गया था जो लक्ष्मीताल का अध्ययन कर रही है।

वर्तमान में दिनांक 31.01.2024 को श्री एम0पी0गौतम प्रभागीय वनाधिकारी के सेवानिवृत्त के के उपरान्त आपके द्वारा आपके प्रभागीय वनाधिकारी का पदभार ग्रहण किया गया है।

अतः उक्त समिति के अध्यक्ष के रूप में लक्ष्मीताल की अध्ययन रिपोर्ट पूर्ण कराते हुये ससमय आख्या उपलब्ध कराने का कष्ट करें।

झाँसी नगर निगम, झाँसी

पृष्ठाकंन दिनांक तदैव। प्रतिलिपि:--

- अ जिलाधिकारी महोदय को सादर सूचनार्थ प्रेषित।
 - 2 अपर नगर आयुक्त को आवश्यक कार्यवाही हेत् प्रेषित।

नगर आयुक्त झाँसी नगर निगम, झाँसी

स्वच्छ झॉसी।



झाँसी नगर निगम, झाँसी कार्यालय नगर आयुक्त, झाँसी



OFFICE OF THE MUNICIPAL COMMISSIONER, JHANSI

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754 / पी०ए० / न०आ० / न०नि० / 2023-24 संख्या

दिनांक: 24 / 02 / 2024

प्रेषक.

नगर आयुक्त

नगर निगम, झाँसी।

सेवा में.

अपर निदेशक.

क्षेत्रीय नगर एवं पर्यावरण अध्ययन केन्द्र,

लखनऊ उ०प्र०।

नगर निगम झाँसी सीमान्तर्गत स्थित लक्ष्मीताल, बिजौली तालाब एवं पानीवाली धर्मशाला की विषय:--सफाई से सम्बन्धित DPR एवं RFP तैयार किये जाने के सम्बन्ध में।

महोदय.

कृपया उपर्युक्त विषयक अपने पत्र संख्या - URC/1286/-124/2023--24 दिनांक 18.10. 2023 का सन्दर्भ ग्रहण करने का कष्ट करें। इस सम्बन्ध में अवगत कराना है कि लक्ष्मीताल में डिसिल्टेशन एवं सौंदर्यीकरण का कार्य कराया जा चुका है। वर्तमान में लक्ष्मीताल में मात्र जल की गुणवत्ता को मानक के अनुरूप बनाये रखने हेतु DPR आपेक्षित है। उल्लेखनीय है कि उक्त कार्य हेतु आपको पूर्व में ही धनराशि निर्गत की जा चुकी है।

अतः अनुरोध है कि झाँसी के पर्यावरणीय पारिस्थितक तंत्र के लिये सर्वाधिक महत्वपूर्ण एवं संवेदनशील लक्ष्मीताल के सम्बन्ध में अतिशीघ्र कार्यवाही कर अवगत कराने का कष्ट करें।

ब्ये, झॉसी नगर निगम, झॉसी।

पृष्टांकन दिनांक तदैव। प्रतिलिपि :--

1. अपर नगर आयुक्त को आवश्यक कार्यवाही हेतु।

2. नगर स्वास्थ्य अधिकारी को आवश्यक कार्यवाही हेत्।