BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

ORIGINAL APPLICATION NO. 211OF 2024

IN THE MATTER OF:

Suo Motu ...Applicant(s)

VS

Telangana State Pollution Control Board,
Through its Member Secretary Hyderabad,
Telangana and Ors ....Respondent(s)

REPORT FILED BY THE 2ND RESPONDENT – FOREST DEPARTMENT

Place: Chennai

Date: 14.02.2025

Mrs. H. Yasmeen Ali,
Counsel for the 2nd Respondent.

BRIEF NOTE ON HON'BLE NATIONAL GREEN TRIBUNAL, SOUTHERN ZONE, CHENNAI IN CASE NO.558 OF 2024

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The Hon'ble NGT, Delhi has ordered Suo Motu on News item titled "Hyderabad Zoo Gets contaminated Water from Mir Alam Says Chief Wildlife Warden" appeared in Deccan Chronicle dated 14/4/2024 vide O.A.No.558 of 2024.

In this context the facts of the case are submitted as hereunder;

In the Nehru Zoological Park, Hyderabad the drinking and utilization water to the Wild Animals is being provided with the Municipal water from Hyderabad Metropolitan Waterworks & Sewerage Board, Hyderabad. There are (3) No. of Commercial water supply connections through which the filtered water from HMW&SB, Hyderabad are provided to the animals in the Zoo.

The details are;

S.No.	HMW&SB Water Service No.	Category of Water	Quantity of Water	Amount (2023-24)
1	144601011146801	Filter Water	68557 KL	1,05,05,076
	144601011102670			
2	144601022244010	Raw Water		

2019-20		2020-21		2021-22		2022-23	
Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount
79038 KL	13124728	60233 KL	11119057	65510 KL	10540653	54375 KL	11297873

Apart from the above water source, (26) Nos. of Water Bore-wells are available at different locations in the Nehru Zoological Park, Hyderabad for regular use to the Animals upkeep and maintenance.

For the visitors in the Nehru Zoological Park, Hyderabad (12) Nos. water filter plants are installed in through which Drinking Water is provided daily and these are maintained regularly.

It is pertinent to submit that, water from Mir-Alam Tank adjoining to the Nehru Zoological Park, Hyderabad which is found to be contaminated is not utilized for any purpose related to animals in the Nehru Zoological Park, Hyderabad. It is fact that, the water in Mir-Alam Tank is contaminated due to urbanization and high population density upstream of the tank and lot of sewage is let in the Mir Alam Tank.

Due to earlier reports a joint inspection of officials from Forest Department, GHMC and HMWSSB was taken up on 21/10/2017. During the inspection the officials found some key issues of utmost importance to be attended on priority are as follows;

1. Regulation of the quantity of water entering the NZP from Mir-Alam Tank and improving the water quality entering the NZP from Mir-Alam Tank

2. Maintenance of the arched bunds of the Mir-Alam Tank by way of arresting seepage by grouting and clear of the vegetation on the bund at all times.
3. Providing Treated Water to Nehru Zoological Park
4. Providing Sewage Disposal Facility to Nehru Zoological Park

The Curator vide Rc.No.1843/2009/AE/WS, dt: 24/09/2016, dt:28/12/2016 & dt:15/3/2017 has addressed the Commissioner, Greater Hyderabad Municipal Corporation, Hyderabad regarding taking up important works to take up the repairs to the leakage in Mir-Alam Tank and removal of weeds and silt and to construct an alternative outlet from Mir-Alam Tank in addition to the existing one etc.,

Vide letter dated 24/9/2016 the Curator has addressed the Commission, GHMC that due to heavy rainfall Arch Dam of Mir-Alam Tank arch dam is constructed during Nizam's period was dangerously overflowing which may result in flooding and submerging the Safari Park, animal enclosures, pathways, roads with water and ultimately the Nehru Zoological Park campus, which is situated on the lower side of the Mir-Alam Tank. Due to above problem, the Safari was closed from 01.09.2016 and Zoo was also closed for two days as the moats and enclosures of the animals were filled up due to this water coming through seepage and overflowing of tank. As the water coming from Mir-Alam Tank is polluted and also brings lot of garbage and dirt, the chances of animals getting infected and visitors were also facing lot of inconvenience and infection when such water was overflowing in the Zoo roads / pathways.

The Prl. Chief Conservator of Forests (HoFF), Telangana along with Prl. Chief Conservator of Forests (WL), and Chief Wildlife Warden, Telangana State visited the Zoo on 15.9.2016 to inspect the water situation on 16.9.2016, Hon'ble Minister for EFS&T, Telangana State and instructed authorities to do the needful which can be done by Nehru Zoological Park and also promised to take up the matter with the other concerned departments with regard to the Mir-Alam Tank anicut repairs to arrest seepage, to find alternative way for water outlets and also regarding removal of the weeds and silt which have covered large area of the Mir-Alam Tank.

Therefore the GHMC authorities were requested to take action in this regard and issue instruction to the concerned to take up repairs to plug the leakage in MirAlam tank and removal of weeds and silt and if possible to find an alternative outlet from Mir-Alam Tank in addition to the existing one, so that disasters which can occur due to the above situation can be prevented in future and the wild animals and people living in the Nehru Zoological Park and down below Mir-Alam Tank can be safe.

enclosed area

During this period, the animals were kept in the kraals and night house causing loss of revenue to a tune of Rs. 7 to 8 lakhs which could used for maintenance of Zoo. In this period of closure the visitors could not get an opportunity to see the animals in safari which is an attraction of Nehru Zoological Park.

It has been informed that the Nehru Zoological Park, Hyderabad is having wild animals of all kinds which are exhibited in the public during the day time and in case of sudden heavy flooding, it will be dangerous to the animals as well as to the people as there are habitations all around the Zoo. Therefore, there is a need to have few other outlets on the other side of the Mir-Alam Tank for the excess water flow in order to prevent the risk of overflow of water into the Zoo.

Vide letter dated 15/3/2017, it was informed by the Curator to the Commissioner, GHMC bringing all the facts again that the Mir-Alam Tank arch dam dangerously overflowed during the rainy season 2016, which resulted into flooding and submerging of parts of the Safari Park, pathways and safari park was closed for about two months due to flooding of the water and constant flowing of water through safari and on the road at the safari entry.

The Curator vide Rc.No.1843/2009/AE/WS, dt:27/5/2019 has addressed the CEO/Project Director, Musi River Development Authority, Telangana, Hyderabad informing that the Nehru Zoological Park, Hyderabad abutting to the Mir-Alam Lake is spread over an area of 380 acres. Large number of animals and several endangered species, both native and exotic are housed.

The water from the surplus weir of the Mir-Alam Lake enters into Zoo in Lion Safari area and flows through the existing ponds and finally exits through the service gate side. The water flows through the following ponds in the zoo premises before it connects into the drain that leads to Musi River.

i. Natural wetland : 6 acres approx.
ii. Singoji pond : 10 acres approx.
iii. Flamingo pond : 3 acres approx.
iv. Bear Moat pond : 3 acres approx.
v. Dingy pond : 2 acres approx.

The polluted water entering the Nehru Zoological Park in safari area is resulting in:

i. Water logging: In rainy season, certain areas in the Zoo are inundated with water, resulting in closure of certain operations, thus causing loss of revenue. Additionally, this creates unhygienic environment.
ii. Damage to animal health: The water enters into moats resulting in exposure of animal to harmful chemicals and pathogens thereby causing mortalities.
iii. Emanating foul smell
iv. Formation of water hyacinth in all ponds.
v. Inconvenience to visitors etc.

Further, the following rectification works were suggested to address the problem;

i. Taking up of cleaning of ponds by clearing water hyacinth / desilting etc.,

ii. Diversion of the excess water from surplus weir to the exit channel located at service gate side by creating an artificial drainage.
iii. Strengthening of arch bunds of Mir-Alam duly providing a walkway along with fencing.

The Musi River Development Authority has been requested to take up the above works as part of restoration of Mir-Alam tank in the interest of the wild animals housed in the Zoo and the visitors.

The Prl. Chief Conservator of Forests (HoFF) & Chief Wildlife Warden vide Rc.No.14703/2014/WL2(i), dt:16/10/2020 has addressed the Chief Engineer, Irrigation & CAD Dept., Hyderabad, Commissioner, GHMC, Hyderabad and the Additional Commissioner, Entomology Division, GHMC, Charminar Zone, Hyderabad requesting for taking up measures to strengthen Mir Alam Tank to reduce inundation and related problems of the Nehru Zoological Park. In the letter it was informed that due to continuous inflow into the lake resulting in inundation of the roads and water logging in the Safari area of the Zoo Park. Besides the heavy flow of water in to the park, the arch bunds nearer to the wetland area (Arch bunds No.7-10) and Lion Safari area (Arch bunds No.11-20) are having significant leakeages which is an alarming situation, not only to the animals in the Zoo Park but also to the nearby residential area. It was requested to take up necessary measures to strengthen the arch bunds, clean the water hyacinth in the lake, divert the excess water from surplus weir to the exit channels located at the service gate side by creating an artificial drainage, diversion of sewerage and fixing of the trash collectors.

The Prl. Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Telangana vide Ref.No.111/2021/WL1, dt:15/4/2024 has addressed the Principal Secretary to Government, Municipal Administration & Urban Development (MA&UD) Dept., Telangana Secretariate informing the issue of polluted water from Mir-Alam Tank passing through Nehru Zoological Park, causing health hazardous and related problems and request for construction of Sewerage Treatment Plant (STP) one near Tiger Safari area and the other near Pool area duly incorporating this under the Musi River Development Plan or any other scheme of MA&UD Department. The intervention from MA&UD Dept will not only control the entry of contaminated water while passing through Zoo area and entering into animal moats but also protect their health and help them to survive for many more years.

As a part of protection measures in Nehru Zoological Park, Hyderabad detailed Water Analysis and Solutions as well Soil testing in Nehru Zoological Park has been taken up from time to time. The Curator has obtained Ground Water & Surface water samples from Environment Protection Training & Research Institute (EPTRI), Hyderabad, the result of Surface water is found to be below class E Criteria i.e., polluted waters due to high values of BOD and Total Coliform, feacal coliform, E-Coli which are to be controlled by immediate chlorination by using mild bleaching liquids to avoid infections to the animals. The ground water shows at two wells are hard waters and exceeding the BIS limits and not suitable for drinking and other uses and to be stopped immediately to feed to animals.

- CSIR-Indian Institute of Chemical Technology (CSIR-IICT) was requested to offer their opinion on water, soil health in Nehru Zoological Park. Accordingly, the Team has visited and evaluated the water and soil health on 11/11/2023. As per their preliminary observations with reference to water quality, it has been revealed that the water intake from Mir-Alam tank, intended for moats, fodder growth, and domestic use, was contaminated with sewage from nearby residential areas and industrial leachates. The water exhibited turbidity and was observed to have elevated levels of organic matter, nutrients, and heavy metals. Maitry Lake, situated at the heart of NZP, is excessively filled with Eichhorniz crassipies, significantly impacting the lake habitat and overall aesthetic of the park. The water in the safari zone appears green and turbid due to the presence of algae and cyanobacterial blooms. Alongside, Mir-Alam tank, located adjacent to NZP is surrounded by a bund with a height of 2 feet, and the banks of the lake are predominantly covered with *Eichhornia crassipes, Typha latifolia, Pistia straiotes*, Duckweed and Para grass. Based on the preliminary observations, a sustainable eco-restoration strategy to manage and maintain water quality is required.

The following action plan has been proposed;

1) A Physicochemical analysis of the water at all locations as well as in moats, municipal tap water, bore wells and drinking water from Filtration units.
2) Redirecting sewage inflow from the residential area to municipal sewer line can reduce the organic load and heavy metal content in the fodder growing area.
3) Leveraging Maitry Lake as a primary water reservoir and implementing channels to distribute water to moats and other necessities can be advantageous. Installing surface spray features such as fountains, paddle wheels, air diffusers, etc., at 4 to 5 locations within the lake can effectively prevent stratification and enhance aerobic habitat. Aeration also has the potential to decrease algal biomass to some extent, potentially mitigating cyanobacterial growth.
4) Establishing a sewage treatment plant (STP) at the entry point from Mir-Alam Tank can effectively eliminate inflow of carbon and nutrient loads. Incorporating constructed wetlands can also contribute to the removal of other nutrient as well as carbon and to a certain extent, heavy metals.
5) The restoration of existing filter beds can be assessed.

The Laboratory Test of Microbiology from Veterinary & Animal Husbandry Department (VBRI) has been obtained dated 19/1/2024 and 18/3/2024. The reports are PH:6 Presumptive coliform count is 800/100 ml of water found unsatisfactory, un-fit for consumption. The water and soil analysis has been taken up by the Institute of Soil Health Management, Agricultural Research Institute, PJT Agricultural University, Rajendranagar.

The brief results are as below;

1. The critical observation of soil samples analysis results clearly indicates that vulture bore water and Miralam Water at Neelgai moat and Fodder blocks are mainly contributing to high salinity and accumulation of major, micro nutrients and heavy metals above their permissible limits.
2. The Water Test Result found having more chloride than WHO standard for drinking purpose. Magnesium content of water was low, RSC was high at three points is moderately safe for irrigation purpose. Micro and heavy metal content

was in traces. As per WHO (1984) standards for drinking purpose, the micro and heavy metal contents are below the permissible limits.

3. The Fodder samples test results are low in manganese content and sufficient in total copper and iron. Heavy metal content in fodder crops was above the permissible limits in case of Cr and Ni. Chromium content found to be very high. It is approximately 700% more at Natural Grass location. Nickel was very high in the fodder grown. Lead and Cadmium content is below the permissible limit in the fodder samples (WHO 1996).

Later the Blue Drop Enviro Private Limited, Hyderabad was entrusted for study of water in the Nehru Zoological Park, Hyderabad regarding Water Study and Solutions are as follows

1. Controlled distribution of Manjira Ground Water
2. Direct Line to OHT-2 from Main Sump
3. A closer study of Mir-Alam Tank required
4. Digitization of Water consumption at Most Points
5. Installation of (3) New STPs inside the Zoo for preventing in ingress of contaminated water from Mir-Alam Tank
6. Plan to Stop ingress in moats at the Children's Park Area
7. Water Saving plan and capacity building among zoo caretakers
8. to have a centralized water treatment plant
9. Main Sump Tank and measures to be taken
10. Rejuvenating the Singoji pond
11. To create a sponge ecosystem with shallow aquifer management [SAM] systems for water harvesting

It is submitted that, as part of upkeep and maintenance of animals,

- The moats of animals were properly cleaned and cement lining of the moats was carried out. Further, few animals are kept in Dry-moats
- Necessary arrangements for free flow of the seepage water from Mir-Alam tank is being carried out annually by desilting the drain inside the Park.
- Alam addition to the running water and treatment of water carried out regularly.

Apart from the above, joint inspections of Mir-Alam Tank has been taken up with Municipal Authorities of Hyderabad and proposals for instilling STP and strategic plan channeling the overflow water far away to NZP, Hyderabad.

Further, the Chief Wildlife Warden, Telangana has addressed the Municipal Authority & Urban Development, Government of Telangana for placing the proposals before the Commissioner and taking up the work immediately.

It is submitted that, for the animals health protective measures are followed in Nehru Zoological Park, Hyderabad by providing medications and no Mir-Alam Tank water is utilized for animals in Nehru Zoological Park, Hyderabad.

Enc: Reports & Photos.

Curator,
Nehru Zoological Park,
Hyderabad.

Nehru Zoological Park
HYDERABAD-T.S.

Annexure - I

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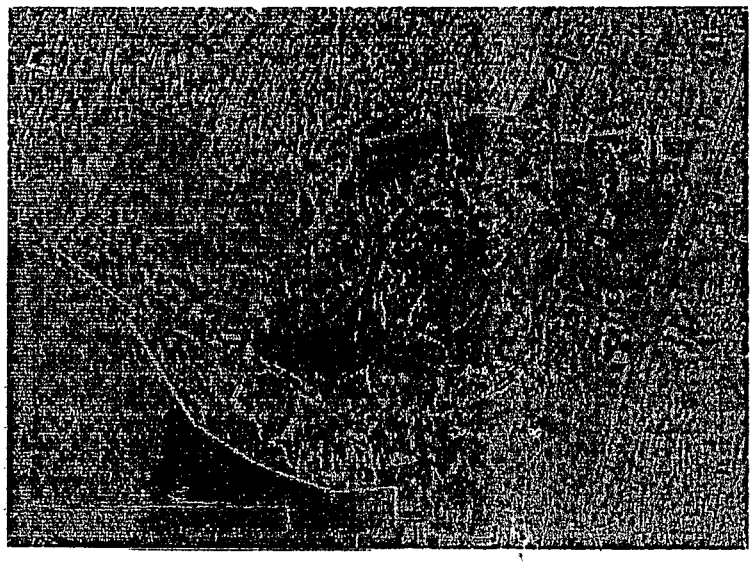
WATER STUDY REPORT AT NEHRU ZOOLOGICAL PARK

SOLUTIONING FOR NZP AT A GLANCE

The entire gamut of the Solution Framework has been grouped under 5 activities as given below along with the tentative timelines.

S.No	Activity	Q 1	Q 2	Q 3	Q 4	Q 5
1	Compilation of Existing Data, & Data Gap Identification					
2	Generation of Data, Analytics and Decision Framework of Solutions for the Spectrum of Water Solutions					
3	Outline and Delineation of the Solutions and implementation in different phases					
4	Response Model/ Plan for all Sources of Water, Storage, Distribution and Disposal of Water					
5	IEC Activity, Capacity Building & Implementation of the Toral Water Solutions Plan					

GENERAL OBSERVATIONS –



Bird's eyeview... Total Area : 332.36 Acres

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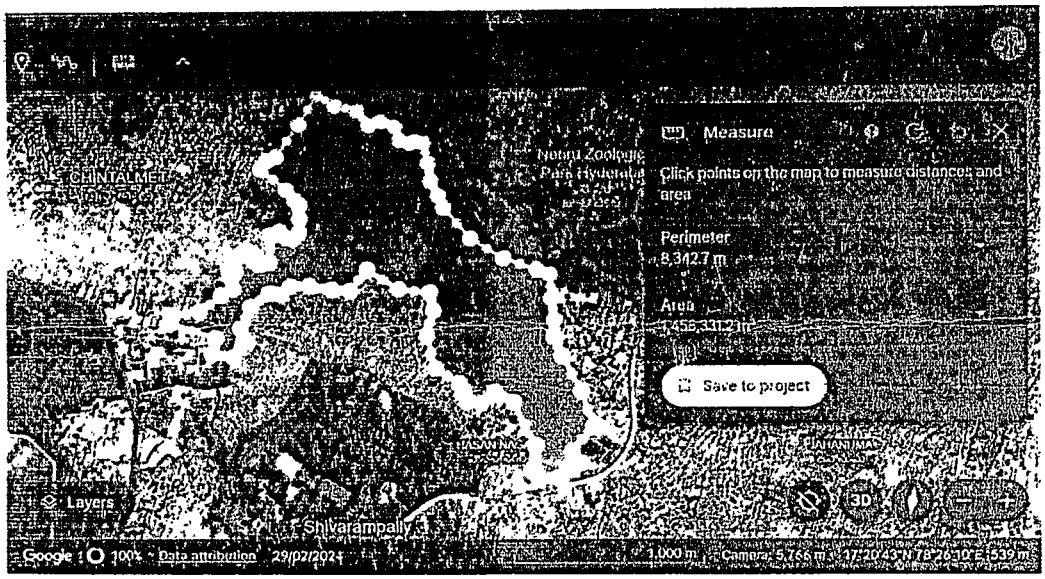
The 332.36 -acre Nehru Zoological Park has been a green lung for Hyderabad for 60 years and home for hundreds of animals of the wild. Water required for the Zoo is nearly one million litres a day. Safe, healthy drinking water requirement is about a tenth of this requirement. Cultivation of food for the animals, and for the natural vegetation in the Park consumes most of the requirement. The cascade of watering holes within the Zoo park depends on the eight non-rain months on the water overflow from the 220-year-old [established 1806] Mir Alam Tank.

Mir Alam Tank, the 464-acre lake expanse adjoining the Zoo Park is the source of all water for landscaping and cultivation of the high-water-consuming species like sugarcane, banana , and fodder generating species that the Park grows. Mir Alam Tank is the source and essence of life for the Zoological Park. The quality of water from Mir Alam Tank is polluted by the urban sanitation water and maybe industrial waste water that flows into the MA Tank from the neighbouring areas



Our cursory study is the quality of water that feeds the Tank after the two tertiary water treatment plants that treat the sewage water before it enters the Tank. This needs urgent and deeper investigation for the level of pollution, contamination and toxicity. Depending on the quality of water secured from the MA Tank, recommendation on the solution will have to be designed and executed as quickly as possible – especially areas such as the fodder cultivation area. Toxic water usage for fodder, Bananas, sugarcane etc can be fatal for animals consuming it. At another level, we must check how harmful the toxic water is to the vegetation. We will have to engage a Plant Biologist to dwell on it.

The second source of water is deep Borewells. There are 27 of them located at different places at the park. The quality of water drawn from the borewells also needs to be examined urgently. The waters of the MA Tank that flow through two major arterial canals that run across the length of the Park,

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may also contribute to the groundwater contamination. This needs to be determined, validated, and immediate remedial measures taken. .

The Third source of water for the Park is Manjira water from HMWSSB. The daily water demand is estimated at this preliminary juncture to be about 250 KLD. The cost of purchase of Manjira water from our preliminary study is put at about Rs. 100/ KL or about ₹25,000 per day, with the annual cost being ₹90-100 lac a year. This is apart from the cost of energy for the pumps that draw water from the borewells. Estimate of groundwater drawn is yet to be made.

The fourth source of water is filtered water from the RO Plants. There are 12 ROs installed at the Zoo. All of the RO Plants have been secured by the Zoo with donations or support from CSR funds.. Two of the RO plants donated by Dr Water are working. Of the balance nine RO tanks, only one is functional. Therefore 10 RO Plants are dysfunctional and non-operative. The visitors to the Park are offered RO treated water where possible and Manjira Water from the RO plant taps. Table here shows about 2.5 million visitors to the Park in the previous year. [Source : Check this link]

There is a 1.5 lakh litre sump which collects Manjira Water - Grid Water throughout the day. This is the only inlet point feeding water into the sump tank that has a solitary meter in the entire 332.36 - acre campus.

From this Sump, it is pumped to a 1 lakh OHT beside the sump with a 10 HP motor. Another 1 lakh litre OHT is located about one Kilometer away at the Guest House, to which another 10 HP pump sends the Manjira water from the sump tank. The first OHT fills in one hour. But the second OHT fills in 3 hours. The pipeline is a HDPE pipeline and has been erected in 2018. The sizing of this pump, the pipeline, the friction loss, and the head has to be examined before a solution is created for efficient pumping to the pump near the Guest House.

Within 2 hours in the morning, 9 – 11 am, both tanks are empty. All water is pumped through 6-inch pipelines throughout the campus . This water is sent to all animal enclosures and to the functional RO plants.

RECOMMENDATION 1 - CONTROLLED DISTRIBUTION OF MANJIRA GRID WATER :

Sl.No.	Month	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
		Nos.	Nos.	Nos.	Nos.	Nos.	Nos.	Nos.	Nos.
1	April	1,97,834	2,06,101	1,83,807	-	39,750	1,00,446	1,87,505	1,44,649
2	May	3,50,348	3,83,209	2,63,431	-	446	3,15,437	3,50,443	3,25,666
3	June	2,33,503	2,47,724	2,64,467	-	-	2,13,765	2,31,682	
4	July	2,03,704	1,79,419	1,62,694	-	60,004	1,22,486	1,37,982	
5	August	1,91,761	1,96,653	1,81,513	-	1,38,868	1,55,450	1,75,294	
6	September	2,40,771	1,72,973	1,33,602	-	1,14,956	1,57,965	95,028	
7	October	2,10,640	3,02,233	2,27,815	28,409	1,69,217	3,06,068	2,37,690	
8	November	2,56,061	2,67,986	1,98,025	74,628	1,84,272	2,64,837	1,38,386	
9	December	3,74,281	2,63,958	2,76,179	1,28,946	2,01,218	3,01,554	2,58,210	
10	January	2,90,468	2,82,686	2,70,449	2,27,244	2,07,005	3,06,095	2,36,831	
11	February	1,93,690	1,79,529	1,79,514	1,56,498	1,40,354	1,66,375	1,51,936	
12	March	1,52,530	1,34,839	54,830	1,10,559	1,62,867	1,33,874	1,15,495	
	Total	28,95,591	28,27,310	23,96,326	7,26,282	14,18,957	26,12,508	23,16,462	4,70,315

There are just 5-6 valves to control or hold the water flow. Some of the animal enclosures have small sumps and some even do not have sumps. Whatever water is pumped irrespective of the requirement of the enclosure reaches the enclosure and gets wasted because of the lack of the valves.

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Valves at the right places can hold the water and they can control the flow. This can save water at least up to 25%.

Valves at the following places will be useful to control the flow -

1. **From the OHT 1 -**
   1) At New Quarters
   2) At Old Quarters
2. **From the OHT 2 -**
   1) At Lion Safari pipeline junction point
   2) At Bear Safari pipeline junction point
   3) At Bhavani Canteen + Bison Enclosure pipeline junction point
   4) At the termination point leading inside to the animal enclosures
   5) At the Seetal sambar
   6) At the Peacock - Guest House junction - two valves
   7) At the Yellow / White Tiger junction point
   8) 8) At the Lion Safari point.

RECOMMENDATION 2 – DIRECT LINE TO OHT 2 FROM MAIN SUMP:

All the Manjira Grid Water flows into the main sump. From the main sump, it is distributed to the two OHTs. As mentioned earlier, it takes 1 hour to fill OHT 1, near the main sump, and 3 hours to fill OHT 2, near the Guest house.

It must be noted that the energy required to pump to OHT 2 is three times the energy needed to fill OHT 1. This situation has to be corrected with efficient solutions that will be recommended after further study. The route from the main sump to OHT 2 is circuitous. Also, it goes downhill beside the butterfly park area and then comes uphill to the Guest house. A contour survey will be undertaken to take the most efficient route to OHT 2.

A second option will be explored in the next phase of creating Solutions Framework. Options that will be examined are another grid line which [a] can be connected to five of the six swimming pools, and [b] from where it can be sent to OHT 2 and wherever possible directly sent to the consumption points on the pipeline from OHT 2. It is noted by our current audit and diagnostics study that the swimming pools are, contour-wise, at a higher level—like the OHT 2—and can carry water by gravity to the pipeline consumption points of OHT 2.

RECOMMENDATION 3 – A CLOSER STUDY OF MIR ALAM TANK REQUIRED :

It is recommended that a drone survey is conducted of the Mir Alam Tank along with a Bathymetry test and analysis. Also, it is essential that we secure a better, detailed understanding of the water flow rate per hour at all the ingress and egress points of the tank. It is imperative that we measure and know how much water is coming in from the MA Tank into the zoo, and how much water is leaving the Park. IT will lead to an understanding of the demand for water for landscape and cultivation. Similarly for the water received from borewells which has to be undertaken separately.

Bathymetry is a type of water-based survey that maps the depths and shapes of underwater terrain to illustrate the land that lies below. This will help us understand the volume of water that the Lake hosts at various times of the year, and the daily variations in the volume of water that is received by the MA Tank.

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Water for landscape and cultivation is the most critical of the water consumption needs at the Zoo. It is essential that we secure a mapping of the quantity of water received and used with a system of measuring-monitoring-managing that is installed as soon as possible. To understand the total water consumption of the zoo it is essential that we understand the landscape/cultivation water need, since this is the bulk of the water used by the Zoological Park.

RECOMMENDATION 4 – DIGITISATION OF WATER CONSUMPTION AT MOST POINTS:

All the major consumption points must be metered through digital metering. This will help us understand the water consumption patterns at the Zoo based on which we can think in terms of saving water at all of these consumption points. The installing of a systemic network for digitisation and securing of real-time data, will help identify leakages in the entire network of the Zoo and in real-time monitoring of the water consumption throughout the zoo. This is will be operating basis for creating a comprehensive set of water-saving plans and schemes.

The residential quarters, upon our prima facie analysis and evidence, is also a major consumer of water. However, to validate this, as the other conclusions listed in this Document, we need a system to be put in place ASAP for measure-monitor-manage at various critical points to track water demand, supply, consumption, and conservation measures to be instituted.

RECOMMENDATION 5 – INSTALLATION OF 3 NEW STPs INSIDE THE ZOO FOR PREVENTING INGRESS OF CONTAMINATED WATER FROM MA TANK:

It is proposed to install two STPs for the waters received from the Mir Alam Tank at the two arterial points. One STP is recommended to be erected at the Elephant Safari point for the water entering the Zoo through the pipeline.

The Second STP is recommended to be constructed at the ingress point of the Mir Alam Tank water at the Tiger Safari area.

With the installation of these 2 STPs, we can treat all the incoming water from Mir Alam Tank before the water is 'admitted' into the Zoo for landscape/cultivation use.

Our study also suggests that a third STP requires to be erected in the Zoo premises for the Sewage water from the Septic tanks of all the toilet blocks. This water after treatment can be re-used for landscape purposes.

The sizing of the three STPs requires to be done after securing precise data on the flow of water per hour, the diurnal variations in the flow of water from the MA Tank or from the toilets. This will require initially the installation of flow meters at vital strategic points upstream of the recommended locations for the STPs.

RECOMMENDATION 6 – PLAN TO STOP INGRESS IN MOATS AT THE CHILDREN'S PARK AREA:

The issue of seepage of water in the moats at the Children's Park area needs further inspection and solution creation. The following scheme is recommended, subject to further investigation in Phase of implementation.

Part 1. Creation of a Transit Housing Tank at Elephant Safari

At the pipeline junction behind the last swimming pool where the pipeline from the Elephant Safari is culminating and water is flowing as streams to the fodder area and the children's park area, we have to build a housing tank to allow all the water to collect in it before it can be sent to the children's

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park area. From the tank a 6" pipeline can run through the course towards the Children's park area and from there join the Pelican Pond.

This will ensure that no seepage into those moats happen and also enable the water to go through all the areas till the Children's Park area. Sub-lines can be drawn from the existing 6" line to allow water to reach all areas which require water for gardening or for the moats.

Part 2 – Housing Tank at the Road Intersection before the Children's Park Area

The second stream from the junction behind the last of the six swimming pools, which goes towards fodder growing area at the end of its course, crosses the road and goes into the Children's Park area. This stream should not be allowed to cross the road and it should be cut off right there. This will require another housing tank to be built at that location, from where another pipeline can run through the children's park area into the Pelican Pond.

RECOMMENDATION 7 – SAVING ANNUALLY ₹1.5 CRORE WITH THE SAVINGS PLAN AND CAPACITY BUILDING AMONG ZOO CARETAKERS

There is need to secure a proper understanding of the purchase cost and the quantum of water secured of Manjira water. The Zoo caretakers will need a few capacity building workshops to help them understand the difference between Manjira water and Borewell water, the quality of water from the two sources and the processes and protocols needed to manage the two water sources. Such capacity building for these animal caretakers will extend necessarily to helping them understand the difference between the quality of borewell water, the damage that groundwater extraction causes to the Zoo natural ecosystem, and the need for reducing and eventually replacing purchase of Manjira water that currently costs ₹1 crore annually for the Park. In most places, borewell water is used throughout the day after the 9-11 AM Manjira water stops. The training will also help them understand and implement daily the new protocol we will recommend on storing and distributing water in the hours beyond 9-11 am throughout the Park. With the full cooperation, knowledge, and understanding that such Capacity Building and training will offer, the Zoo can completely stop purchase of water from Manjira, stop use of borewells water, and save about ₹1.5 crore every year with the approaches and solutions that we will recommend, explain at every stage, and drive the implementation with the support of the Zoo Caretakers.

This implementation will have to be done in a phased manner without disrupting the regular operating and running of the Zoo, with phased implementation. A detailed plan will be presented to the Curator, and then with the active cooperation of the Head of the Zoo Caretakers, we will distribute Manjira water for one hour in the morning and one hour in the afternoon, with planned storage. This will help study the impact on the water supply for all the Animal enclosures. With the help of inputs from the Zoo caretakers, we will mapthe daily consumption patterns at all animal enclosures and other places. This will form the basis for chalking out a comprehensive plan to enhance water efficiency throughout the Zoo.

The Water Saving Plan will potentially reduce in phases to ZERO, the purchase of Manjira water, eliminate in phases the use of Deep Borewell water with greater reliance on open wells and the system of Shallow Aquifer management that is proposed as part of this Water Management Plan to be introduced to the entire expanse of the Zoo.

RECOMMENDATION 8 – TO HAVE A CENTRALISED WATER TREATMENT PLANT

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Our Field Investigations of June 2024 indicate that 10 of the 12 RO plants, as stated earlier, are not functioning. Out of the 12 RO plants, two of Dr. Waters' plants are working, and one of the other RO plants is working. The RO plant at the Animal Kitchen Centre is also working.

The challenge of regular operations and maintenance of the RO plants have to be addressed immediately. The dysfunction RO plants have to be fixed, after understanding the need for the RO Plants, the energy they consume, the RO reject water they produce and other vital parameters. This will ensure that the RO plants are not only functioning efficiently but are serving the need for the Zoo with optimisation of the use of the RO Plants.

Currently, where the RO plants are not functioning, the Water vending kiosks are supplying Manjira water directly. Most of such Kiosks get water not through the pipeline but through a tanker owned by the Zoo which goes around filling the Sintex-type tanks at the kiosks.

Manjira water which is usually good-grade water should not be sent to RO plants for treatment. This needlessly adds to the maintenance cost of treatment at ROs and further creates a large quantity of RO waste water. All this is paid water which is wasted down the drain.. We have to implement this daily protocol immediately. This measure alone will bring a reduction in the purchase of Manjira water that will save ₹20 lac a year at our preliminary estimate.

In order to ensure, as a public park, that safe, healthy access of drinking grade water is provided to the 2.5 million visitors to the Zoo, Manjira Water can be treated through a non-RO treatment WTPs (Water Treatment Plant) with a much lower capital cost, and a fraction of the operating cost of RO plants, is installed. This can be located at a centralized place near the main sump tank where the Manjira water is now collected or in the area close by where some shelter is available so that the cost of building to house the WTP is avoided. After the treatment at the non-RO WTP the water can be sent to all the kiosks around the zoo.

The RO at the Animal Kitchen Centre of course can continue to function depending on the criticality of quality of water for use at the Kitchen Centre.

This would save wastage of precious water, treatment cost of RO plants and provide good healthy water to the Zoo visitors.

RECOMMENDATION 9 – Main Sump Tank and measures to be taken

An Auto Level Controller is recommended to be installed at the the main sump near OHT 1. This OHT hosts a capacity of 1.5 lakh litres. Overflow from this sump tank is a frequent occurrence at times when supervisors are busy elsewhere. When such a large tank of water does not have an overflow outlet the hydrostatic pressure of water can push the slab of the tank and make it come apart. The solution is simple and will avoid wasteful overflow of water from OHT1. The installation will help immensely in extending the life of the main tank of the Zoo.

RECOMMENDATION 10 – REJUVENATING THE SINGOJI POND

This 7-acre pond has a capacity to hold an estimated xxx cu. meters of water. This is a vital stage of holding water that is received from the MA Tank. Hyacinth overgrowth has choked the lake and needs a maintenance protocol for removing and recycling the hyacinth.

Water Hyacinth [*Eichhornia crassipes*] can be removed by raking or seining it from the pond's surface.

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BLUEDROP ENVIRO PRIVATE LIMITED, CIN: U37100TG2005PTC046109, GSTIN: 36AABCI3644N2ZA
#101 Sree Krishna Homes, Sai Prithvi Enclave , Plot - Near -13A, Near Aparna Serene Park,
Kondapur, Hyderabad - 500084, Telangana.
projects@bluedropwetlands.com www.bluedropwetlands.com

BlueDrop Enviro®
PRIVATE LIMITED

Water Hyacinth does a good job at absorbing excess nutrients from a pond, especially when there's no food left for the Pond's species in the height of summer. Water hyacinth leaves might start to yellow, and flowers might cease their blooming. If this happens, you can pull them from the pond and put them in a bucket of water mixed with a soluble fertilizer according to package directions. Such maintenance protocols will also be established by the Blue Drop team.

RECOMMENDATION 11 – TO CREATE A SPONGE ECOSYSTEM WITH SHALLOW AQUIFER MANAGEMENT [SAM] SYSTEMS FOR WATER HARVESTING

The rich, dense, biodiverse ecosystem of vegetation at the 380-acre Zoo sprawl, lends naturally to the creation of a SAM and SPONGE plan for harvesting water from a network of open wells that will serve as a major source of water for the Zoo and help to replace the purchase of Manjira water over a couple of monsoons.

The first step is to assess and evaluate the potential for contamination of the shallow aquifers thanks to the import of water every day from the MA tank.

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Annexure - II

PJTSAU- Institute of Soil Health Management
All India Co-ordinated Research Project for investigation on Soil Test Crop Response Correlation (AICRP on STCR)
(Hyderabad Centre)
Agricultural Research Institute, Rajendranagar, Hyderabad-30

E Mail : sterpjtsau@gmail.com Mobile No: 9848976765

From
Dr. A. Madhavi
Principal Scientist (SS) & Head,
Institute of Soil Health Management
Agricultural Research Institute
Rajendranagar, Hyd-30

To
The Curator
Nehru Zoological park,
Forest Department
Govt. of Telangana
Hyderabad – 500 064

Sir,

Sub: Institute of Soil Health Management – Soil, Water and Fodder crop analysis reports- Reg.

Ref: 1. Lr No.11382/Res.II/2023 dated 08.01.2024 of the Director of Research, PJTSAU

***

With reference to the above subject cited, I am here with submitting the Soil, Water and Fodder crop analysis reports. This is for your information.

Thanking you

Encl: As above in duplicate

Yours Sincerely

A. Madhavi

PRINCIPAL SCIENTIST (SS) & HEAD
Institute of Soil Health Management
Agricultural Research Institute
Prof. Jayashankar Telangana State Agril. Universit
Rajendranagar, Hyderabad-500 030, Telangana Stat

PJTSAU- Institute of Soil Health Management
All India Co-ordinated Research Project for Investigation on Soil Test Crop Response Correlation (AICRP on STCR)
(Hyderabad Centre)
Agricultural Research Institute, Rajendranagar, Hyderabad-30
E Mail : stcrpjtsau@gmail.com Mobile No: 9848976765

Nehru Zoological Park Report

As per University Lr. No 11382/Res.II/ 2023 date: 08.01.2024 of the Director of Research, PJTSAU, two Principal Scientists from ISHM, ARI, Rajendranagar has deputed to the Nehru Zoological Park on 03.02.2024. Initially, general scouting was done over the zoological park along with zoological park map and survey was conducted. Based on collected soil, water and fodder samples for evaluation of soil and water quality parameters and also heavy metal content.

The information on samples collection was presented in Annexure 1. Based up on the concerned officials' suggestions and natural drain passage the water samples were collected. Soil samples were also collected from the places where the wild animal mortality was severe. The fodder samples collected on all corners of Zoo for micro and heavy metal load.

Results:

Soil:

- Soil samples were analysed for physicochemical and chemical parameters like pH, EC, available nitrogen, phosphorus, potassium, available Micro and Heavy metals (Table 1).
- All the soil samples are slightly alkaline in reaction, except samples 9 &12, where the source of water is Vulture bore and Miralam water, respectively.
- All the soil samples are non-saline in nature, except samples 12 & 13 where the source of water is Miralam water.
- All the soil samples are low in available Nitogen, except samples 9, 12 and 13 which are medium to high where the source of water is Vulture bore and Miralam water, respectively.
- All the soil samples are high in available Phosphorus except sample no 14 which is medium in available phosphorus status.
- Soil samples are ranging from low to high in available potassium status.
- All the samples are sufficient in available micronutrients (Zn, Fe, Cu, Mn).
- Except Pb all heavy meal contents are within the permissible limit of WHO (1984) limits.

Critical observation of soil samples analysis results clearly indicates that vulture bore water and Miralam water at Neelgai moat and Fodder blocks are mainly contributing to high salinity and accumulation of major, micro nutrients and heavy metals above their permissible limits. (Chapman, H.D 1975).

Water:

The total of eleven water samples were collected from zoo park area (Table 2). The sources are Miralam tank and bore wells. The same water is used for both drinking and irrigation purpose. The samples were analyzed for pH, EC, Cl, CO_3^-, HCO_3^-, Ca, Mg and Sodium. Sodium Absorption Ratio (SAR) and Residual Sodium Carbonate (RSC) were calculated. Water pH was slightly alkaline to moderately alkaline. Very high saline water was observed at location points 2, 5 and 6. Remaining all other sites (1,3,4,9,10,11,12 and16) falls under class C_3(High Salinity water 0.76 to 2.25 dSm^{-1}). Water chloride was more at the points 5 and 6, it's not suitable for irrigation purpose. All sites are having more chloride than the WHO standard (4.0 mg/L) for drinking purpose. Magnesium content of water was low (Minimum of 25-50 mg/L necessary for drinking purpose). RSC was high at points 2, 12 and 16 water is moderately safe for irrigation purpose. Micro and heavy metal content was in traces. As per WHO (1984) standards for drinking purpose, the micro and heavy metal contents are below the permissible limits.

Irrigation Purpose: (Tandon, 1993):

- Very high saline water was observed at location points 2, 5 and 6.
- High salinity: observed in 1,3,4,9,10,11,12 and16 location points.

Drinking Purpose: (WHO, 1984)

- All the micro and heavy metal contents are below the permissible limits.

Fodder crops:

Fodder samples were collected from Zoo Park fields (Table 3). Para grass, Sugarcane, Banana, water hyacinth and Lucerne crops were collected. Most of the area is under para grass cultivation. The crop samples were tested for micro nutrients and heavy metals. Few plant samples were low in zinc (Sugarcane, Banana and Water hyacinth) collected at Elephant block and Fodder block. Sugarcane and lucerne samples are low in manganese content and sufficient in total copper and iron. Heavy metal content in fodder crops was above the permissible limits in case of Cr and Ni. Chromium content found to be very high (<2.0ppm is permissible). It is approximately 700% more at location 8 (Natural Grass). Nickel was very high in the fodder grown at location 8. Lead and Cadmium content is below the permissible limit in the fodder samples. (WHO 1996).

A. Madhavi

(A. Madhavi)
PRINCIPAL SCIENTIST (SS) & HEAD
Institute of Soil Health Management
Agricultural Research Institute
Prof. Jayashankar Telangana State Agril. University
Telangana State

1)Water samples pertaining to 8,11,20,21 & 22 are having high chloride contents than the WHO standards.

2)All the water samples were having micro nutrients and heavy metals within limits as per WHO standards

*Residual Sodium Carbonate (RSC) was high in these samples

A Madhavi

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Agricultural Research Institute
Prof. Jayashankar Telangana State Agril. University
Rajendranagar, Hyderabad-500 030, Telangana State

Table 1: Physico chemical, micro and heavy metal content of Zoo park soils

Sample No.	Location point	Source of water	pH	EC (dSm-1)	N	P_2O_5	K_2O	Zn	Fe	Cu	Mn	Co	Cr	Pb	Ni	Cd
					kgha^{-1}			(mg/kg)								
2	Elephant Block	Bore Water	7.89	1.76	63	167	978	2.2	14	2.75	13	0.055	T	4.34	0.32	0.022
7	Bison (Indian gur)		7.96	0.39	251	114	156	5.4	39	2.05	11	0.068	T	8.00	0.37	0.018
8	Chow Singha	Elephant Bore	7.84	0.78	226	63	1423	2.5	21	2.36	8	0.025	T	6.72	0.49	0.002
9	Neelgai Moat (Manubothu Duppi)	Vulture Bore	7.12	1.70	289	579	2976	11.5	27	2.30	58	0.49	T	2.66	0.35	0.016
12	Fodder Block	Miralam water	7.42	3.11	627	121	132	5.12	52	3.51	59	0.47	T	13.07	1.10	0.018
13	Fodder Block	Miralam water	7.78	5.55	552	145	206	16.3	72	12.46	102	0.18	T	20.87	2.07	0.205
14	Fodder Block	Miralam water	7.75	1.07	238	56	140	5.7	35	8.01	30	0.13	T	13.23	0.93	0.030
15	Fodder Block	Miralam water	7.62	0.22	138	218	251	4.2	15	3.76	5.0	0.03	T	6.99	0.37	0.029
Critical Limits WHO (1984)								2.0	10.0	5.0	10.0	2.0	2.0	5.0	2.0	0.5

Table 2: Water Quality Parameters and micro and heavy metal content in Water

S. No.	Location Point	Source of Water	pH	EC dSm^{-1}	Cl$^-$ meqL^{-1}	CO_3^{--} meqL^{-1}	HCO_3^- meqL^{-1}	Ca meqL^{-1}	Mg meqL^{-1}	Na ppm	SAR meqL^{-1}		RSC meqL^{-1}		Zn ppm	Fe ppm	Cu ppm	Mn ppm	Co ppm	Cr ppm	Pb ppm	Ni ppm	Cd ppm
1	TSP Seepage Water (Entry point)	Miralam water (Head point)	7.72	1.93	6.8	0.00	8.2	4.73	2.81	6.2	3.19	S	0.66	Permissible safe	0.006	0.006	T	0.002	T	T	T	T	T
2	Elephant Block	water bore	7.15	2.52	8.8	0.00	13	6.30	4.49	9.5	4.09	S	2.21	Moderately unsafe	T	0.004	0.001	T	T	T	T	T	T
3	Tiger Moat	Municipal water + Tiger moat bore well	7.82	0.90	4.0	0.00	3.8	1.65	1.75	3.3	2.53	S	0.40	Permissible safe	0.009	0.005	0.001	T	T	T	0.001	T	T
4	Lion Moat Area	Miralam Mid-stream	7.80	1.91	6.8	0.00	8	4.64	2.68	6.5	3.40	S	0.68	Permissible safe	0.005	0.002	0.001	T	T	T	T	T	T
5	Lion Moat	Lion moat bore water	7.36	3.43	12.8	0.00	11	7.44	6.79	12.7	4.76	S	-3.22	Permissible safe	0.004	0.012	0.003	T	T	T	T	T	T
6	Hippo Moat	Hippo moat Bore water	7.25	4.44	19.2	0.00	11.2	12.88	7.50	14.4	4.51	S	-9.18	Permissible safe	0.006	0.017	0.002	T	T	T	T	T	T
9	Neelgai Moat (Manuboth u Duppi)	Vulture Bore	7.21	1.97	7.6	0.40	7.4	5.85	2.79	6.9	3.32	S	-0.83	Permissible safe	0.002	0.007	T	T	T	T	T	T	T
10	Lacones	Summer house bore	7.58	1.51	5.2	0.40	6.4	3.09	2.88	5.8	3.36	S	0.84	Permissible safe	0.005	0.003	T	T	T	T	T	T	T
11	Mouse deer Breeding Center	Tank water + Muncipal water	7.96	0.90	3.6	0.00	2.6	1.55	1.71	3.3	2.58	S	-0.66	Permissible safe	0.002	0.006	T	T	T	T	T	T	T
12	Fodder Block	Miralam water	7.73	1.92	6.0	1.60	8	4.61	2.64	6.4	3.36	S	2.34	Moderately unsafe	0.005	T	T	T	T	T	T	T	T
16	Inpatient Backside	Miralam Tail end Point	7.83	1.95	6.8	0.80	8	4.68	2.78	6.7	3.47	S	1.34	Moderately unsafe	0.008	0.002	T	T	T	0.001	T	T	T

*Suitable, T- Traces

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Table 1: Physico chemical, micro and heavy metal content of Zoo park soils

Sample No.	Location point	Source of water	pH	EC (dSm-1)	N	P_2O_5	K_2O	Zn	Fe	Cu	Mn	Co	Cr	Pb	Ni	Cd
					kgha^{-1}			(mg/kg)								
2	Elephant Block	Bore Water	7.89	1.76	63	167	978	2.2	14	2.75	13	0.055	T	4.34	0.32	0.022
7	Bison (Indian gur)		7.96	0.39	251	114	156	5.4	39	2.05	11	0.068	T	8.00	0.37	0.018
8	Chow Singha	Elephant Bore	7.84	0.78	226	63	1423	2.5	21	2.36	8	0.025	T	6.72	0.49	0.002
9	Neelgai Moat (Manubothu Duppi)	Vulture Bore	7.12	1.70	289	579	2976	11.5	27	2.30	58	0.49	T	2.66	0.35	0.016
12	Fodder Block	Miralam water	7.42	3.11	627	121	132	5.12	52	3.51	59	0.47	T	13.07	1.10	0.018
13	Fodder Block	Miralam water	7.78	5.55	552	145	206	16.3	72	12.46	102	0.18	T	20.87	2.07	0.205
14	Fodder Block	Miralam water	7.75	1.07	238	56	140	5.7	35	8.01	30	0.13	T	13.23	0.93	0.030
15	Fodder Block	Miralam water	7.62	0.22	138	218	251	4.2	15	3.76	5.0	0.03	T	6.99	0.37	0.029
Critical Limits WHO (1984)								2.0	10.0	5.0	10.0	2.0	2.0	5.0	2.0	0.5

Table 2: Water Quality Parameters and micro and heavy metal content in Water

S. No.	Location Point	Source of Water	pH	EC dSm^{-1}	Cl$^-$ meqL^{-1}	CO_3^{--} meqL^{-1}	HCO_3^- meqL^{-1}	Ca meqL^{-1}	Mg meqL^{-1}	Na ppm	SAR meqL^{-1}		RSC meqL^{-1}		Zn ppm	Fe ppm	Cu ppm	Mn ppm	Co ppm	Cr ppm	Pb ppm	Ni ppm	Cd ppm
1	TSP Seepage Water (Entry point)	Miralam water (Head point)	7.72	1.93	6.8	0.00	8.2	4.73	2.81	62	3.19	S	0.66	Permissible safe	0.006	0.006	T	0.002	T	T	T	T	T
2	Elephant Block	water bore	7.15	2.52	8.8	0.00	13	6.30	4.49	95	4.09	S	2.21	Moderately unsafe	T	0.004	0.001	T	T	T	T	T	T
3	Tiger Moat	Municipal water + Tiger moat bore well	7.82	0.90	4.0	0.00	3.8	1.65	1.75	33	2.53	S	0.40	Permissible safe	0.009	0.005	0.001	T	T	T	0.001	T	T
4	Lion Moat Area	Miralam Mid-stream	7.80	1.91	6.8	0.00	8	4.64	2.68	6.5	3.40	S	0.68	Permissible safe	0.005	0.002	0.001	T	T	T	T	T	T
5	Lion Moat	Lion moat bore water	7.36	3.43	12.8	0.00	11	7.44	6.79	12.7	4.76	S	-3.22	Permissible safe	0.004	0.012	0.003	T	T	T	T	T	T
6	Hippo Moat	Hippo moat Bore water	7.25	4.44	19.2	0.00	11.2	12.88	7.50	14.4	4.51	S	-9.18	Permissible safe	0.006	0.017	0.002	T	T	T	T	T	T
9	Neelgai Moat (Manuboth u Duppi)	Vulture Bore	7.21	1.97	7.6	0.40	7.4	5.85	2.79	6.9	3.32	S	-0.83	Permissible safe	0.002	0.007	T	T	T	T	T	T	T
10	Lacones	Summer house bore	7.58	1.51	5.2	0.40	6.4	3.09	2.88	5.8	3.36	S	0.84	Permissible safe	0.005	0.003	T	T	T	T	T	T	T
11	Mouse deer Breeding Center	Tank water + Muncipal water	7.96	0.90	3.6	0.00	2.6	1.55	1.71	3.3	2.58	S	-0.66	Permissible safe	0.002	0.006	T	T	T	T	T	T	T
12	Fodder Block	Miralam water	7.73	1.92	6.0	1.60	8	4.61	2.64	6.4	3.36	S	2.34	Moderately unsafe	0.005	T	T	T	T	T	T	T	T
16	Inpatient Backside	Miralam Tail end Point	7.83	1.95	6.8	0.80	8	4.68	2.78	6.7	3.47	S	1.34	Moderately unsafe	0.008	0.002	T	T	T	0.001	T	T	T

*Suitable, T- Traces

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Annexure - III

GOVERNMENT OF TELANGANA

Veterinary & Animal Husbandry Department

TS VBRI, Shanthinagar, Hyderabad-28
(Email: jdbp.vbri@gmail.com)

LABORATORY TEST REPORT : MICROBIOLOGY, TSVBRI

Sample Receipt Date: 10.04.24 Test Report Date: 22.04.24
Ref: Lr.Roc.No. 18/DD/NZP/2024 Date: 10.04.24.

Sample No	Ref.No	Specimen	Species	Test	Results
1-2	13-14	water	NA	Cultural test	E.Coli could be isolared
1	15	Urine	Galapogas Toroise	Culture test & ABST	No organism could be isolated

Interpretation: *Correlate with Clinical Signs*

Joint Director (V&AH)
TS VBRI
Hyderabad

To,
The Deputy Director(Vet)
Nehru Zoological Park
Hyderabad

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GOVERNMENT OF TELANGANA
Veterinary & Animal Husbandry Department
TS VBRI, Shanthinagar, Hyderabad-28
(Email: jdbp.vbri@gmail.com)

LABORATORY TEST REPORT : MICROBIOLOGY, TSVBRI

Sample Receipt Date: 10.04.24 Test Report Date: 22.04.24
Ref: Lr.Roc.No. 18/DD/NZP/2024 Date: 10.04.24

Sample No	Ref.No.	Specimen	Species	Test	Results
1-2	13-14	water	NA	Cultural test	E.Coli could be isolared
1	15	Urine	Galapogas Toroise	Culture test & ABST	No organism could be isolated

Interpretation: *Correlate with Clinical Signs*

Joint Director (V&AH)
TS VBRI
Hyderabad

To,
The Deputy Director(Vet)
Nehru Zoological Park
Hyderabad

24/4/24

25

GOVERNMENT OF TELANGANA
Veterinary & Animal Husbandry Department
TS VBRI, Shanthinagar, Hyderabad-28
(Email: jdbp.vbri@gmail.com)

LABORATORY TEST REPORT : MICROBIOLOGY, TSVBRI

Sample Receipt Date: 10.04.24 Test Report Date: 22.04.24
Ref: Lr.Roc.No. 18/DD/NZP/2024, Date: 10.04.24,

Sample No	Ref.No	Specimen	Species	Test	Results
1-2	13-14	water	NA	Cultural test	E.Coli could be isolared
1	15	Urine	Galapogas Toroise	Culture test & ABST	No organism could be isolated

Interpretation: *Correlate with Clinical Signs*

Joint Director (V&AH)
TS VBRI
Hyderabad

To,
The Deputy Director(Vet)
Nehru Zoological Park
Hyderabad

GOVERNMENT OF TELANGANA
Veterinary & Animal Husbandry Department

TS VBRI, Shanthinagar, Hyderabad-28
(Email: jdbp.vbri@gmail.com)

LABORATORY TEST REPORT : MICROBIOLOGY, TSVBRI

Sample Receipt Date: 10.04.24 | Test Report Date: 22.04.24
Ref: Lr.Roc.No. 18/DD/NZP/2024 | Date: 10.04.24

Sample No	Ref.No	Specimen	Species	Test	Results
1-2	13-14	water	NA	Cultural test	E.Coli could be isolared
1	15	Urine	Galapogas Toroise	Culture test & ABST	No organism could be isolated

Interpretation: *Correlate with Clinicol Signs*

Joint Director (V&AH)
TS VBRI
Hyderabad

To,
The Deputy Director(Vet)
Nehru Zoological Park
Hyderabad

PROF. JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY
INSTITUTE OF SOIL HEALTH MANAGEMENT (STCR, RTI, & CMS SCHEMES)
ARI, RAJENDRANAGAR, HYDERABAD – 30.

ZOO PARK WATER ANALYSIS REPORT

Date: 18-04-23

S. No.	Name	pH	EC (ds/m)	$Ca^{++}+Mg^{++}$ (meq/l)	CO_3^{--} (meq/l)	HCO_3^- (meq/l)	Cl^- (meq/l)	Na^+ (meq/l)	SAR	RSC	Zn (ppm)	Fe (ppm)	Cu (ppm)	Mn (ppm)	B (ppm)	Ni (ppm)	Cd (ppm)	Pb (ppm)	Cr (ppm)
1.	Sil (Tap Water)	8.33	0.86	5.8	0.8	6.4	4	5.9	3.59	1.8*	0.05	0.056	0.01	0	Traces	0	Traces	0.011	0
2.	Lemurs (Bore Water)	8.41	1.05	6.2	2.8	7.4	4	7.8	4.43	4.0*	0.03	0.056	0.01	0	Traces	0	Traces	0.013	0
3.	TP NDRC Water	8.45	0.72	5	3.2	3.6	3.2	4.4	2.78	2.8*	0.07	0.056	0.01	0	Traces	0	Traces	0.007	Traces
4.	Reptile House (Tap Water)	8.25	0.67	4.3	4.8	4.8	3.2	4.2	2.86	3.9*	0.1	0.093	0.01	0	Traces	0	Traces	0.011	Traces
5.	Giraffe (Tap Water)	7.52	0.65	4.8	0	5	3.2	3.6	2.32	0.2	0.04	0.006	0.01	0	Traces	0	Traces	0.01	Traces
6.	C/S (Tap Water)	8.20	0.64	4.8	0	4.8	2.8	3.6	2.32	0.0	0.0	0.058	0.01	0	0.7	0	Traces	0.009	Traces
7.	Bison Safari Park (Tap Water)	7.30	0.64	4.8	3.6	4.6	3.2	3.6	2.32	5.6*	0.04	0.047	0.01	0	0	0	Traces	0.014	Traces
8.	Bear Safari (Bore Water)	7.23	1.25	15.6	6.8	14	11.6	16.1	5.76	3.2*	0.01	0.008	0.01	0.1	0.8	Traces	Traces	0.013	0
9.	Elephant (Tap Water)	7.51	0.63	5	0	4.6	2.8	3.6	2.28	0.6*	0.01	0.031	0.01	0	0	Traces	Traces	0.011	Traces
10.	Tiger Moat (Tap Water)	7.52	0.64	5.2	0.6	4.6	3.2	3.3	2.09	0.6*	0.01	0.027	0.01	0	0	Traces	Traces	0.008	Traces

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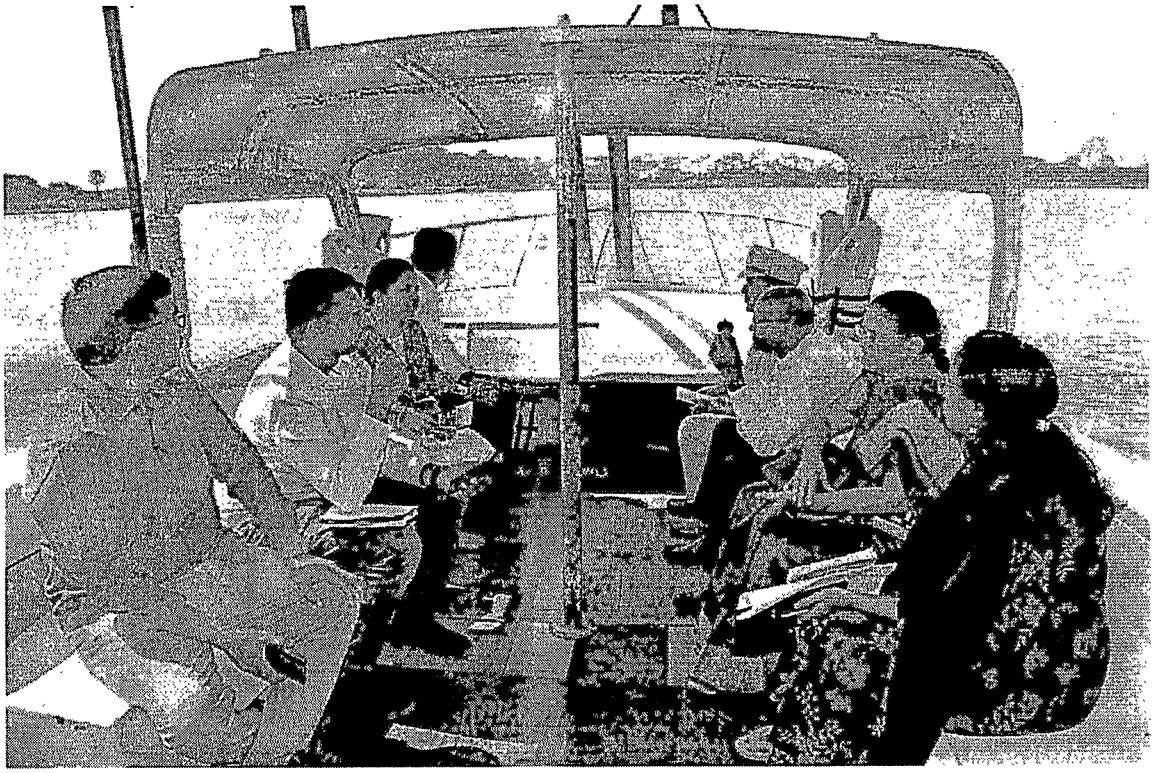
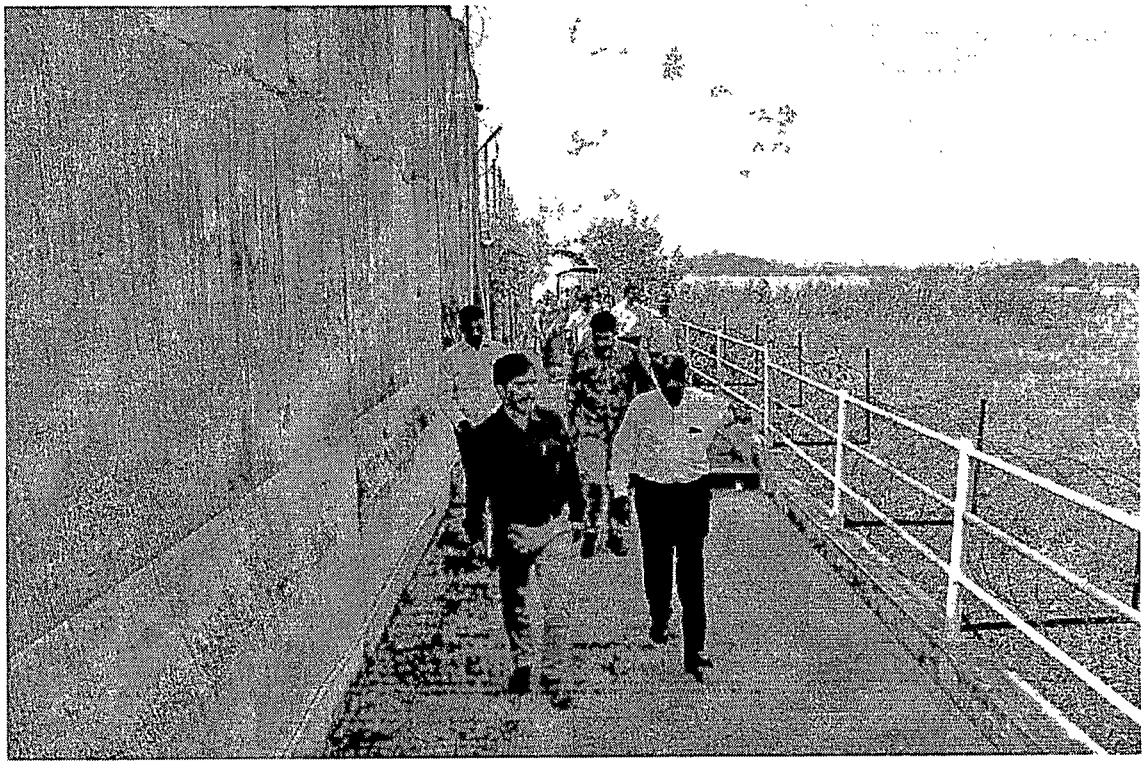
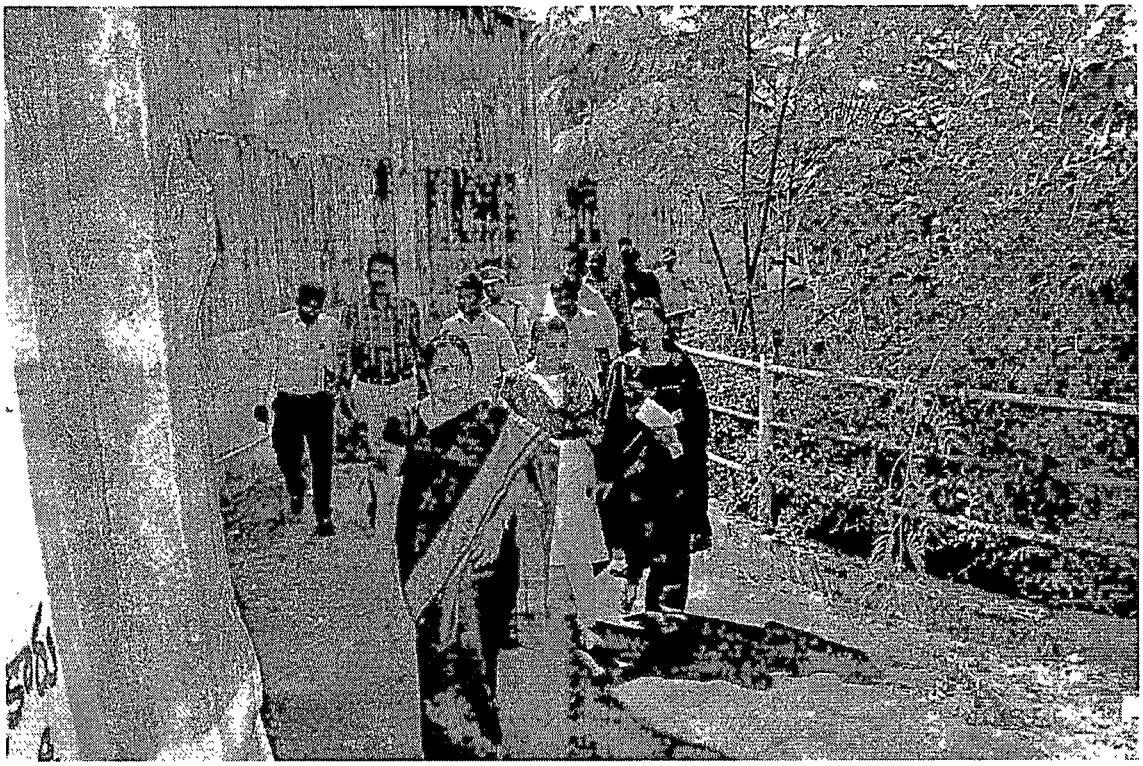
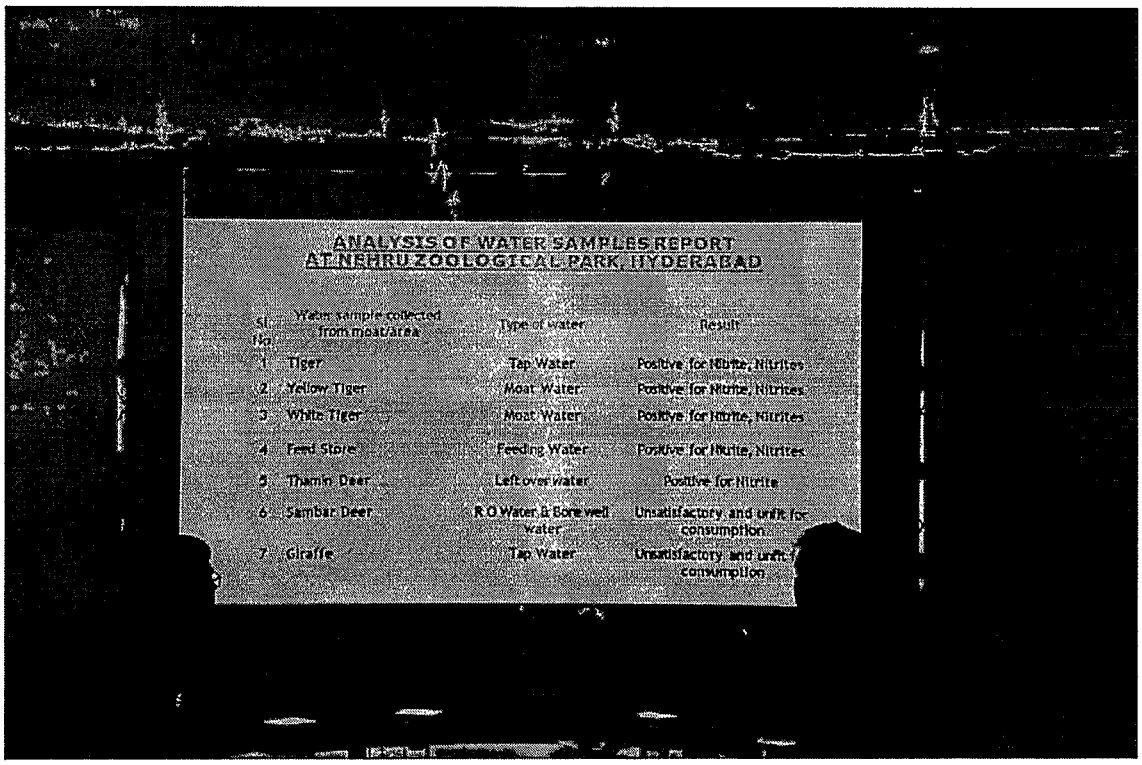
11.	LM (Bore Water)	8.50	1.91	12.8	11	7.2	9.6	10.8	4.27	5.2*	0.04	0.004	0.01	0	Traces	0	Traces	0.029	0
12.	Bear Moat (Tap Water)	7.95	0.69	5.4	12	4.8	2.8	4	2.43	11*	0.22	0.056	0.01	0	0	0	Traces	0.011	0
13.	Meeaws (Tap Water)	8.00	0.62	5.4	12	4.6	2.8	3.5	2.13	12*	0.03	0.039	0.01	0	0	Traces	Traces	0.011	Traces
14.	Main Gate (Municipal Water)	7.72	0.63	4.6	13	4.6	3.2	3.7	2.44	13*	0.03	0.041	0.01	0.1	0	Traces	Traces	0.007	Traces
15.	Water in (Tap at Chinkara)	7.77	0.69	5.2	14	5.2	2.8	3.9	2.42	14*	0.03	Traces	0.01	0	0	0	Traces	0.014	Traces
16.	Primate (Tap Water)	7.70	1.03	7.4	0	8.4	4	7.1	3.69	1.0	0.08	0.038	0.01	0	0	Traces	Traces	0.02	Traces
17	Duck Pond (Moat Water)	7.73	1.43	10	18	8.2	6	8.5	3.80	16*	0.03	0.059	0.01	0	0	Traces	Traces	0.022	0
18.	D.Bed RO Plant Water	7.94	0.25	2.2	0	2.8	2	1.2	1.14	0.6	0.03	0.03	0.01	0	0	0	Traces	0.009	Traces
19.	New Inpatient (Bore Water)	7.76	1.12	7.4	20	8.8	4	7.4	3.85	21*	0.19	0.024	0.08	0	0	0	Traces	0.026	Traces
20.	Royal Bengal Tiger (Normal) Moat Water	7.73	2.46	11.8	21	14	10.4	18.1	7.45	23*	0.03	0.022	0.01	0.2	0	Traces	Traces	0.038	0
21.	White Tiger Moat Water	7.82	1.78	9.2	22	5.6	9.2	13.5	6.29	19*	0.02	0.006	0.01	0	0	Traces	Traces	0.028	Traces
22.	Borned Malacker Moat Water	8.44	2.46	11.8	24	8.8	12.8	18.7	7.70	21*	0.01	0.008	0.01	0	0	Traces	Traces	0.042	Traces

Note: These samples are not drawn by the staff of this laboratory









ANALYSIS OF WATER SAMPLES REPORT
AT NEHRU ZOOLOGICAL PARK, HYDERABAD

Sl. No.	Water sample collected from moat area	Type of water	Result
1	Tiger	Tap Water	Positive for Nitrite, Nitrites
2	Yellow Tiger	Moat Water	Positive for Nitrite, Nitrites
3	White Tiger	Moat Water	Positive for Nitrite, Nitrites
4	Feed Store	Feeding Water	Positive for Nitrite, Nitrites
5	Thamin Deer	Left over water	Positive for Nitrite
6	Sambar Deer	R O Water & Bore well water	Unsatisfactory and unfit for consumption
7	Giraffe	Tap Water	Unsatisfactory and unfit for consumption