Welcome to Winnovators 2026

Solve Webinar

Winnovators

Developing skills, ideas, futures

Agenda

1. Welcome & introduction
2. Responses – Solve Challenge 1
3. Responses – Solve Challenge 2
4. Next Steps

WaterAid

Strengthening Healthcare Waste Management in Nepal

1. Given that national standards and SOPs for waste management exist but may not always be effectively implemented, and that many responsibilities across the waste management cycle sit with local governments beyond the direct control of individual healthcare facilities (HCFs), could you please clarify the expected scope of solutions for this Solve challenge? Should solutions focus on interventions that can be practically implemented at the HCF level, or should teams also consider broader systemic changes beyond the facility level?

We encourage teams to start with solutions that can be realistically implemented at healthcare facility level, while also considering how the facility connects with the wider waste management system. In Nepal, responsibilities are shared among health facility operation and management committees, municipal and local governments, private sector waste service providers and regulatory authorities.

Teams are not expected to propose national policy or legislative reform. But we would like you to keep the full waste management pathway in mind and explore opportunities to strengthen coordination, accountability, monitoring and sustainability across this pathway. Specially we encourage you to consider how your solution could work at the points where responsibility passes from the healthcare facility to other actors, because waste that is correctly segregated within a facility may still be mixed again during collection, transport or final disposal.

Strengthening Healthcare Waste Management in Nepal

2. Could you share examples of HCWM initiatives that were piloted but didn’t continue or failed? What lead them to stop, especially once external support ended, and what does your team feel is missing for a long-term solution?

WaterAid Nepal’s experience is generally not that individual HCWM initiatives have completely failed or been discontinued. Instead, our improvements achieved during periods of external funding or technical support can become difficult to sustain once that support ends. This is particularly true where interventions focus mainly on infrastructure and equipment without adequately strengthening institutional capacity, government ownership and engagement of Health Facility Operation Management Committee (HFOMC) and local government.

We encourage teams to consider the conditions needed for their proposed solution to continue beyond the initial pilot or funding period. We would like teams to keep sustainability, affordability and ownership in mind and explore how your solution could be embedded within existing facility and local systems so that they remain functional, affordable and locally owned beyond an initial pilot or period of external support.

Strengthening Healthcare Waste Management in Nepal

3. From your team's on-the-ground experience with HCWM, could you share what current SOP training looks like, including its scope, frequency, and accessibility, and reflect on what tends to work well, what doesn't, and where you see the biggest gaps or opportunities to fix?

Training on national guidance and SOPs in Nepal is delivered through government led orientations, IPC programs, partner-supported projects and facility level initiatives. However, its content, frequency and accessibility vary across locations and facility levels. Smaller facilities often have less access and opportunity, and training coverage differs among the staff groups involved in HCWM.

Nepal's experience shows that practical learning with appropriate follow up is generally more effective than standalone one-off orientation. We encourage teams to explore what an effective and sustainable capacity strengthening approach could look like across different facility contexts and workforce groups, including how it might connect with existing WASH and IPC systems.

Addressing Chemical Water Quality Challenges in Groundwater in Nepal

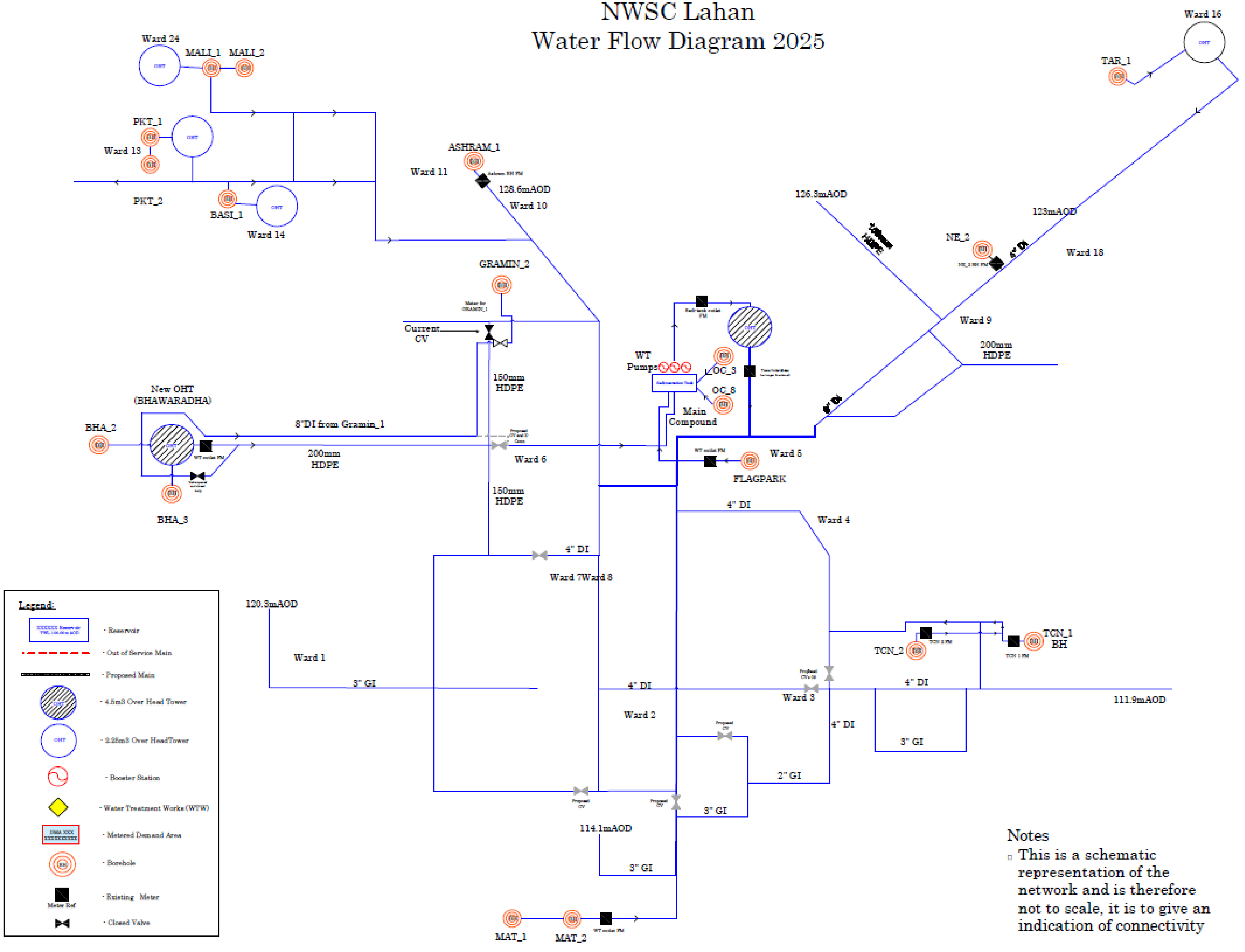
1. Current treatment system context and constraints

Could you please confirm the current water supply system configuration, including which sources currently bypass the treatment system and the expected scope of the proposed treatment solution?

"Figure 3: From source to tap" (Reference From source to tap: Improving water supply in Lahan, Nepal Learnings from the Beacon Project, November 2020)" indicates a supply capacity of 2.9 ML/d to the local community. However, our understanding is that this includes supply from Laxminiya and TCN, which currently bypass the treatment system.

- The current **water supply configuration (Schematics)** – see next slide
- NWSC used to operate in a core urban ward (Wards 1 to 10). From past few years, NWSC has expanded its service area at the outskirt wards (Wards 13, 14, 16 and 24) of the municipality as well. Currently, NWSC operates 18 boreholes with maximum production capacity of 14.72 MLD with an average borehole production of 5.7 MLD.
- Recent water quality monitoring under the NWSC Lahan **Manganese Sampling Protocol (July-September 2025)** has confirmed persistent and widespread manganese contamination across the majority of Lahna's groundwater sources.
- Several high-yield boreholes including Gramin, OC8, NE1/NE2, TCN1/TCN2, and MAT1 regularly exceeded both NDWQS (0.2mg/L) and WHO provisional guidelines (0.08 mg/L), often by large margins. Only a few peripheral boreholes remain consistently within safe limits.

NWSC Lahan
Water Flow Diagram 2025



Notes
- This is a schematic representation of the network and is therefore not to scale, it is to give an indication of connectivity

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WaterAid/Avash Karmacharya

Nepal Water Supply Corporation (NWSC) Lahan Branch office compound

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Addressing Chemical Water Quality Challenges in Groundwater in Nepal

2. Raw water quality and design criteria

Could you please provide any available raw/feed water quality data and confirm the basis of design for the proposed treatment system?

Specifically, it would be helpful to receive:

- Water quality monitoring data (ideally up to one year), including parameters such as iron, manganese, arsenic, pH, alkalinity, dissolved oxygen, total dissolved solids, suspended/ dissolved iron and manganese, and any other relevant data
- The required treatment capacity for the design development
- Treated water quality targets (e.g. iron and manganese concentration)
- Any other key design criteria that should be considered

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Addressing Chemical Water Quality Challenges in Groundwater in Nepal

2. Raw water quality

The borehole named **OC8** (high concentration and relatively lower discharge case) has been considered to pilot with the Manganese treatment unit. Technical design and performance requirements are:

(a) Design Discharge Capacity: The treatment system for borehole OC 8, located within the Nepal Water Supply Corporation (NWSC) Lahan Office compound, shall be designed for a continuous discharge capacity of **12 litres per second (L/s).**

(b) Raw Water Quality: The design criteria for the treatment system shall incorporate a **raw water manganese concentration of 1.0 mg/L**, as determined through a comprehensive water quality testing.

Fig.: NWSC Lab incharge preparing for testing

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Addressing Chemical Water Quality Challenges in Groundwater in Nepal

2. design criteria

(c) Treated Water Quality Objectives:

- The treatment system shall be capable of reducing manganese to a maximum concentration of 0.05 mg/L in the treated water.
- All other treated water quality parameters shall fully comply with the National Drinking Water Quality Standards (NDWQS) 2079.
- The treated water shall be of a quality suitable for domestic use and shall not adversely affect its use for cooking, drinking, food preparation, or washing. Following treatment, the water quality shall comply with the specified acceptance criteria. Representative samples shall demonstrate acceptable taste and odour, and key parameters including iron, manganese, turbidity, and clarity shall remain within the specified permissible limits for treated water.

(d) Operational Cycle: The system shall be designed to achieve an ideal minimum operational run time of 18 hours between successive backwash cycles under normal operating conditions.

(e) Standby Provision: Adequate provision shall be made for a standby treatment unit to ensure uninterrupted operation during maintenance, backwashing, or unexpected shutdowns.

(f) Backwash Water Management: A suitable backwash water collection, treatment, and disposal system shall be provided within the NWSC compound. The system shall ensure that discharged backwash water is managed in an environmentally safe manner, with particular attention to preventing adverse impacts on nearby river, water bodies and the surrounding environment.

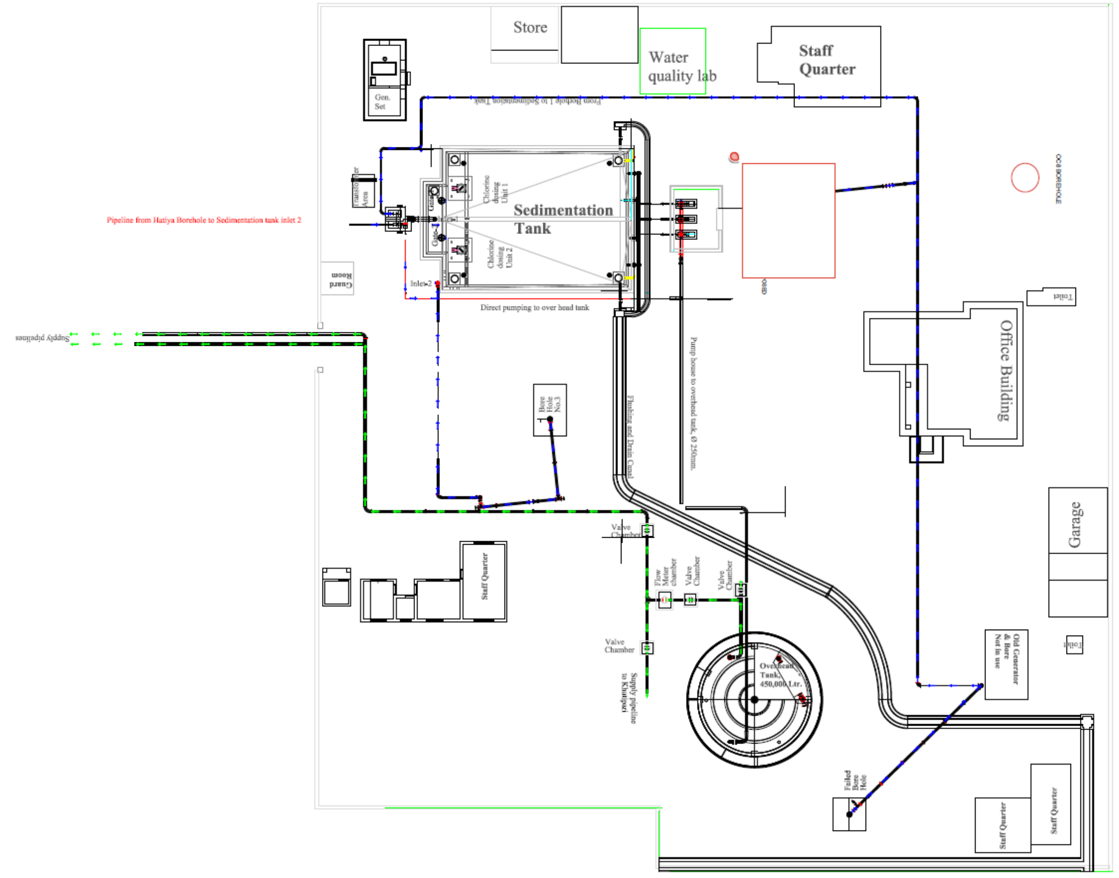
Addressing Chemical Water Quality Challenges in Groundwater in Nepal

3. Existing site layout and available space

Could you please provide any available site information to help us understand the existing facilities and constraints?

This could include:

- General arrangement drawings or dimensioned site plans
- GIS or spatial data, where available
- The layout of the sedimentation tanks and surrounding infrastructure
- Available land or footprint for any future treatment facilities



NWSC Compound for Reference

NWSC Without Earth

NWSC Compound AutoCAD Drawing

NWSC Top View

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Addressing Chemical Water Quality Challenges in Groundwater in Nepal

4. Sludge, flushing water and waste management

Could you please describe how flushing water, sludge and other treatment residuals are currently managed at the Lahan facility?

Specifically:

- How flushing water from the sedimentation tanks is handled
- How sludge is removed, treated and disposed of
- Any existing or preferred waste management options for future treatment residuals (e.g. sewer, drying beds, lagoons)

By regular opening of wash out valves. The sediments collected from the sedimentation tank, consisting predominantly of sand particles, are managed by disposing of them in low-lying areas or potholes within the NWSC premises/compound. This practice facilitates on-site reuse and avoids off-site disposal requirements. The rest of the water passes through the municipal drainage. The sand trapped in the drainage channels are removed manually.

Addressing Chemical Water Quality Challenges in Groundwater in Nepal

5. Local implementation constraints

What key local factors should we consider to ensure any proposed treatment solution is practical and implementable?

For example:

- Available power supply and any constraints
- Funding considerations
- Local materials and suppliers
- Procurement, operational and maintenance constraints
- Any other practical considerations for long-term operation

Considering the backup electricity generators is a must as the power cut is quite often. In addition, the electrical protection works like provisioning of voltage protection, phase failure protection, dry run protection, and lightening arrestors shall add huge value for the system protection. It is also necessary to consider the ease in supply chain management along with the provisioning of annual maintenance contracts for immediate corrective measure.

Addressing Chemical Water Quality Challenges in Groundwater in Nepal

Gayatri Kumari Pasman, 42, drinking water from a jug, after extracting it from a water pump at her home, Lahan-14, Nepal, October 2023.

6. Community needs

How should proposed technical solutions incorporate local community needs, preferences and cultural considerations to maximise long-term acceptance and effectiveness?

We'd be particularly interested in understanding the priorities and expectations of the community in Lahan regarding their water supply system.

Under the technical design criteria, the treated water shall be of a quality suitable for domestic use and shall not adversely affect its use for cooking, drinking, food preparation, or washing. Following treatment, the water quality shall comply with the specified acceptance criteria especially acceptable taste and odour, and turbidity, and clarity shall remain acceptable for the community.

Questions and Responses from the Webinar Chat

1. **While Manganese and Iron are the contaminants being focused on, are there any other heavy metals or other contaminants that are being looked at?**

The National Drinking Water Quality Standards (NDWQS) 2022 include 19 standard parameters covering physical, chemical, and microbiological aspects of drinking water quality. In addition to these standard parameters, the NDWQS 2022 also identifies parameters that require further testing based on risk and contextual relevance.

Under the standard chemical parameters, Iron, Manganese, Arsenic, Fluoride, Ammonia, Chloride, Sulphate, Nitrate, Copper, Zinc, Aluminium, Total Hardness, and Residual Chlorine (for systems with chlorination facilities) are recommended for routine monitoring. For additional testing based on risk and contextual relevance, parameters such as Calcium, Lead, Cadmium, Chromium, Cyanide, Mercury, and Nitrites are recommended.

As Kabindra mentioned, a Water Safety Plan has been implemented in this water utility. A comprehensive risk assessment has been conducted for the entire water supply system, including the source boreholes. Based on which, the regular water quality testing has been carried out through ISO-certified laboratories.

Based on the risk assessment and water quality monitoring results, only Iron and Manganese have been identified as key contaminants. All other tested parameters were found to be within the threshold limits specified by the NDWQS.

Questions and Responses from the Webinar Chat

2. **You did note that the target was around 5.4 ML per day for treatment, what future treatment requirements will be required to meet growth - volumes**

The current water demand in the system is approximately 5.4 million litres per day (MLD), serving around 6,700 households. As you rightly pointed out, future demand also needs to be considered. Based on demand projections and the historical pattern of annual system expansion and network extensions, the number of household connections is expected to increase to approximately 13,000. This would result in a total water demand of about 10.5 MLD.

However, not all boreholes contain elevated concentrations of Iron and Manganese. Therefore, treatment of the entire water supply volume is not necessary. The project team is currently exploring optimized solutions, including both borehole-level treatment solution and system-wide blending options, to achieve effective and cost-efficient water quality management for the utility.

For the current case, we are proposing a borehole-level treatment solution for a borehole with a raw water Manganese concentration of 1 mg/L considering the safety factor. The borehole has a discharge capacity of 12 litres per second and operates for 18 hours per day. Based on these operating conditions, the proposed treatment system would be designed to treat water from a single borehole with a capacity of approximately 0.78 MLD.

Questions and Responses from the Webinar Chat

3. Is there a report available on seasonal changes in manganese concentration at bore holes?

Yes, a report is available on the seasonal variation of manganese concentrations in the boreholes. Water quality monitoring has been conducted for all source boreholes over an extended period, with records spanning nearly eight years. The monitoring data indicate that manganese concentrations began exceeding the limits specified in the National Drinking Water Quality Standards (NDWQS) only in recent years, particularly since 2024. The underlying reason for this increase has not yet been established.

To verify whether the elevated manganese concentrations were consistent over time and to accurately identify the boreholes contributing higher levels of manganese and iron, a comprehensive testing protocol and monitoring procedure were developed and implemented between July and September 2025.

This monitoring period was intentionally selected to assess potential seasonal variations in water quality. July represents the peak monsoon season, while September is comparatively drier and represents post-monsoon conditions. By conducting repeated testing across these contrasting seasons, the study aimed to determine whether manganese and iron concentrations were influenced by seasonal factors.

The results confirmed that manganese concentrations were generally consistent across the monitoring period and did not show significant seasonal fluctuations. The study also successfully identified the specific boreholes where manganese and iron concentrations exceeded the NDWQS limits. These findings have provided a reliable basis for targeting appropriate treatment

Questions and Responses from the Webinar Chat

4. **Do you have current site electrical single line diagram and maximum demand, or power demand daily profile for the proposed compound?**

Regarding the availability of a site electrical single-line diagram (SLD) for the proposed compound, I am not aware of any existing documentation and understand that such a diagram may not currently be available.

However, information on the maximum power demand and the daily electrical load profile of the proposed compound can be obtained from the Time-of-Day (TOD) meter installed at the site. Historical consumption and demand data recorded by the TOD meter can be analysed to determine peak demand, daily load patterns, and overall power usage characteristics of the facility.

Questions and Responses from the Webinar Chat

5. **Is your power purchased through a PPA with any of the nearby renewable power providers and does this have various load and or timing constraints?**

In Nepal, electricity is supplied and distributed through the Nepal Electricity Authority (NEA), the government-owned utility responsible for the national power system. The proposed site purchases electricity directly from the NEA and does not have a Power Purchase Agreement (PPA) with any nearby renewable energy provider.

At present, Nepal does not have a formal load-shedding program, which was previously practiced during periods of national power shortages. However, the power supply can still be affected by occasional outages due to maintenance activities, transmission and distribution system issues, weather-related events, or other operational factors. These interruptions may be either planned or unplanned, and their timing and duration can sometimes be uncertain.

Therefore, there are no known contractual load restrictions or time-of-use constraints associated with the site's electricity supply. Nevertheless, the possibility of intermittent power interruptions should be considered during the design and operation of the proposed facility.

It is also worth noting that the electricity supplied through the NEA is predominantly generated from hydropower, which is a renewable source of energy. As a result, the power consumed at the site is largely derived from renewable energy resources.

Questions and Responses from the Webinar Chat

6. **The scope of this seems pretty large. Are there specific aspects that we should primarily focus on?**

As noted in the response to Question 2, the overall potential treatment scope across the water supply system is extensive. However, the current focus is intentionally limited to a single borehole within one compound that exhibits relatively high manganese concentrations and a comparatively lower production yield.

This targeted approach is intended to serve as a pilot intervention, allowing the utility to gain practical experience over an extended operational period, ideally covering different seasonal conditions throughout the year. The pilot will provide valuable insights into the design requirements, operational performance, maintenance needs, reliability, and treatment effectiveness of the proposed system.

The lessons learned from this pilot project will help inform and optimize the design of future treatment installations at other boreholes within the system. In addition, the experience gained will support the development of standard operating procedures (SOPs), strengthen operator capacity, and establish practical guidelines for the long-term operation and maintenance of manganese treatment systems across the utility.

Therefore, our primary recommendation is to focus on the successful implementation, monitoring, and evaluation of this pilot-scale treatment system before considering wider-scale deployment across the entire water supply network.

Questions and Responses from the Webinar Chat

7. **Should we base our response on health or aesthetic guidelines? And which would be of higher priority?**

Both. Both health and aesthetic aspects are equally important for the sustained safer use of water by the consumers.

Questions and Responses from the Webinar Chat

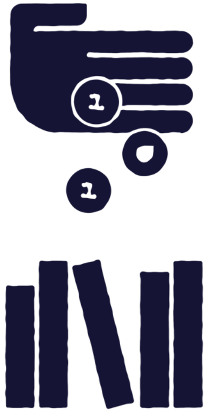
8. When you assess a healthcare facility that has been successful in HCWM, what specific indicators or observations do you look for?

When assessing an HCF, we can look for:

- Proper waste segregation at point of care (source)
- Availability of SoPs and guideline at HCF and access by staff
- Safe storage and handling of healthcare waste (including availability of PPE)
- Disinfection or treatment of hazardous waste before disposal
- No open-burning or unsafe disposal practice
- Staff trained and consistently following the procedure as mentioned in SoPs

Timeline and deliverables

Throughout your team's Winnovators journey there will be key milestones to reach for Solve, Fund and Learn.



	April	May	June	July & August	September	October
	Welcome to Winnovators! Get started by having your first team meeting and learning more about your teammates **27 April** **Virtual Launch Event** where you will be briefed on the program	**22 May** All teams submit their **Fundraising Pitch**	**1 June** WaterAid send feedback and seed funding based on each team's Fundraising Pitch **1 June** All teams submit their **Solve Challenge Outline** **22 June** WaterAid provide feedback	**30 July** **Solve Webinar**	**30 September** Time's up! Make sure all your **final submissions** have been turned in for judging	**Virtual Awards Event** **Date TBC**

Teams deliver on their plans and activities

WaterAid/ Tariq Hawari

Thank you for being part of Winnovators 2026!