II. JICA- Biratnagar Water Supply Improvement Project

Background:

Biratnagar Metropolitan City is the third largest city in the eastern part of Nepal. An industrial and economic hub is a habitat to approximately 300000 people in around 48000 households. Biratnagar mainly rely on groundwater as its source of water supply. NWSC is the main water utility who is responsible for supplying safe drinking water to residents of the city. Due to the ageing distribution networks and lack of treatment systems, it is a big challenge for the utility to achieve their mandate of providing safe drinking water. Other than NWSC there are three Water Users and Sanitation committees who are providing drinking water supply. Due to abundant ground water resources, people often rely on shallow tube wells as source of water which might be contaminated due to improper sanitation practices.

Almost 6000 people got infected with Hepatitis epidemic in 2014 and there was a huge concern of improving the water quality of the city. Upon the request from Government of Nepal, a grant aid project was approved by Government of Japan for the improvement of water supply infrastructure of the city.

Project Timeline:

The first field survey was conducted by Japanese consultant team in November 2019. Various consultation with the stakeholders were conducted during this period. Second comprehensive field survey was done from the period of January-March 2020. Due to the lockdown caused by the COVID-19 pandemic, all field works was to be suspended until August 2021. However, outline design works continued during that period based on the available survey data done before the lockdown. Consultant team submitted their outline design report and a MoU was signed between JICA and Ministry of Water Supply on 3rd September 2021. Following this agreement, Government of Japan and Government of Nepal signed grant aid agreement on 10th March 2022 for the commencement of detailed design. Detailed design works started from May 2022 and is expected to be completed by March 2023. Procurement works for the selection of contractor is expected to be completed by October 2023 and the contractor is expected to be mobilized by November 2023. The construction schedule is estimated to be 24 months; however, the total project duration is 34 Months.

Current Situation:

According to the survey conducted by the consultant in 2019-20, the coverage of piped water supply system is around 30%. Very high concentration of iron and manganese was observed in the ground water samples. Also, there was an evidence of e-coli in the water sample taken from the shallow tube wells. Non-revenue water was estimated around 40% and the supply hours was limited to 13 hours per day.
Salient Features of the Project:
This project will focus mainly within the distribution area covered by pump stations located at Devkota Chowk, Tinpaini, Munalpath, and area around BFM and Pichara pump stations. Project proposes to construct 3 new deep tube wells each at existing Devkota, Tinpaini, Munalpath pump stations and one new pump station at ward no. 5 towards the western part of the metropolitan city. These 3 deep wells at each pump stations will produce 1,200 Liter per minute of raw water. Pumped raw water will be pre-chlorinated and will flow through the treatment facilities including removal of iron and manganese. The treated water will be stored in the ground reservoir and will be pumped to the existing overhead tanks at Devkota, Tinpaini and Munalpath. A new pump station which is proposed at ward no. 5, a whole set of 3 deep tube wells, treatment facilities, ground clear water reservoir, 1,200 cubic meter capacity overhead tank and an administrative building will be constructed.

This project will also lay approximately 100km of transmission and distribution pipe networks. Each pump station will be provided with water quality analysis equipment for regular monitoring of the water quality parameters. Mini excavator will be procured for making it easy for NWSC to promptly repair the leakages and to excavate for further expansion of the distribution networks. This project also includes the soft component, which will help NWSC to enhance the capacity of their human resources in water quality management and water distribution management.

Proposed Facility Components of Project:
In order to improve water quality and promote piped water supply rate for water supply system of NWSC Biratnagar, Japan International Cooperation Agency (JICA) provided a preparatory survey for the Japan’s Grant Aid in 2019-2020. According to the survey, following components were proposed and the Governments of Japan and Nepal agreed to implement the project by the Japan’s Grant Aid.
### Table 7: Details of Proposed Facility Components for Project

<table>
<thead>
<tr>
<th>Each Facility</th>
<th>Devkota water distribution areas / Tinpaini water distribution areas / Munal Path water distribution areas</th>
<th>New No.5 water distribution areas</th>
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</table>
| **Well**                        | Production well (Depth 150m) : 3unit / Each PS  
Well pump : 1.2m³/min / Each PS  
Raw water pipe, instrumentation equipment : 1set / Each PS | Production well (Depth 150m) : 3unit / PS  
Well pump : 1.2m³/min / PS  
Raw water pipe, instrumentation equipment : 1set / PS |
| **Water Treatment Facility**    | Open reinforced concrete structure (receiving well, filtration reservoir) : 3.6m³/min : Each PS  
Manganese sand, water collection system, washing and drainage system, instrumentation equipment (Flow meter) : 1set / Each PS | Open reinforced concrete structure (receiving well, filtration reservoir) : 3.6m³/min / PS  
Manganese sand, water collection system, washing and drainage system, instrumentation equipment (Flow meter) : 1set / PS |
| **Water Reservoir / Pump Building** | (Water Reservoir)  
Reinforced concrete structure semi-underground tank : 1,200m³ / Each PS  
(Pump Station)  
Reinforced concrete frame and brick masonry structure : 239m² / Each PS | (Water Reservoir)  
Reinforced concrete structure semi-underground tank : 450m³ / PS  
(Pump Station)  
Reinforced concrete frame and brick masonry structure : 182m² / PS |
|                                | Single suction volute pump : 3 unit / Each PS  
Chlorine Tank : 2 unit / Each PS  
Chlorine injection facility, instrumentation equipment (Water level meter, Flow meter), building facility, power receiving and distribution equipment, control panel : 1set / Each PS | Single suction volute pump : 3unit / PS  
Chlorine Tank : 2 unit / PS  
Chlorine injection facility, instrumentation equipment (Water level meter, Flow meter), building facility, power receiving and distribution equipment, control panel : 1set / PS |
| **Overhead Tank**               | (Existing OHT will be used)  
Instrumentation equipment (Water level meter·Flow meter) / Each PS | Reinforced concrete structure Height 25m  
Volume 1,200m³ / PS  
Instrumentation equipment (Water level meter·Flow meter) : 1set / PS |
| **Administratio n Building**    | (Existing building will be used) | Reinforced concrete frame and brick masonry structure : 72m² / PS  
Building facility, wastewater treatment plant : 1set / PS |
| **Distribution Pipe**           | Main pipe 10”—12” dia, L = 4.92km  
Branch pipe 3” – 8” dia, L = 61.87km  
Drawer pipe 2” dia, L = 10.94km | Main pipe 10”—12” dia, L = 3.82km  
Branch pipe 3”–8” dia, L = 26.49km  
Drawer pipe 2” dia, L = 4.26km |
| **Procurement of the Equipment** | Mini Excavator : 2 unit  
Water Quality Analysis equipment : 1 set | |
Projected Outcomes:

Design period of this project is for 15 years i.e. up to 2035 A.D. The project aims to increase the current service coverage from 35% to 50% by 2027. This expansion of service coverage is expected to benefit around 95,000 population of Biratnagar Metropolitan city. There will be drastic improvement in the water quality and NRW is expected to be reduced to 15% by 2035.

Proposed No. 5 Pump Station at Ward No. 5, Biratnagar Metropolitan City

Average water supply volume per day will also increase from 9,000 m³/day to 15,000 m³/day. Other than quantitative effects project will have more qualitative benefits to the people of Biratnagar. The project will improve the existing three tube well pump stations, adding/rehabilitating water treatment systems and will construct a new water pump station as well as tube wells and treatment system. Improvement of water quality will decrease chance of infection of water borne diseases. It is also expected that customer satisfaction will increase in due time and people will shift from using shallow tube wells to piped water supply in future and it leads the citizens’ willingness to connect to piped water supply system. The ultimate overall aim of this project is to enhance the living standards of the people of Biratnagar.