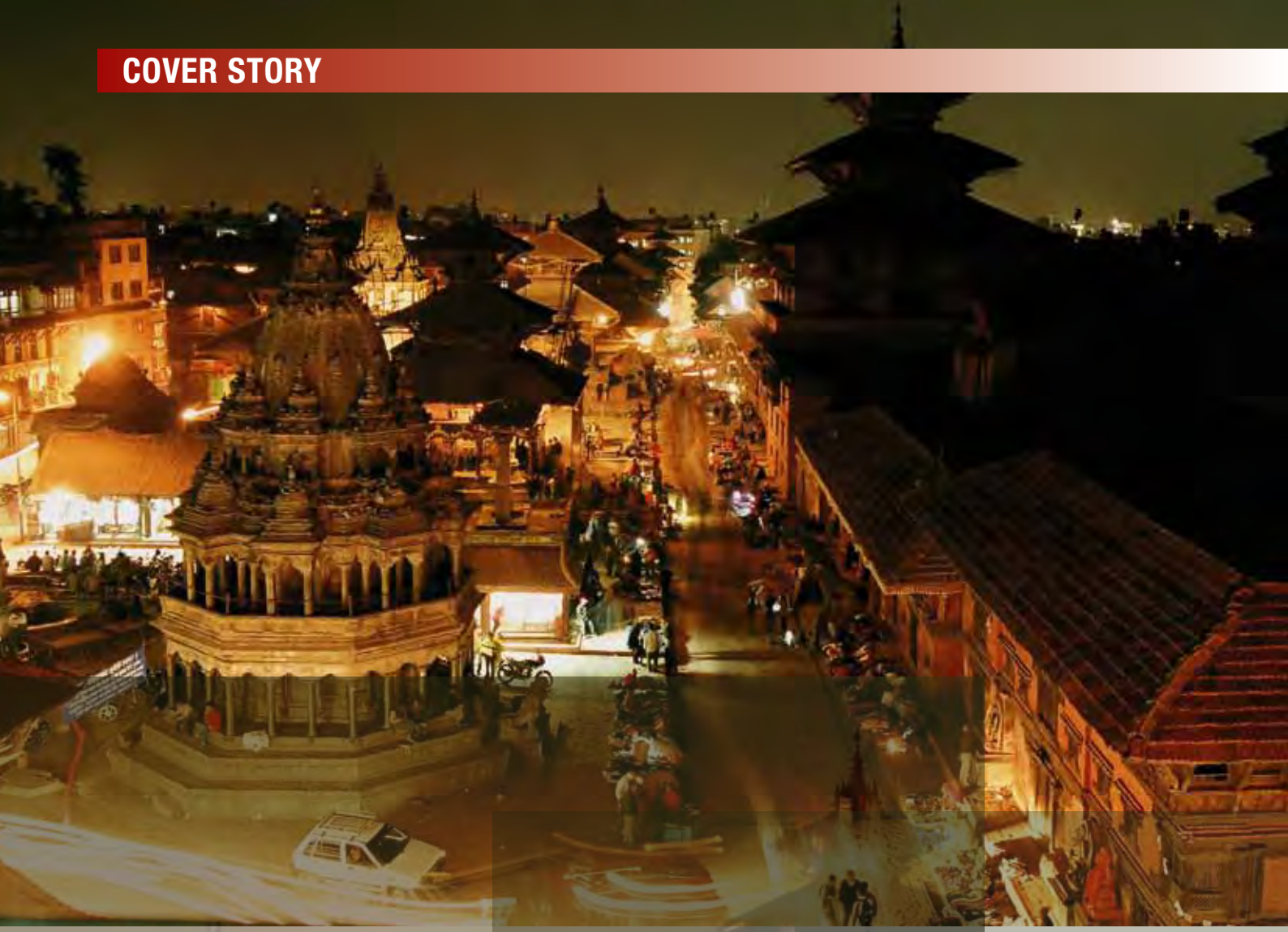

IMPROVING TREATMENT INFRASTRUCTURE

A wastewater masterplan lays out a vision for water infrastructure in Nepal.

Imagine only having access to water for one hour a day on every third day. This is the situation in Kathmandu, the capital of Nepal, which is struggling to supply water to its burgeoning population.

While the city will increase its bulk water supply to 170ML/d by 2014, the wastewater system could struggle to cope which would pollute the nearby streams and rivers.

To solve this, GHD and MWH are working to produce a conceptual wastewater master plan for the city. This is different to a conventional masterplan which would typically have preliminary engineering plans and was chosen due to the high uncertainty about the current extent and condition of the buried wastewater assets.

The conceptual master plan is currently in draft form and will be finalised by March. GHD and MWH are also completing a capital investment and asset management plan (CIAMP) and a feasibility study for future loans from the Asian Development Bank. This study will consider cost estimates and the environmental and social impacts with a view to securing loans from the Asian Development Bank which will be the major funding agency for future work.

The current population of the greater Kathmandu area is about 2.6 million. By 2025, this will increase to about 4.44 million. The current water network can only satisfy about half of the demand and even then, the supply of water is intermittent to most customers.

Of the 40,000 people currently living in low income and squatter settlements, almost a quarter do not have a water connection.

MWH sewerage specialist Darryl Jackson … "Despite the problems appearing overwhelming, one has to be careful not to try and solve all the problems at once – a measured, pragmatic approach is needed."

More generally, the lack of access to basic urban infrastructure and services is posing major health risks for the urban population. About 70% of the urban population is connected to a combined piped wastewater system collecting stormwater and sewage.

The remaining population use on-site systems – generally septic systems for those houses with water supply. Of the 80,000 septic systems in the greater urban area, less than 40% have a soak pit or leach field associated with the septic tank. Most of the septage (sludge from the septic tanks) is effectively disposed of untreated to surface waterways.

The infrastructure master plan proposes carrying out an asset survey and condition assessment. This will be supported by a sewer cleaning program. This will take about two to three years. New sewer cleaning equipment will be purchased to complement this work. This will be followed by an initial pilot rehabilitation program based on the findings of the asset condition survey and a new network masterplan.

The conceptual masterplan has a roadmap to 2025, and calls initially for an asset survey and condition assessment, which will be supported by a sewer cleaning program and new sewer cleaning equipment. These will take about two to three years to be completed. Introduction of an asset management system will be addressed separately by KUKL and ADB.

This survey and cleaning program will be followed by an initial pilot rehabilitation program based on the findings of the asset condition survey and a new network master plan, as well

The current water network in Kathmandu can only satisfy about half of the customer demand.

as by significant infrastructure improvements, including new/augmented treatment plants, new interceptors along the major streams, and wastewater network rehabilitations and extensions. A trial of a sewage screening system is under consideration. Ten small decentralised septage plants will be constructed using constructed reed-bed technology to serve the growing number of on-site systems. Other small decentralised systems will be encouraged.

According to MWH sewerage specialist Darryl Jackson, who helped develop the master plan, the sewage strength in Kathmandu is very high – over twice the typical values in Australia. "This is due to the limited water supply which means that there is little dilution of the biological load. The low flow is one of the contributing causes of sewer blockages," he said.

About 95% of the collected wastewater discharges raw and unscreened into surface streams. Water quality in the urban reaches of the rivers is very poor with dissolved oxygen levels often less than 2mg/L. These streams can be classified as medium strength sewage.

In working on the plan, Jackson discovered the challenges of working in an industrialising country. There were institutional issues such a severe lack of funding which had to be solved by loans undertaken through Asian Development Bank and Kathmandu Upatyaka Khanepani Limited (KUKL), a public company set up by the Nepal government to manage water services in the Kathmandu Valley. The loans total $16 million.

Then there was the existing sewerage infrastructure whose condition was of poor or unknown condition with buried assets. There are few reliable records of existing sewer networks. However, there are 40km of primary sewers, consisting of interceptors adjacent to the streams and rivers. These were constructed in the 1970s and 1980s but today are mostly blocked and not working. Although the system was originally designed with three pumping stations, none are operational.

Asset surveys and condition assessments are being undertaken to fill in the information gaps. Introduction of an asset management system is being addressed separately.

Lastly, land for treatment plants is very scarce and land must be acquired now for future treatment sites. Limited land has been a serious constraint on treatment process options. Disposal of untreated or inadequately treated sewage to water courses.

"Working in developing countries at this level requires a good understanding of the context. Despite the problems appearing overwhelming, one has to be careful not to try and solve all the problems at once – a measured, pragmatic approach is needed," Jackson said.

The political instability in Nepal has slowed the progress of investment or plans for institutional change. This, combined with rapid urban growth and limited asset and flow data, makes it difficult to operate a sewerage system, particularly with an intermittent power supply. "In the 2009 dry season, load shedding was more than 16 hours per day," Jackson said.