



1 The power network of London is mainly underground.

Pump Data Transfer Through the Sky

In large cities, more and more electricity cables for power distribution are laid underground – below the earth. Sulzer has been chosen by a leading UK electricity distribution network operator as its partner to provide a risk management solution. A combination of AquaWeb and Sulzer Control and Monitoring equipment offers monitoring, surveillance, and remote control of the installed drainage pumps.

One of the largest power distribution companies in the UK delivers electricity to eight million homes and companies. In London alone, the company covers an area of 770 km² with cables stretching over 36 500 km. The London network is almost exclusively underground (Fig. 1). Businesses, banks, households, and the government all rely on power distribution that operates without interruption.

The challenge to keep it dry

Underground tunnels containing electrical cables have to stay dry under all conditions. Flooding of the tunnels would have a catastrophic impact and would result in power outages. The power distribution company was looking for a system solution to keep its tunnels dry and to monitor all pump stations involved. The remote monitoring of the pump will support efficient maintenance. This is part of the company's risk management solution to ensure the reliability of the power supply.

Remote surveillance and control is an important feature to allow technicians to keep an eye on the tunnels and installations below the earth.

Monitoring system for the tunnel pumps

After a sound evaluation phase, the power distribution company decided to implement Sulzer pumps along with Sulzer's AquaWeb monitoring and surveillance system. For each of the four tunnels in London, submersible drainage pumps XJ 80, a PC 242 pump controller, and a level sensor MD 127 was installed. The Sulzer AquaWeb monitors multiple pump stations, and the live data are made available to the power distribution company. The alarm handling features of the AquaWeb system ease the work of the engineers, who are responsible for keeping the tunnels dry. The pump data give the power company a full overview of the current situation in the tunnels. This enables the company to decide on the next steps before sending an engineer to the site.

Adapted to customer requirements

Sulzer pumps are known to be robust, reliable, and energy efficient. Sulzer emphasizes its role as a proactive partner and creates customized solutions. For the power distribution company, a customer-specific solution was implemented because not every station could be equipped with an antenna for 3G data transfer.

Fig. 2 shows the parts of the solution package to keep the service tunnels dry:

- Submersible drainage pumps (1) in the water discharge pipes (A–F)
- Level sensor in each pump pit (2) and control panel at the pump
- Pump controller and modem integrated into a complete electrical panel (3) and RS 485 multidrop modem in all shafts
- 3G modem (4) at water discharge pipe F
- Remote monitoring with AquaWeb applications (5).

Secure data transfer

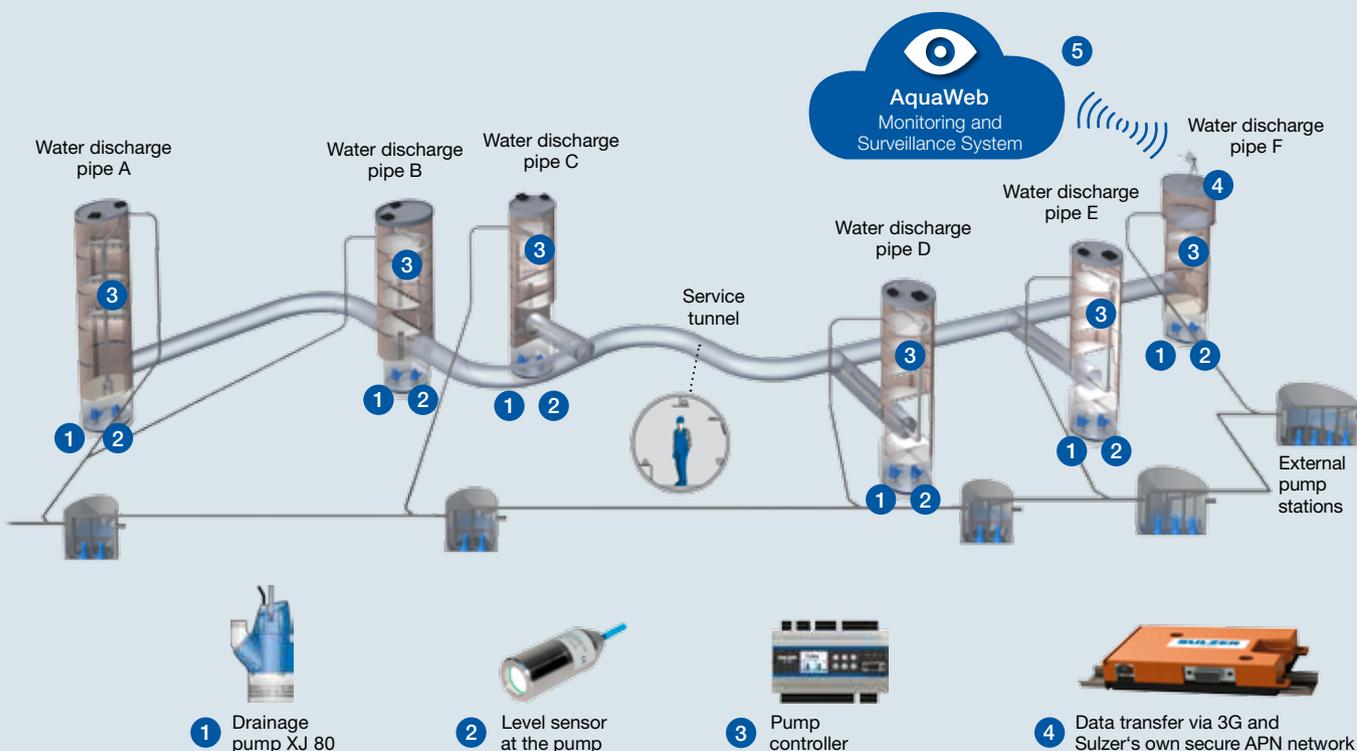
The communication is done in two steps. The RS 485 multidrop modem is used to collect data from stations A–E. Via a cable connection, the data are

delivered to a station F, which has a 3G modem. This 3G modem transfers all data in a similar way to a mobile phone but on a proprietary network of Sulzer.

AquaWeb offers its users different possibilities to connect to the system. The data are transmitted to computers or smartphones. Reports are available in various forms, and these can be customized. Alphanumerical reports are available for those who prefer to analyze raw data. Graphical trend curves are available as well and can be added in the dashboard.

Important data in a single table

Multimimics tables (Fig. 3 on page 8) display the information of several pump stations in a single table. The tables contain the status and run-time information of the desired pumps. The values are automatically updated either when the stations communicate with each other via 3G, after a regular interval, or whenever required. With the help of multimimics tables, the operator can monitor and compare several stations in real time, without switching screens. In the case of high water levels, this might be crucial in order to react quickly to avoid flooding. The water flow from one station to the next can be visualized and influenced by remote control.



2 Customer-specific AquaWeb package.

	● Tunnel Pit 1	● Tunnel Pit 2	● Tunnel Pit 3	● Tunnel Pit 4	● Tunnel Pit 5
Level (m)	0.47	11.34	0.71	0.55	0.29
Inflow (l/s)	0.1	-0.2	0.0	-1.4	-0.1
Outflow (l/s)	0.0	0.0	0.0	5.3	0.0
Pumped Volume Total (m3)	10655	428	3110	12061	0
Pumped Volume Today (m3)	0	0	1	9	0
Pumped Volume Yesterday (m3)	0	0	3	25	0
Pump 1 No. of pump starts Total	16	26	1687	9741	4
Pump 2 No. of pump starts Total	14	17		8716	
Pump 1 No. of pump starts Today	0	0	6	2	0
Pump 2 No. of pump starts Today	0	0		2	
Pump 1 No. of pump starts Yesterday	0	0	11	5	0
Pump 2 No. of pump starts Yesterday	0	0		5	
Pump 1 Running time Total (hh.mm)	263:31	21:01	56:56	332:53	00:01
Pump 2 Running time Total (hh.mm)	01:21	15:08		210:02	
Pump 1 Running time Today (hh.mm)	00:00	00:00	00:12	00:15	00:00
Pump 2 Running time Today (hh.mm)	00:00	00:00		00:12	
Pump 1 Running time Yesterday (hh.mm)	00:00	00:00	00:22	00:36	00:00
Pump 2 Running time Yesterday (hh.mm)	00:00	00:00		00:34	
Pump 1 Avg. Capacity Today (l/s)	19.2	0.6	2.3	7.0	0.0
Pump 2 Avg. Capacity Today (l/s)	23.0	0.7		5.2	
Pump 1 Avg. Capacity Yesterday (l/s)	19.2	0.6	2.4	6.5	0.0
Pump 2 Avg. Capacity Yesterday (l/s)	23.0	0.7		5.7	
Last updated	14/03/2017 10:00:03	14/03/2017 10:00:03	14/03/2017 01:01:37	14/03/2017 10:00:03	14/03/2017 09:57:22
Request new values	Connected	Connected		Connected	Connected

3 Multimimics tables for a quick overview.

Remote control for quick reactions

With the help of AquaWeb, several functions of the water pumps can be set remotely, without climbing into the tunnel or being close to the pump. This allows the technicians to react quickly if AquaWeb indicates an alarm.

AquaWeb remote functions

- Remote start/stop of pumps
- Remote motor reset
- Remote changing of parameters and settings
- Automated remote functions (automatic maneuver).

Fast, automated remote reaction

Customers who know their processes well have the possibility to program automated reactions in case of a specific alarm. In the AquaWeb system, this is called “automatic maneuver.” Based on an alarm, event, or time-triggered sequence, the system can perform automatic tasks, for instance, starting, stopping, or blocking one or more pumps. Automatic maneuver functions can be used to reduce manual labor to clean the pipes. If a pipe is clogged, the station will eventually flood. When AquaWeb receives

a low pump capacity alarm, the system will automatically start two pumps in parallel to try to flush the pipes. This flushing might clean the pipes and restore the capacity automatically. This automatic maneuver can also be initiated preventively at a repeating time interval.

An overview without wet feet

The big advantage of AquaWeb is that the data are collected from the whole waterway network. Optimizing the entire network is the goal, and these considerations can be used to automatically overrun the local control logic.

Without climbing into the tunnels and without getting wet feet, AquaWeb customers know what is going on in their network of waterways. The sensors gather the data, the remote function allows fast — and sometimes even automated — reactions. The power distribution company relies on Sulzer pumps combined with AquaWeb to get sound data and proper control of the water drainage in London’s underground.

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