VEOLIA WATER PROJECTS LIMITED

WATER RESOURCES MANAGEMENT PLAN

APPENDIX 6 – INNOVATION

INTRODUCTION

To successfully deliver the WRMP work packages need to be delivered in line with current best practice and consideration needs to be made regarding improvement and innovation.

A number of actions have been identified in this appendix and are detailed in the sections that follow:

1. Modelling of the water network using GIS and SCADA

2. Improved reporting using Power BI

3. Leakage detection methods

4. Smart Automatic Meter Reading

5. Process as well as functional auditing

The plan is that additional innovative ideas can be added to this section for consideration. Veolia Corporate operate an innovation den, where ideas are shared and a number of technical groups to draw upon international best practice.

VWP staff attend seminars to be kept up to speed on new processes, tools and techniques that can improve upon the delivery of the WRMP and related activities.
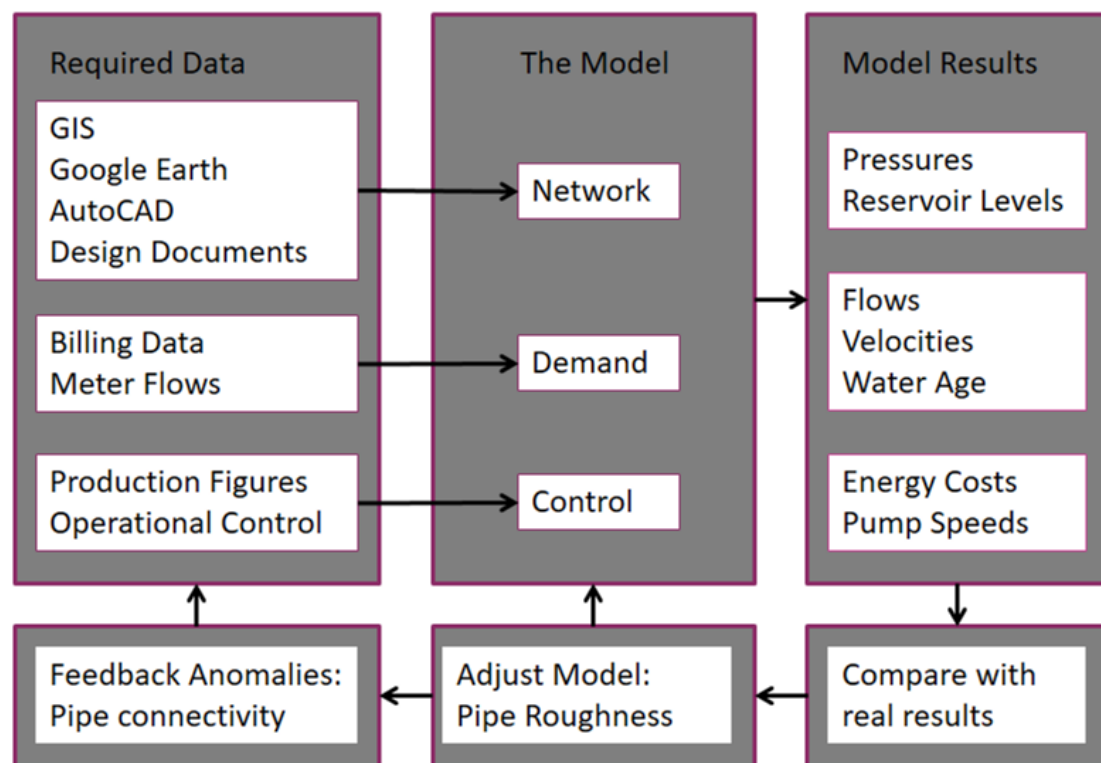
1 MODELLING

A hydraulic model for VWP Tidworth network was created in 2010 to assist in designing modifications to the network required as part of Army Basing 2020.

The modifications to the Tidworth network are approaching completion. The Geographical Information System (GIS) has been updated to reflect these changes and data collection and entry is in line with best practice.

This data will now be used to construct a new all mains model of the distribution system (including the MoD part of the network). The work has successfully passed Governance and the competitive tendering process and is ready to be completed by the middle of 2019.

The modelling process is outlined below:

Required Data	The Model	Model Results
GIS Google Earth AutoCAD Design Documents	Network	Pressures Reservoir Levels
Billing Data Meter Flows	Demand	Flows Velocities Water Age
Production Figures Operational Control	Control	Energy Costs Pump Speeds
Feedback Anomalies: Pipe connectivity	Adjust Model: Pipe Roughness	Compare with real results

Once completed the model can be used to assist in:

- Location of leaks in the network by considering pressure losses
- Resilience using criticality analysis which will be useful for Asset Management
- Capacity analysis – allowing fire hydrant testing to be compared to model results to assist in detecting anomalies in performance
- Energy consumption and efficiency analysis
- Water quality analysis such as age of water to allow targeted sampling
- Regulatory reporting

2. REPORTING

Reporting already exists, however the process is time consuming given the size and resources of VWP.

Work is proceeding to develop an automated process that will allow relevant performance data to be displayed and communicated at a corporate level.

The 'Power BI Reporting' project has already commenced and is expected to be completed by the end of 2019. It will continue to be developed in line with company requirements.

Sections exist for Process, Regulatory, Energy and Assets. Historically the reporting has been set up for waste water, however development has now focused on potable water.

3. LEAKAGE DETECTION

As part of the model building process consideration will be given to using a technique called 'Pressure Loss across Networks' - PLaN.

This process was developed as part of a Veolia Water Project with De Montfort University and is being implemented by Affinity Water. During the PR14 period Affinity Water were able to reduce leakage by 14% and use this process to direct leakage teams to areas of concern.

It has proven to be a very successful technique and the process can be replicated at the time of model calibration (refer to section 1 of this Appendix). The costs of implementation can be minimised when the activity is combined with data logging.

This will allow leaks to be located more rapidly. It is best to combine this technique with pressure management. The main problem faced by most active leakage detection and repair campaigns is that when leaks are repaired the flow reduces at night. Because the flow reduces the pressures on the network will rise as less energy is lost as water travels through the network.

This increase in pressure then results in additional burst mains. It is not uncommon for leakage campaigns to result in record number of leaks being repaired yet leakage not reducing significantly.

Pressure management can be used to reduce the pressure at night to prevent reoccurrence of leaks and limit the natural rate of rise (NRR) of leakage.

A combination of PLaN, an active leakage campaign and pressure management has proven very successful in the past and should be considered for the Tidworth area, particularly if it can be combined with the modelling exercise to make the process more cost effective.

4. SMART AMR

The VWP Tidworth network has meter coverage of approximately 80% and automatic meter reading devices have been attached to the meters.

This has resulted in a significant reduction in terms of PCC.

Veolia Corporate have significant experience of AMR and supply 595,000 customers via this system near to Paris.

It has been possible to set up alarms that automatically generate work orders related to data outliers (due to meter errors) and leaks within customer premises.

The system is also able to generate reports and statistics that can help reduce leakage and improve the accuracy of PCC calculations.

It has been possible to combine the AMR system with a Work Management System to minimise the cost of maintenance and operation of the AMR system.

The technology continues to evolve in relation to battery life and reliability of communication.

AMR customers are able to modify their own accounts so that the AMR attached to their property will alert them of excessive consumption via email or text.

An additional metric often overlooked is pressure at the boundary of the property. It may be possible in the future to not only monitor flow to the customer but also pressure at the same location. Pressure monitoring is best targeted at the larger users who can impact on system pressures when they draw water to fill tanks.

Such systems can then be used to detect drops in pressure associated with leaks on the network thus also assisting in the detection of leaks upstream of the customer meter.

It may well be possible to develop the existing AMR system at Tidworth to more closely align with this corporate process.

5. PROCESS RATHER THAN FUNCTIONAL AUDITS

An audit programme is currently being planned for 2019 through to 2021.

Due to the new matrix structure of VWP it is better to plan audits to review the process (such as leakage detection, meter reading, water quality sampling etc.) rather than by function.

The audits then become a method of continuous improvement allowing business processes to be monitored and concerns raised via the existing risk management process.

6 CONCLUSIONS

The following actions would seem appropriate for consideration to assist in the successful delivery of the WRMP.

- Modelling of the water network using GIS and SCADA

- Improved reporting using Power BI

- Leakage detection methods

- Smart Automatic Meter Reading

- Process as well as functional auditing

7 RECOMMENDATIONS

The model construction and calibration proceed during 2019 as per existing plans

Power BI continue to be developed in line with existing project programme

Consideration be given to implementation of PLaN during model field testing – this will involve the throttling of valves into District Meter Areas (DMA's) at night whilst data loggers are on hydrants (already planned as part of model calibration).

Pressure management proceed as per the original leakage strategy (refer to Appendix 1 - Leakage) thus helping prevent the reoccurrence of leaks on the network

Smart AMR technology is monitored near Paris so that new technology can be implemented to fully realise the potential of the AMR system

Auditing of Local Management Systems proceed as per the audit programme during 2019 to 2021.

8 PLAN OF ACTION

S/N	Element of Work	Pre S/N Req	2019 Q1	Q2	Q3	Q4	2020 Q1	Q2	Q3	Q4	2121 Q1	Q2	Q3	Q4	2022 Q1	Q2	Q3	Q4	2023 Q1	Q2	Q3	Q4
14	Smart AMR Corporate R&D	-			▓	▓																
16	Audit of Asset Management	-			▓	▓																
17	Audit of Maintenance	-			▓	▓																
21	Model Construction	-	▓	▓	▓	▓																
22	Leakage Detection (PLaN)	21	▓	▓		▓																
23	Power BI Development	-	▓	▓	▓	▓																