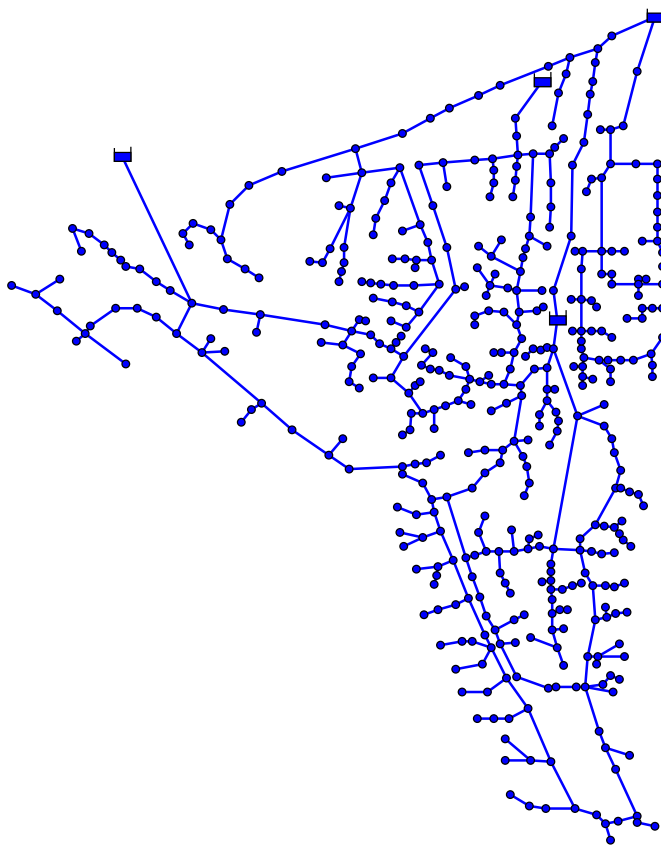# SYSTEM ID: *Balerma Network*

NARRATIVE DESCRIPTION

The Balerma Network is an adaption of an existing irrigation network in the Sol-Poniente irrigation district, located in Balerma in the province of Almerı´a (Spain). It was first presented by Reca and Martinez (2006). The network is supplied with water from four reservoirs. The average annual demand is 25.2 MGD.

NETWORK SCHEMATIC:

HISTORY OF THE NETWORK FILE

The network was first optimized by Reca and Martinez (2006) using genetic algorithms. It has since been optimized in the following studies: (a) Reca et al (2008) using simulated annealing; (b) Geem (2009) using particle swarm harmony search; (c) Banos et al (2010)

using a memetic algorithm; (d) Zheng et al (2011) using a combination of non-linear programming and differential evolution; and (b) Bi et al (2015) by incorporating domain knowledge into a genetic algorithm model.

AVAILABLE INFORMATION

Physical attributes	Yes
Schematic diagram	Yes
Network geometry data	Yes
GIS data file	No
Background map	No
Elevation data	Yes
Pipe data	Yes
Pipe material	No
Pipe age	No
Pipe pressure class	No
Nominal or actual diameters	Actual
Pump data	N.A.
Useful horsepower	
Pump operating curves	
Tank data	N.A.
Elevation data	
Stage storage curves	
Water quality information	
Valve data	N.A.
PRV/FCV data	
Isolation valve data	
Hydrant data	
Demand data	Yes
Total system demand	Yes
Nodal demand data	Yes
Temporal data demands	No
System leakage	No
Hydraulic data	Yes
Hydraulically calibrated model	
Field hydraulic calibration data	
Water quality data	No
Disinfection method	No
Chlorine residual data	No
Booster station data	No
Fluoride/Chloride field data	No
Water quality calibrated model	No
Operational data	No
SCADA datasets	No
Operational rules	No

REFERENCES:

Banos, R., Gil, C., Reca, J. and Montoya, F.G. (2010) A memetic algorithm applied to the design of water distribution networks. Applied Soft Computing, 10, 261-266.

Bi, W., Dandy, G. C. and Maier, H. R. (2015) Improved genetic algorithm optimization of water distribution system design by incorporating domain knowledge, Environmental Modelling & Software, Vol. 69, 370-381.

Geem, Z.W. (2009) Particle-swarm harmony search for water network design. Engineering Optimization 41 (4), 297-311.

Reca, J. and Martinez, J. (2006) Genetic algorithms for the design of looped irrigation water distribution networks, Water Resour. Res., 42.

Reca, J., Martinez, J., Gil, C., and Banos, R. (2008) Application of several meta-heuristic techniques to the optimization of real looped water distribution systems, Water Resour. Man., 22, 1367-1379.

Zheng, F., Simpson, A.R., and Zecchin, A.C. (2011) A combined NLP-differential evolution algorithm approach for the optimization of looped water distribution systems, Water Resour. Res., 47, W08531.

DETAILED DATA SUMMARIES

PHYSICAL ASSETS:

Asset Type:	# of Assets
Master Meters	0
Tanks	0
Pumps	0
Pump Stations	0
Water Treatment Plants	0

NETWORK CHARACTERISTICS:

# Total Pipes:	454
# Branch Pipes:	252
Ratio (Branch Pipes / Total Pipes):	0.56
# Nodes	443
# Reservoirs	4
# Tanks	0
# Regulating Valves	Unknown
# Isolation Values	Unknown
# Hydrants	Unknown
Elevation Data	YES

PIPE DATA:

Diameter (mm)	Length (m)
113.0	To be determined
126.6	To be determined
144.6	To be determined
162.8	To be determined
180.8	To be determined
226.2	To be determined
285.0	To be determined
361.8	To be determined
452.2	To be determined
581.8	To be determined

PUMP DATA:

Pump Horsepower	NO
Pump Curves:	NO

DEMAND STATISTICS:

Demographic Type	Population	Households
Directly Serviceable:	Unknown	Unknown
Indirectly Serviceable:	Unknown	Unknown
Total Serviceable:	Unknown	Unknown

Production Statistics	
Total Annual Volume Produced (MG):	25.2
Total Annual Volume Purchased (MG):	25.2
Total Annual Volume Provided (MG):	25.2
Estimated Annual Water Loss:	Unknown

Water Costs	
Customer Type	Unknown
Customers within the municipality	Unknown
Customers outside the municipality	Unknown

CUSTOMERS AND USAGE:

Customer Type	Customer Count	Average Daily Demand (MGD)
Wholesale:		
Residential:		
Commercial:		
Institutional:		
Industrial:		
Other:		
Total Customers:		
Flushing, Maintenance & Fire Protection:		
Total Water Usage:		25.2

DATA FILE ATTRIBUTES:

ATTRIBUTE		UNITS
Pipe Length & Diameter	X	metres, mm
Pipe Age		
Node Elevation	X	metres
Node Demand	X	L/s
Valves		
Hydrants		
Tank Levels		
Tank Volume		
PRVs		
WTP		
WTP Capacity		
Pump Data		