

AffinityWater

Hydraulic Model Maintenance

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Hydraulic Modelling Team

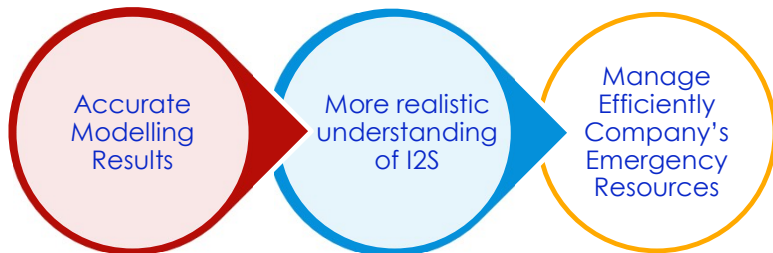
20 In-house hydraulic modellers & external consultants

Models:

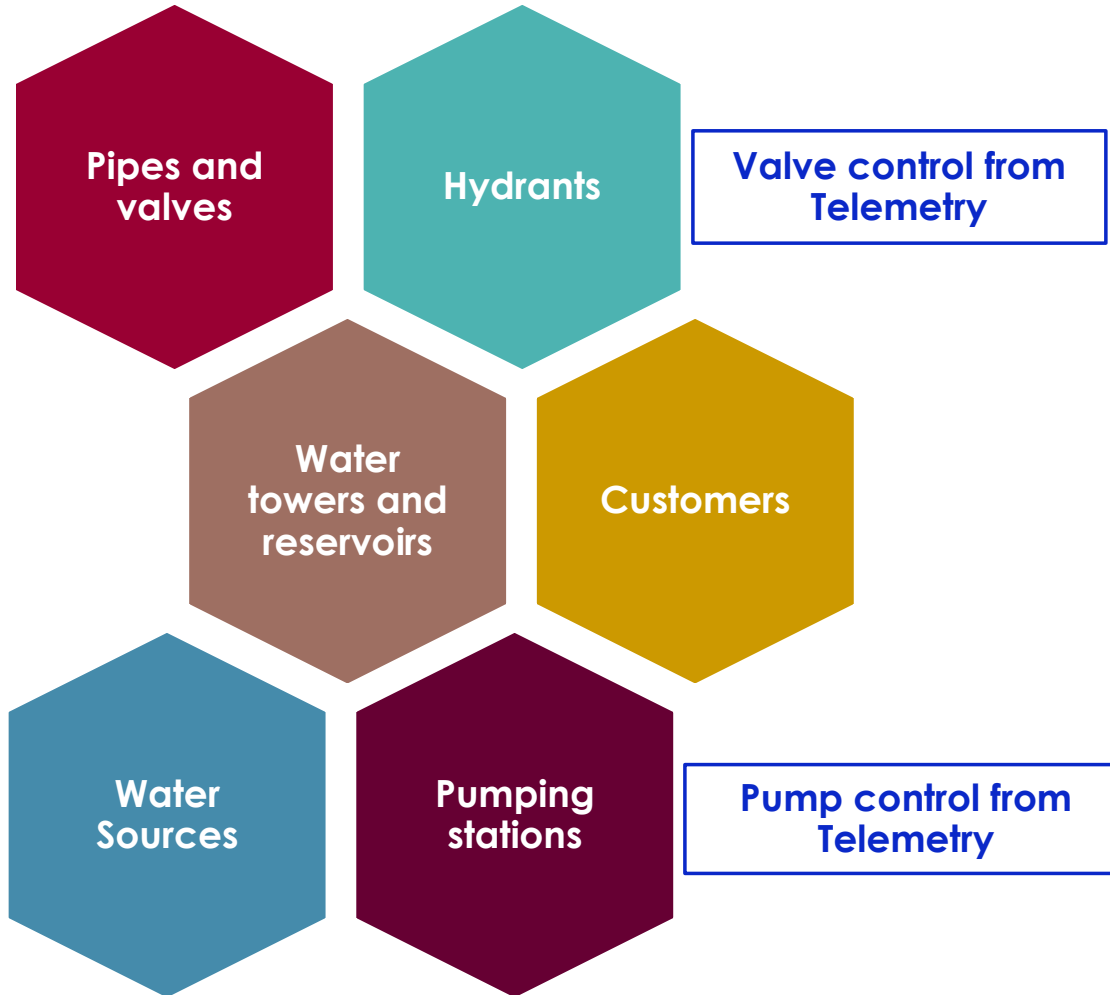
- 39 Hydraulic Demand Zone (HDZ)
- 35 Hydraulic Models + 1 Strategic Model
- Smallest 1,700 nodes to largest 45,000 nodes
- 100% Coverage of distribution network

Studies:

- More than 2000 studies in last year including new development
- 342 request for model & schematic updates



What are Hydraulic Models made of?



Every year new model build for all 39 HDZs? – **No**

Affinity Water build model every 5-7 years. From March 2022 no new model build.

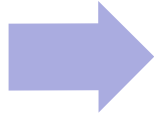
There is an in-house Model Maintenance Team.

How can these assets from GIS and control from Telemetry be transferred into the current model?

Traditional model updates method

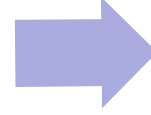
Hydraulic model updates mailbox

- GIS: New Developments, pipes, valves, hydrants, customer points, DMA boundaries, pumping stations etc.
- Distribution updates: New PRV added, and/ or schedule changed
- Production updates: Pump changes and control setting, etc



GIS export part

- Pipe and valves export
- Hydrant export
- Boundary export
- Customer points export

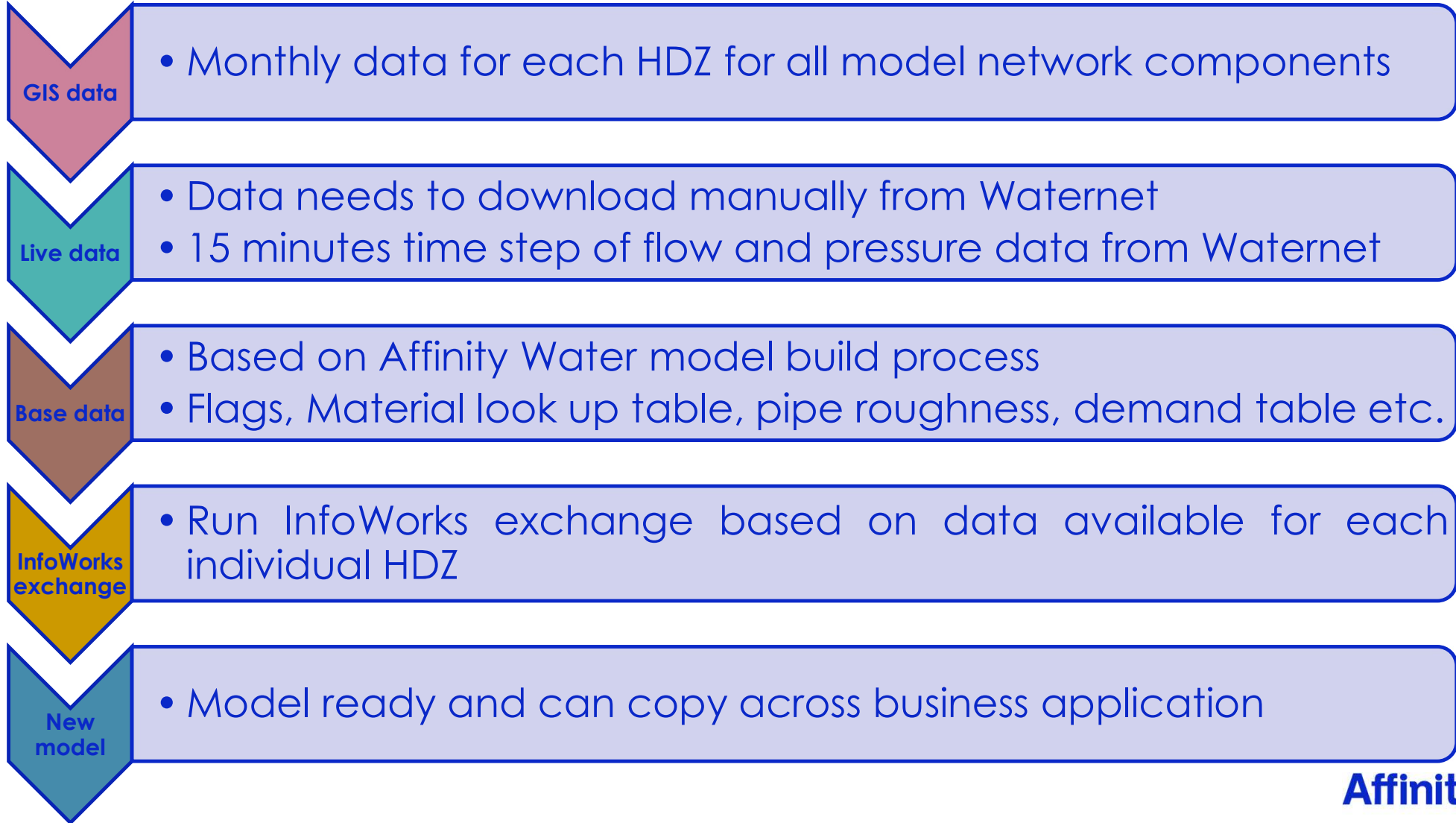


Import in model

(Time consuming and repetitive process)

- Rename assets base on GIS system ID
- Pipe properties (internal diameter, roughness etc)
- Boundary valves shut and trace
- Demand allocation for customers
- Control setting (telemetry part)

Hydraulic Model Maintenance – InfoWorks Exchange process



Video for InfoWorks Exchange



01 GIS Data



02 Live Data



03 Model



04 Exchange



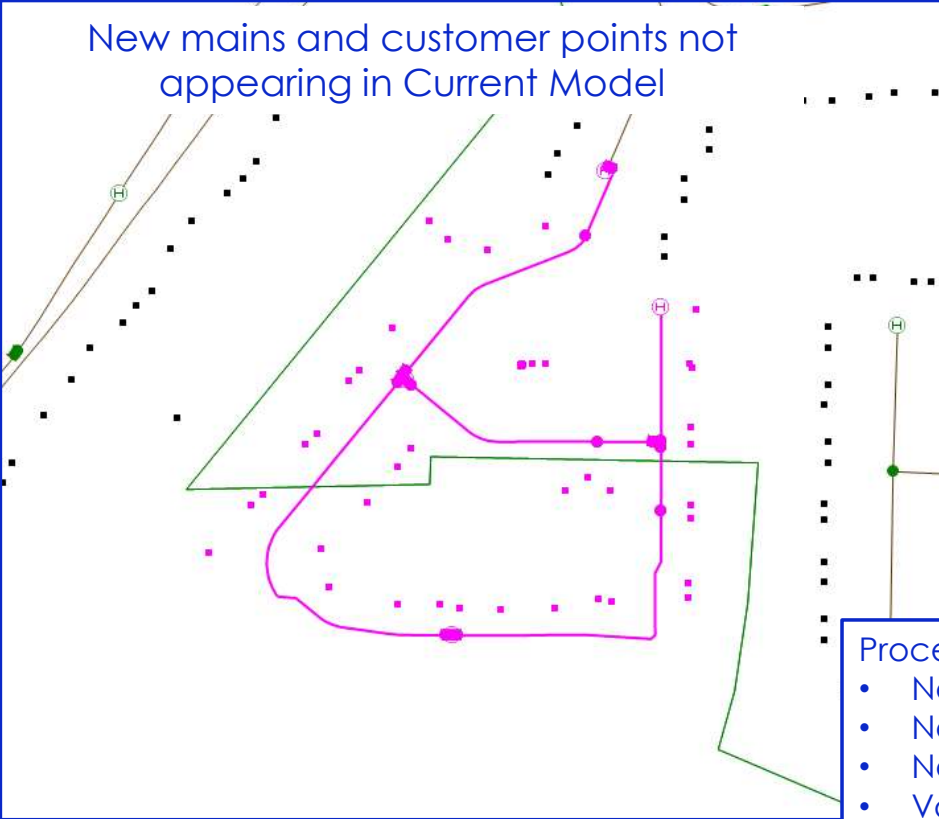
05 Specification
Data



InfoWorks Exchange direct use for small development

New network from InfoWorks Exchange

New mains and customer points not appearing in Current Model

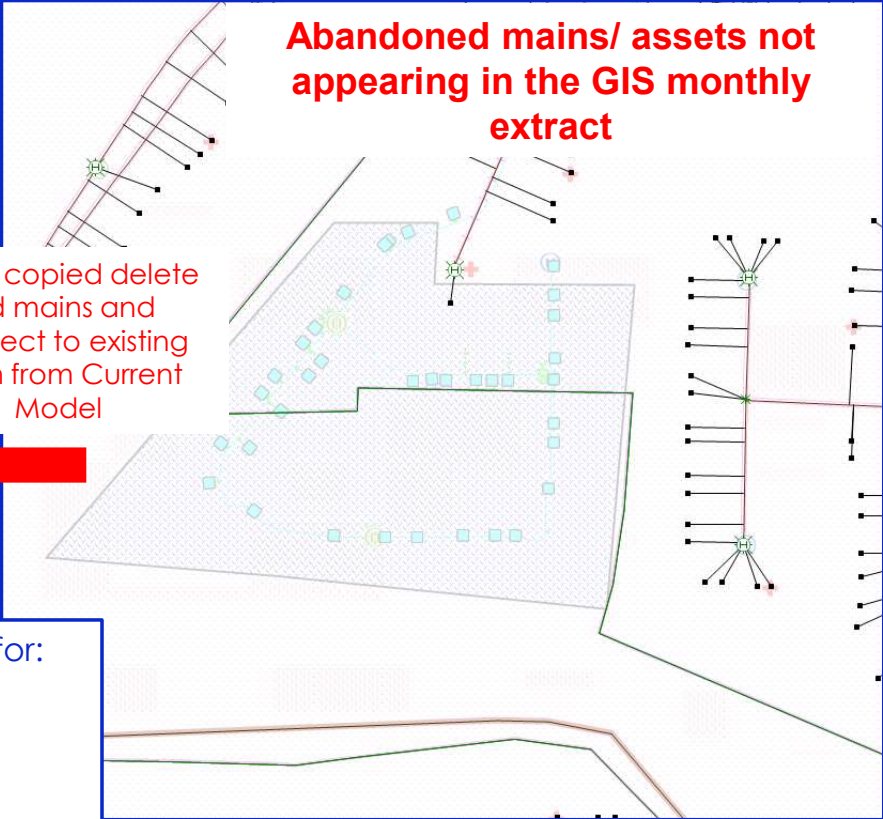


Copy new assets into Current model



Current network from Model library

Abandoned mains/ assets not appearing in the GIS monthly extract

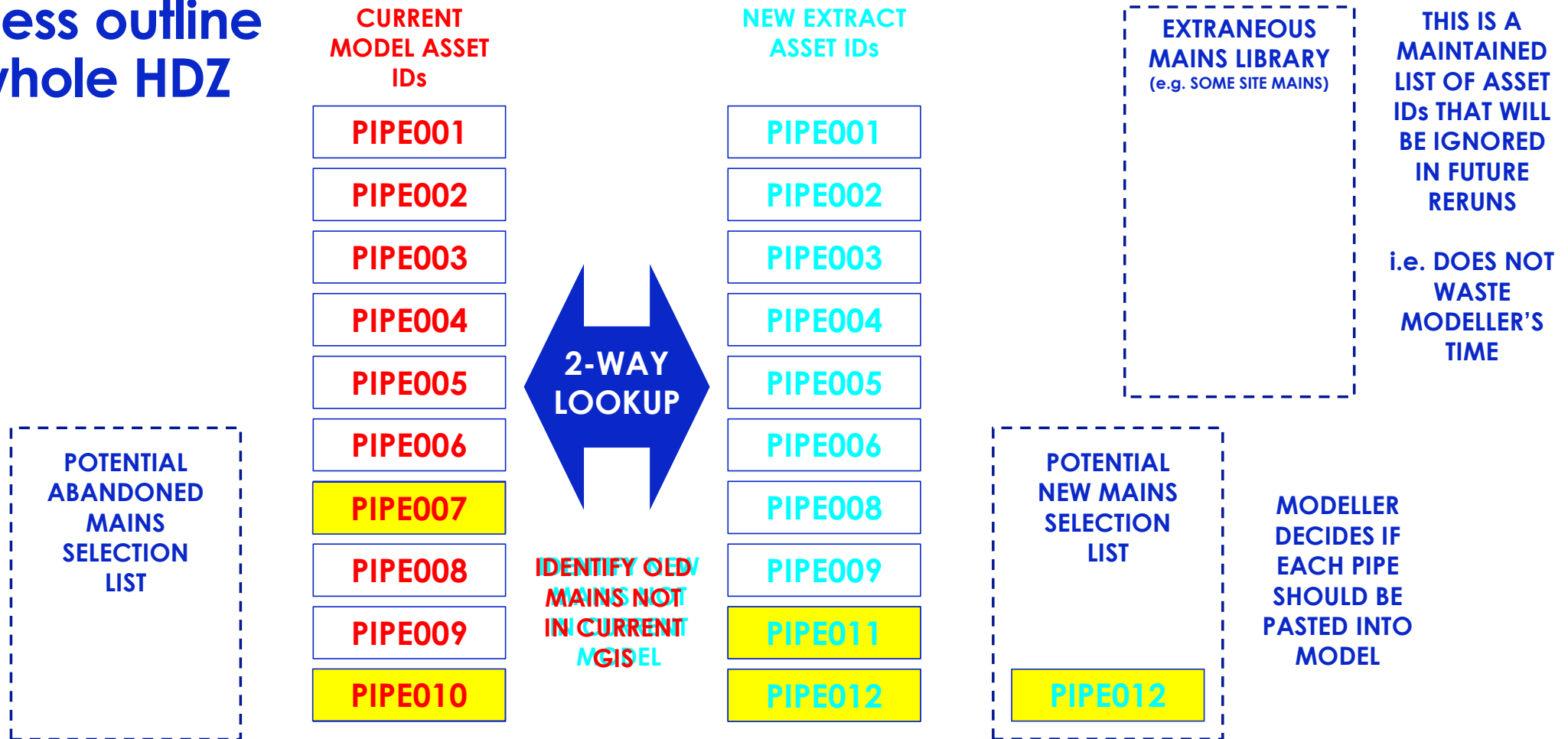


Once copied delete old mains and connect to existing main from Current Model



- Process would also include for:
- New Hydrants
 - New meters
 - New valves
 - Valve status
 - DMA Polygons
 - Customer points

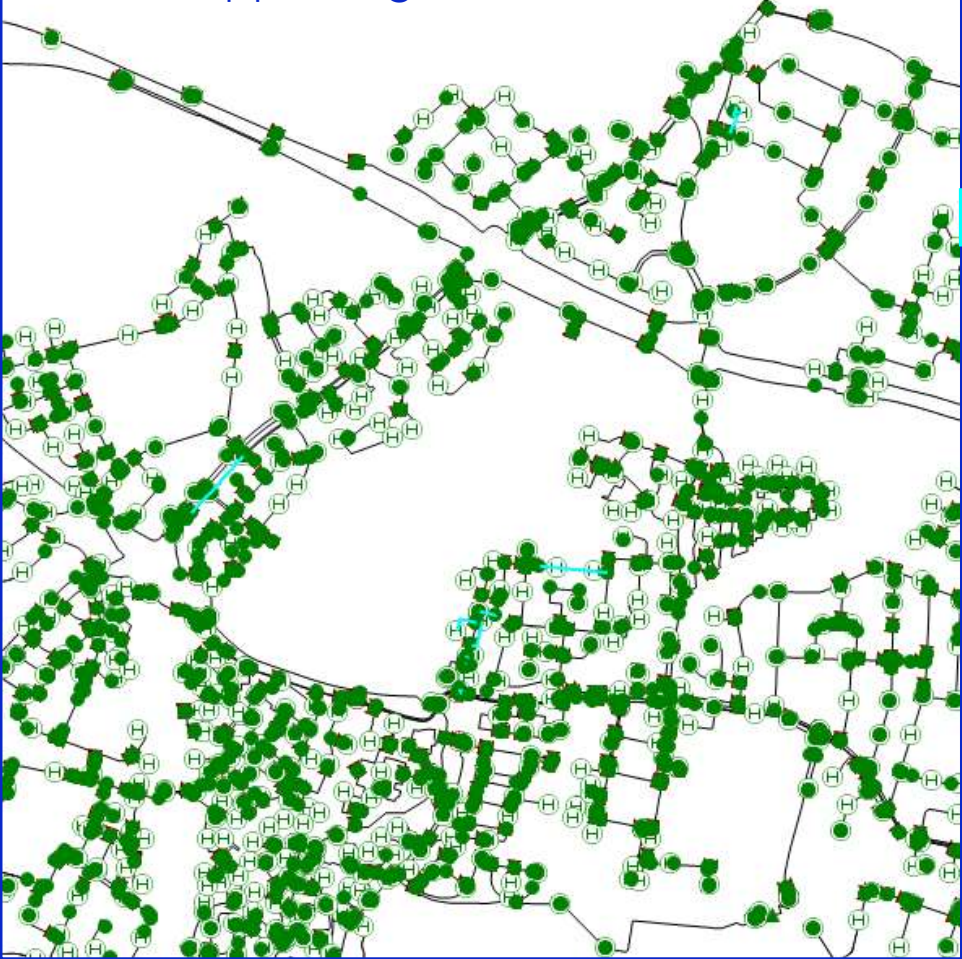
Process outline for whole HDZ



- DELETE ABANDONED PIPES & NODES FROM CURRENT MODEL
- RECONNECT COPIED PIPES & NODES ONTO CURRENT MODEL
- CHECK FOR NODE NAME DUPLICATES & CORRECT (“!”)
- REALLOCATE CUSTOMERS FROM ABANDONED PIPES TO NEW PIPES
- REASSIGN LEAKAGE DEMAND AT NEW NODES
- SET ELEVATIONS AT NODES (IF NOT DONE ALREADY)
- ASSIGN AREA CODES TO NEW PIPES & NODE (DEMAND SCALING)
- UPDATE DMA SELECTIONS (RUBY SCRIPT)

New network from IW exchange

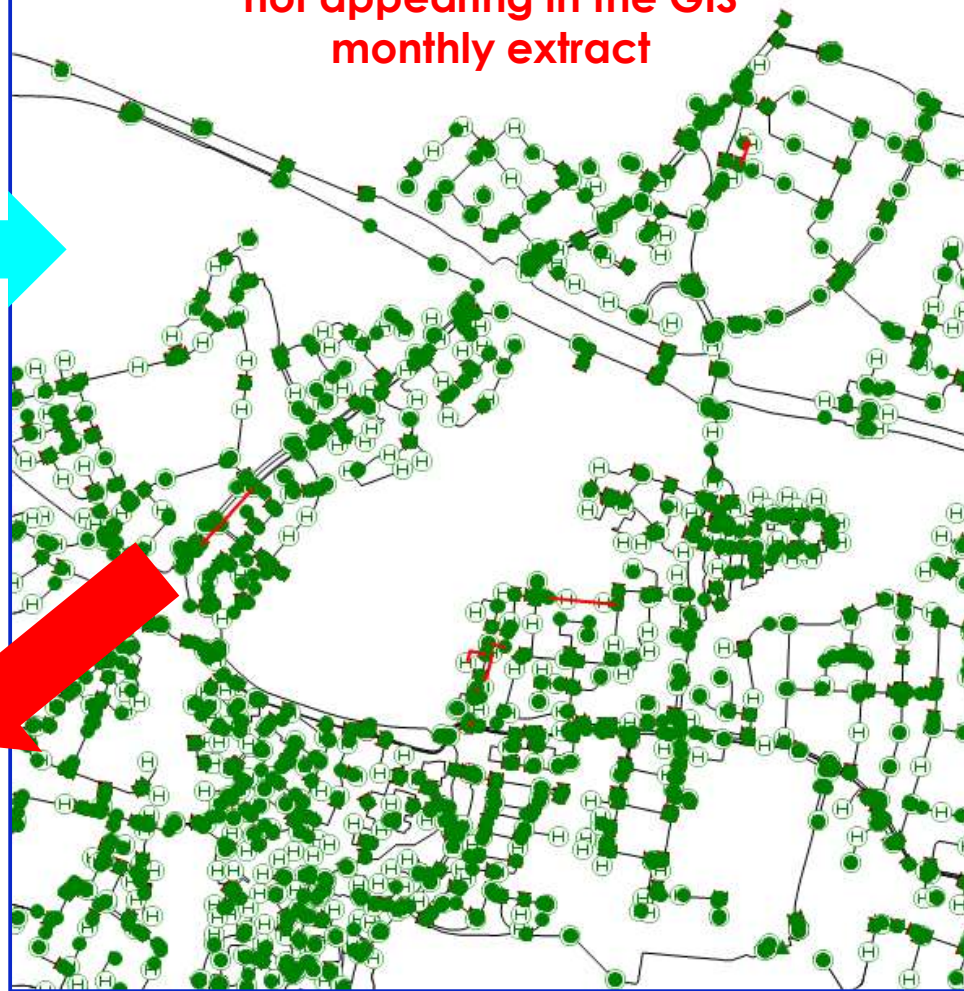
New mains / Assets not appearing in Current Model



Copy new mains into Current model

Current network from Model library

Abandoned mains/ assets not appearing in the GIS monthly extract



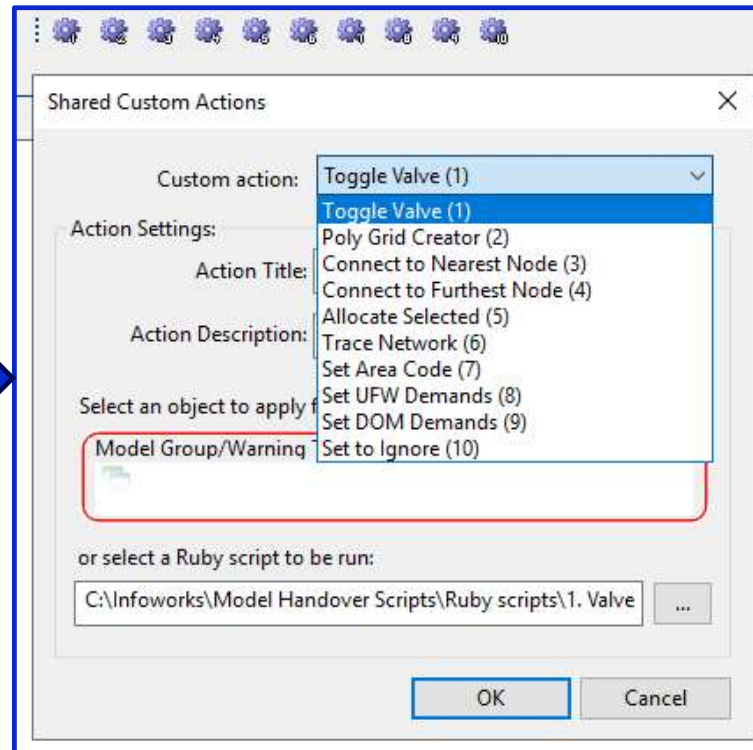
Delete old mains from current model

Ruby script for model update

What is Ruby Script?

A dynamic general-purpose programming language to perform various tasks that may be performed on a regular basis.

- 1. Valve Status toggle.rb
- 2. Model Coverage Polygon Grid Creator.rb
- 3. Reconnect Link NEAREST.rb
- 4. Reconnect Link FURTHEST.rb
- 5. Demand Allocate Selected Customers to Selected Pipes.rb
- 6. Tracing.rb
- 7. Set Area code on selection.rb
- 8. Set UFW.rb
- 9. Set DOM (Unmet & Met).rb
- 10. Tag IGNORE.rb



Brief process outline

'Proof Of Concept' tool

1. Choose test HDZ
2. Meet with GIS team to discuss how asset IDs are created / maintained
3. Develop Excel & ruby script / SQL
4. Get working & refine process and deal with unforeseen issues
5. Translate above process as regular Hydraulic Model Maintenance process

Benefits

- ❖ Time saving
- ❖ Repetitive work is minimised
- ❖ Human error of missing assets reduced
- ❖ Accurate model for studies

Development on-going

- ❖ Live data from Waternet needs to be link with InfoWorks Exchange Model.

Questions

