

NETCREATE —

Using Digital to Develop Mains Rehabilitation Solutions

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AGENDA

01

The Issue

02

Introducing NetCreate

03

Case Study: The Beacon Project

04

Implementation in the UK

THE ISSUE

Challenge

Maintaining the UK water network's 400,000kms of pipes
With limited resources for mains rehabilitation

Objective

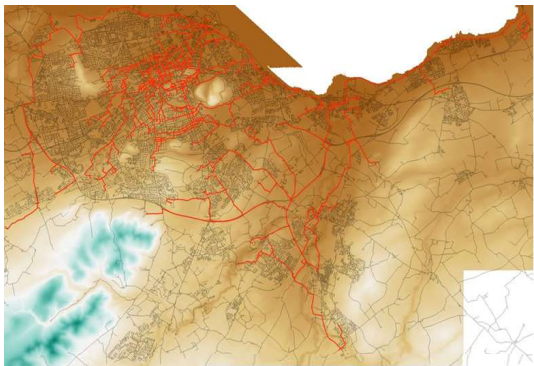
- Optioneer mains replacement
- Simplify operational processes
- Optimise resources

Can we use digital to optioneer network rehabilitation solutions in a targeted manner?

INTRODUCING NETCREATE

AtkinsRéalis NetCreate is a digital process using global open-source GIS datasets to automatically create an outline network on a repeatable basis.

Digital Terrain Model



Population data



Road layout



2019

NetCreate
Wastewater Module



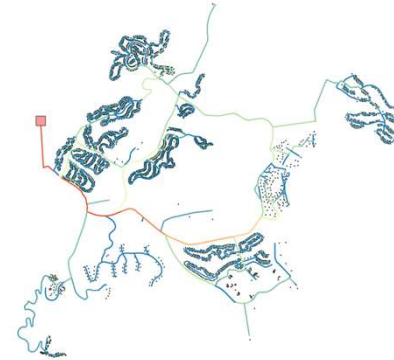
2020



شركة المياه الوطنية
National Water Company

ADB

Asian Development Bank



KSA
Masterplan

2021

NetCreate
Potable Water Module

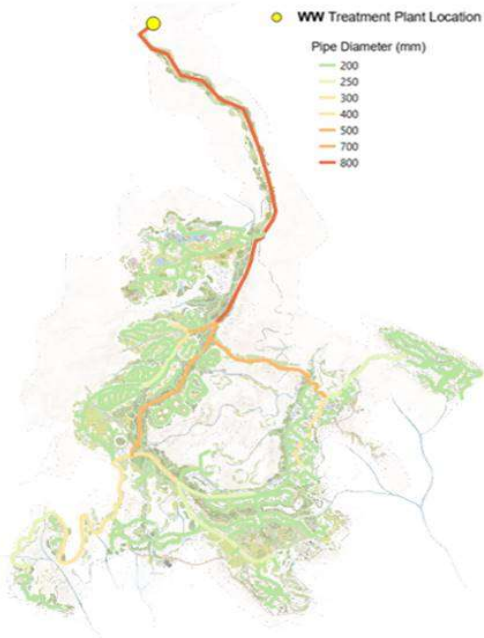
2022



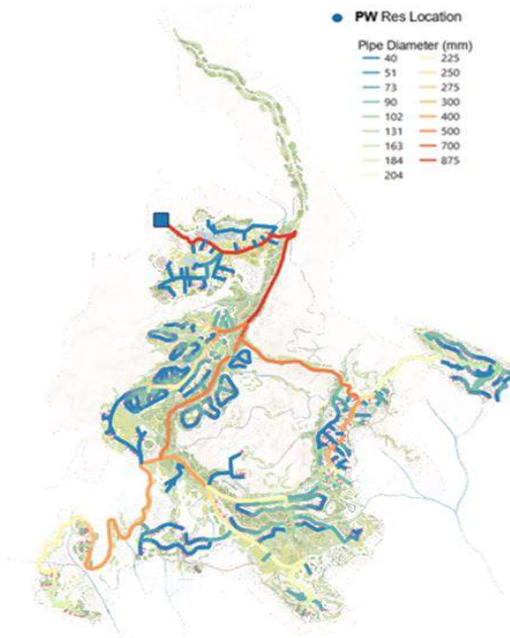
STORY TO DATE



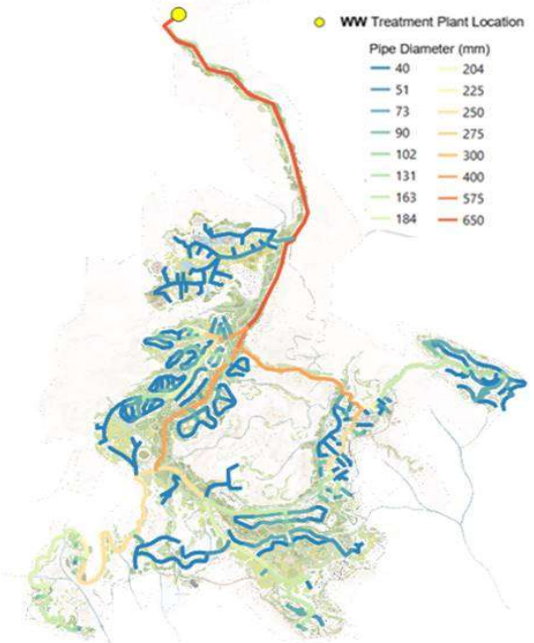
Wastewater



Potable Water



Treated Sewage Effluent



CASE STUDY – KSA MASTERPLAN

Requirements:

- 50,000 population
- Initial high-level wet utility layouts generated quickly for client feedback
- Phasing strategy

Potable Water Outputs:

- Assessed optimal reservoir locations for gravity network
- Over 160km of water network, scoped in two months

2019

NetCreate
Wastewater Module



2020



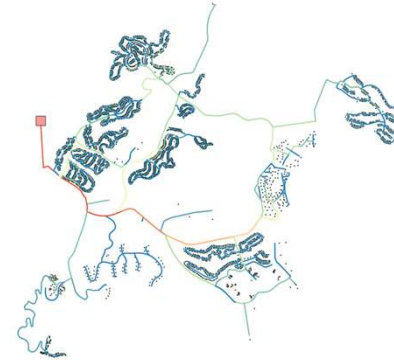
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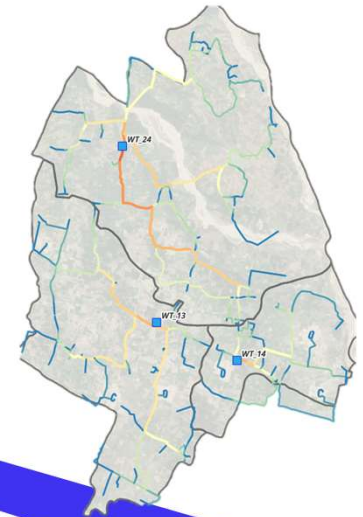


KSA
Masterplan

2022



2023



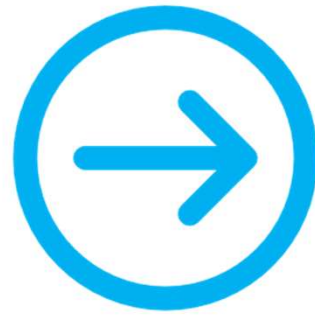
STORY TO DATE



THE BEACON PROJECT



WASH



WOP

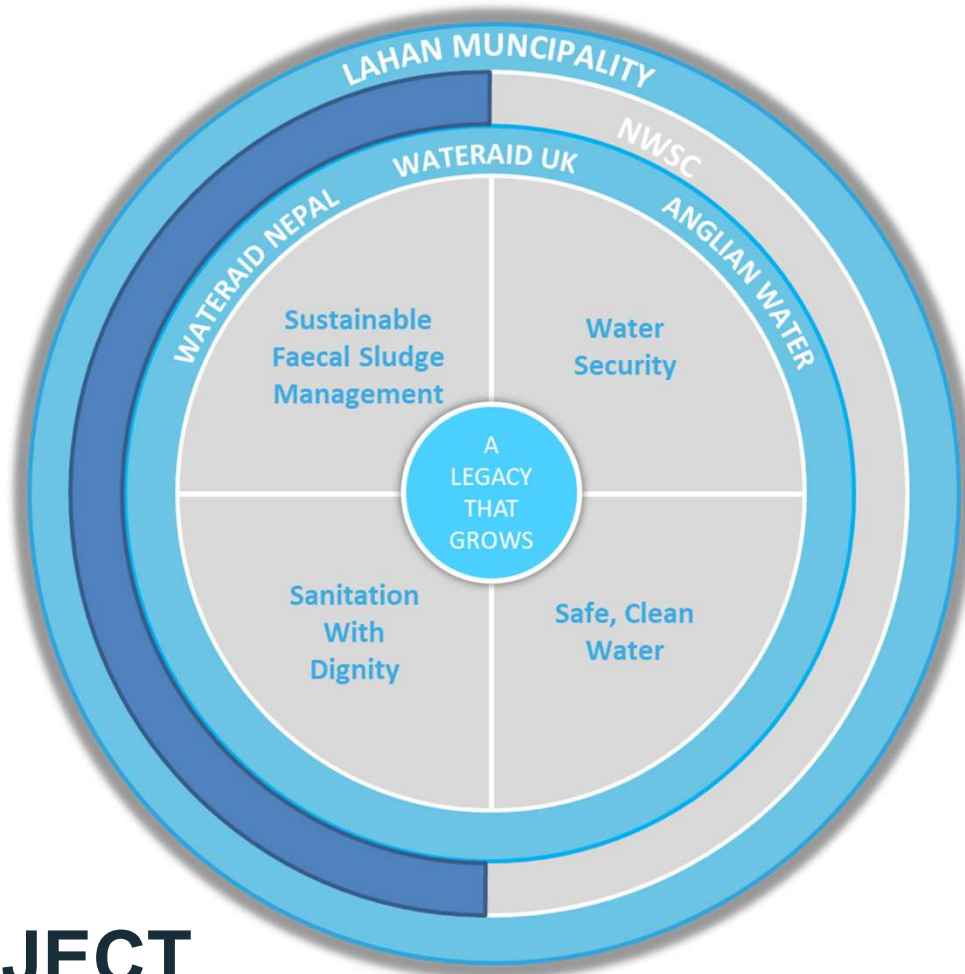
WHAT IS THE BEACON PROJECT?

6 CLEAN WATER AND SANITATION

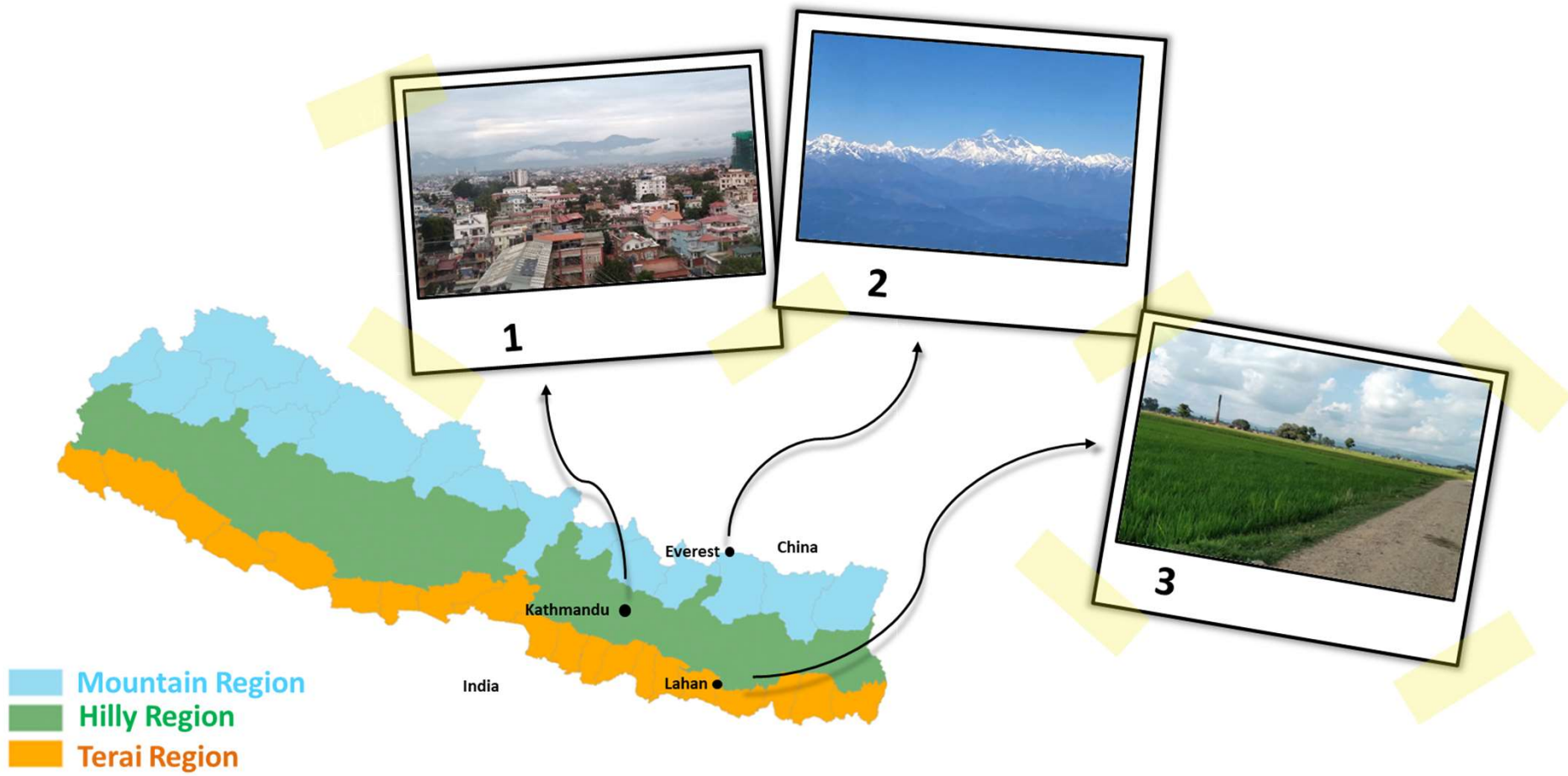


SUSTAINABLE DEVELOPMENT GOALS





PROJECT STRUCTURE



LAHAN & NEPAL



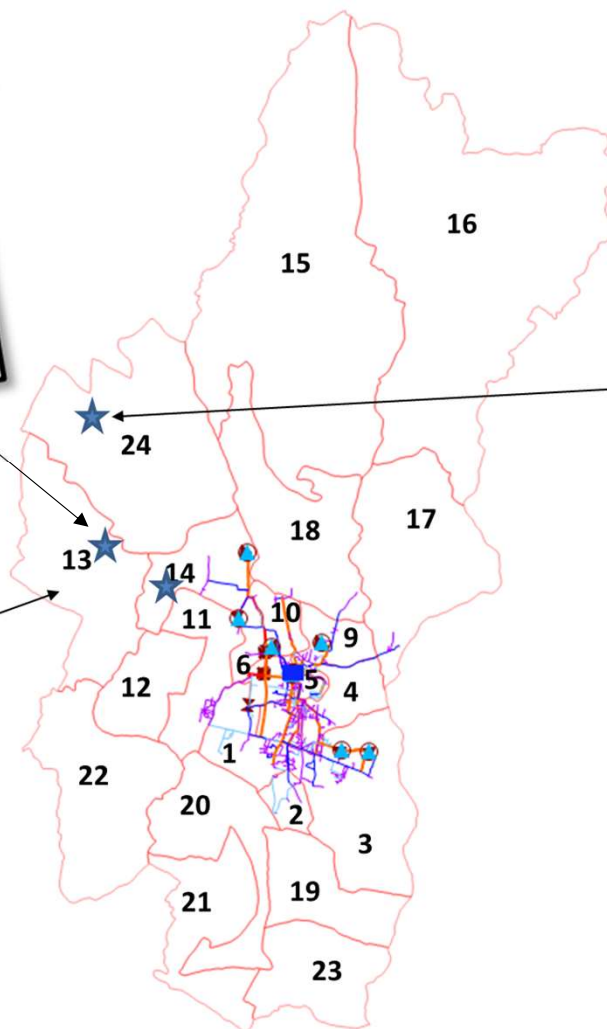
LAHAN MODEL

Data

- 3 WTs
- 4 BHs

Limitations

- Unknown # of connections
- No clear pipeline routes
- Very limited data



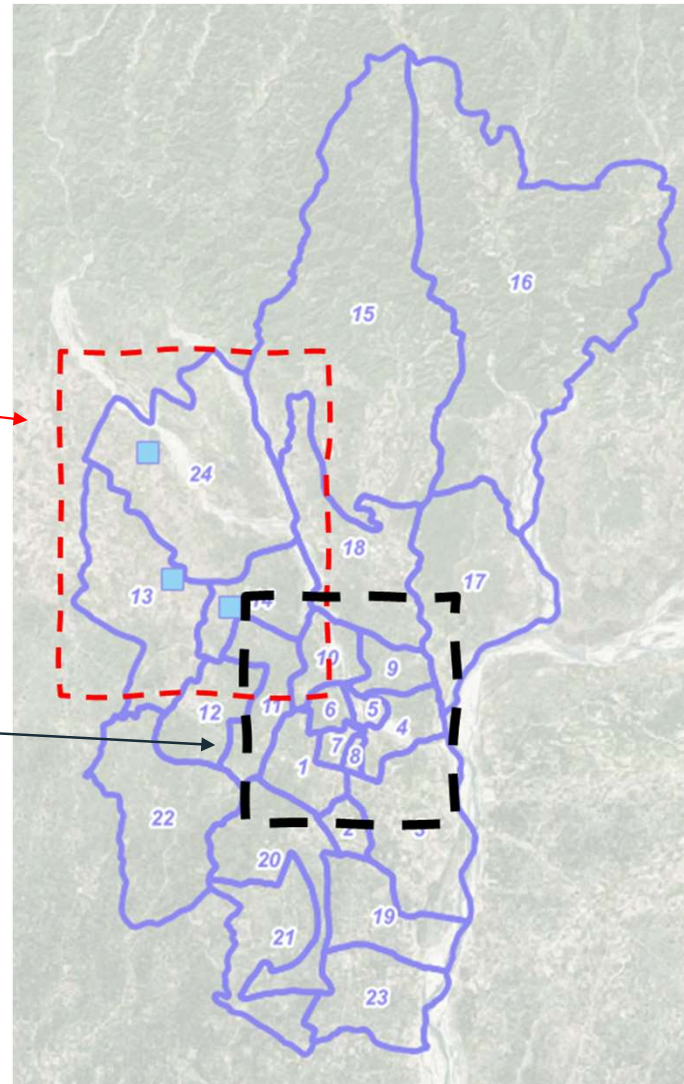
LAHAN & SURROUNDING WARDS

1. Creation of new networks in rural worlds (13, 14 & 24)

- Design of 3 discrete networks utilising existing infrastructure
- Identifying property connections for 3 wards
- Consideration for alternative supply locations

2. Review of existing Lahan Network

- What pipeline extensions are required to enable 100% coverage to all communities
- What improvements would be identified by using NetCreate to redesign the current network?



APPLICATION OF NETCREATE

1 Data Collation

Open Source	<ul style="list-style-type: none"> ▪ ALOS (30m) ▪ Bing Buildings* ▪ OSM ▪ 2021 census ▪ DSM ▪ Building points** ▪ Road ▪ Total population***
NWSC	<ul style="list-style-type: none"> ▪ Ward & DZ boundaries ▪ Supply points of connection & Storage volumes ▪ Intervention lines/ prohibited routes ▪ Existing network (Lahan)

*best coverage compared to *Meta DataforGood* and *OSM Buildings* data

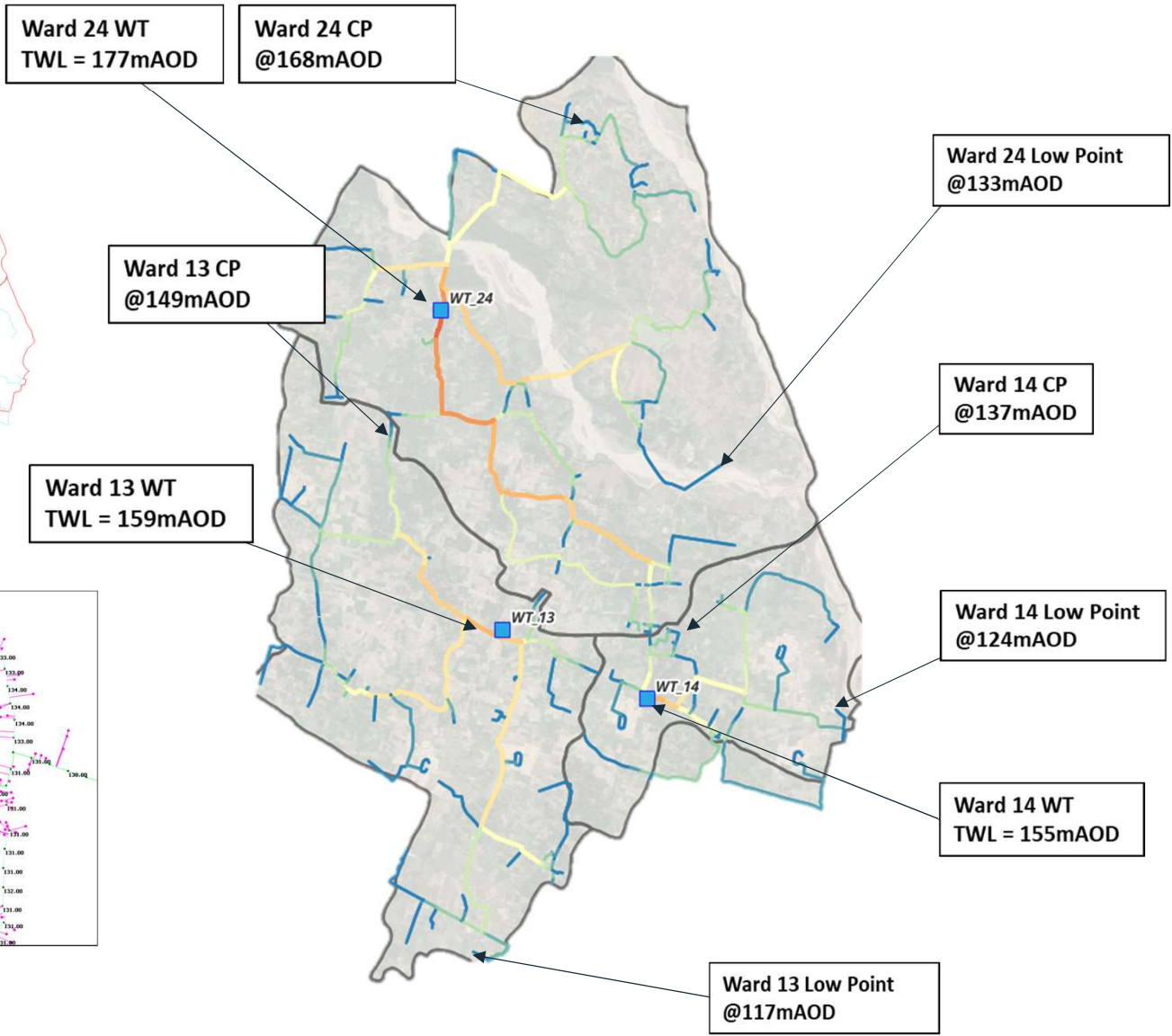
**assumed building centroids

***12% increase between 2021 and 2011

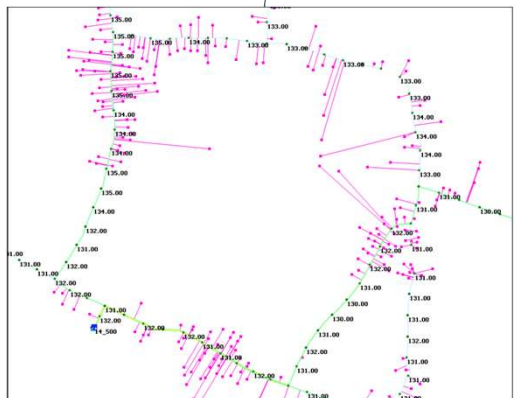
2 Assumptions

Supply	<ul style="list-style-type: none"> ▪ 24-hour supply ▪ Assumed no supply capacity issues ▪ 1 supply feed per boundary – Water Towers/ Boreholes
Demand	<ul style="list-style-type: none"> ▪ Full customer connection coverage ▪ Population for current (2022) and future (2030) ▪ Household customer type only ▪ PCC: Urban = 135l/h/day, Rural: 75l/h/day ▪ Seasonal peak = +33% ▪ Peaking factor = 3
Control	<ul style="list-style-type: none"> ▪ Gravity ▪ Pressures of 5-15m at customer connection point
Pipe	<ul style="list-style-type: none"> ▪ HPPE ▪ Diameter – 16-500mm ▪ Velocity \leq 1m/s ▪ Headloss \leq 3m/km
Node	<ul style="list-style-type: none"> ▪ 30m pipe lengths, segmented by nodes
Other	<ul style="list-style-type: none"> ▪ Coordinate system – WGS84/ UTM zone 45N ▪ InfoWorks WS Pro version 5.0.4

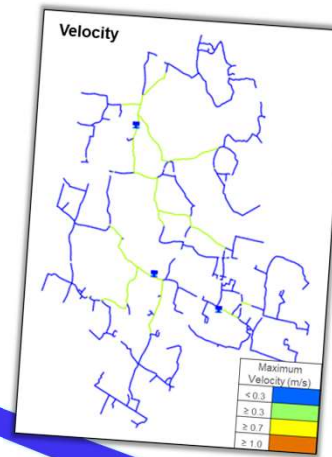
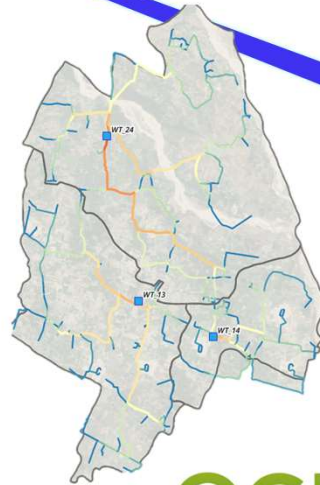
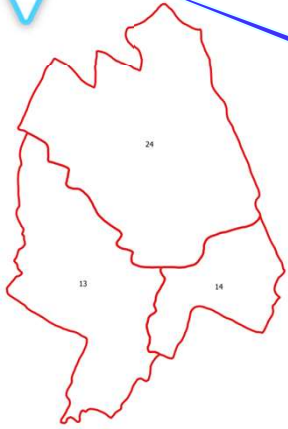
PROJECT METHODOLOGY



- Water Tower Location
 - Ward Boundary
- NetCreate Internal Pipe Diameter (mm)**
- | | | | |
|---|----|---|-----|
| — | 30 | — | 107 |
| — | 38 | — | 123 |
| — | 48 | — | 138 |
| — | 57 | — | 154 |
| — | 69 | — | 173 |
| — | 84 | — | 192 |
| — | 96 | — | 243 |
- **rounded to 0d.p.**



OUTPUTS

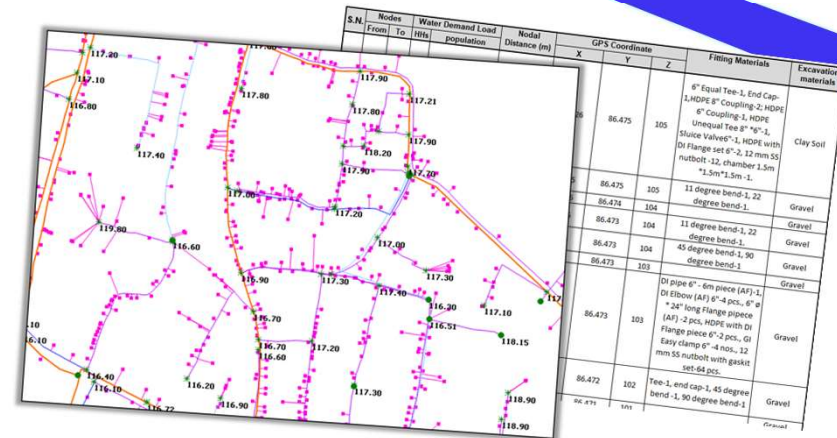


Wards 13,14 & 24

- Assessment of 4 x boreholes
- Identify additional water resource requirements
- On the ground survey of potential connections
- On the ground survey of topography
- Update model with surveyed information
- Supporting NWSC with detailed design and planning phasing of 3 x Networks
- Supporting NWSC with investment planning for budget cycle



NEXT STEPS



IMPLEMENTATION IN THE UK

How can NetCreate support the UK in delivering more efficiently?

**Maintain UK's
water networks**

**Limited
resources**

ISSUE

**NetCreate as a
blueprint to
assess mains
rehabilitation at a
systems level**

SOLUTION

How can NetCreate support the UK in delivering more efficiently?

2023

Tool Development

Using existing networks as a starting point

Use Case

Initial assessment of mains rehab decisions

Benefits

- Synergise with other existing data or tools
- Resolve headloss restrictions
- Reduced carbon & cost

Ongoing Tool Dev

To address the evolving 'Problem Statements'

thank you