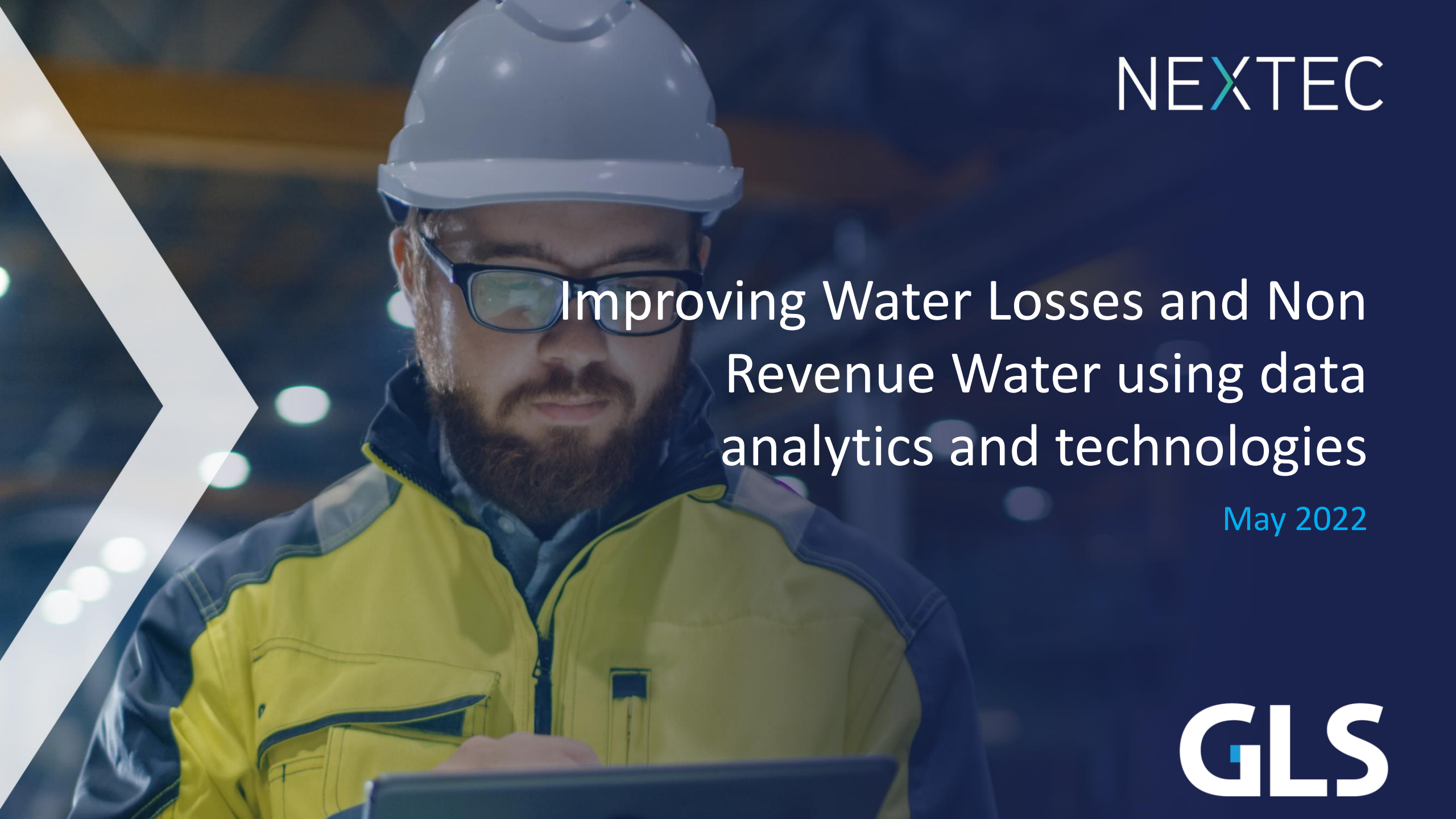

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Improving Water Losses and Non Revenue Water using data analytics and technologies

May 2022

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Agenda

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- Introduction to Non-Revenue Water
- The devil's in the detail
- The real cost
- But wait…there's more
- All this data…so little action
- Conclusion
- Or something like that

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Non-revenue water

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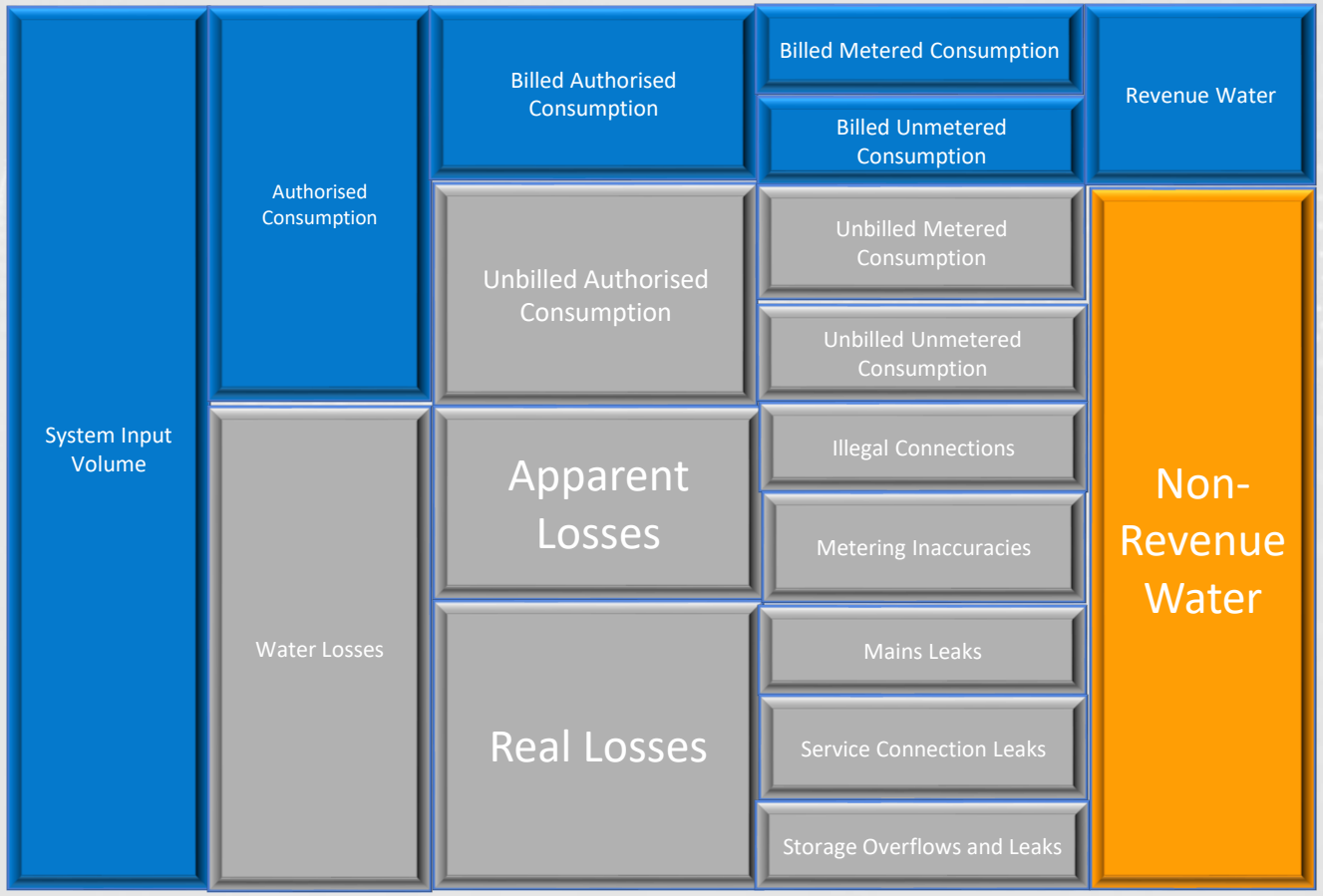
- IWA Water Balance
  - ❖ SIV = RW + NRW
  - ❖ Water losses = Apparent + Real
- Sources estimate NRW around 40% in SA (approx. R11 billion) – best practice around 15%
- Going bust – Not enough revenue recovered to cover real costs of bulk water, losses and distribution thereof
- Unsustainable – finite resources being depleted because higher losses mean more extraction from dams



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Reality check

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- Fresh water is a finite resource
- Energy needs have lead to global warming
- Global warming means changing weather patterns…longer droughts, floods and so on, and so on, and stuff like that
- We cannot afford (never mind rands and cents) to keep spilling our very life source
- Non revenue water optimisation is thus about more than just rands and cents, it is about the very thing that's put all of us here…

LIFE

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Non-revenue water

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- SIV = 900 ML/d
- NRW = 280 ML/d or 31% of SIV
- SIV cost of R12.73/kL
- Total NRW cost at bulk intake:

R 3 564 400 per day

Or

R 1.3 billion per annum!

- Commercial losses = 68.4 ML/day or R 870 732 per day or R 317 million

SIV 895.5	Authorised Consumption 651.2 72.7%	Billed Authorised 617.5 69%	Billed Metered Consumption 573.1 64%	Revenue Water 617.5 69%
			Billed Unmetered Consumption* 44.3 5%	
		Unbilled Authorised 33.7 4%	Unbilled Metered Consumption 0 0%	Non Revenue Water 278.0 31%
			Unbilled Unmetered Consumption 33.7 4%	
	Water Loss 244.3 27.3%	Commercial Losses @28% 68.4 8%	Unauthorised Consumption @10% 24.4 3%	
			Customer Meter Inaccuracies @10% 24.4 3%	
			Data Transfer Errors @8% 19.5 2%	
		Real Losses @72% 175.9 20%	Real Losses 175.9 20%	

* Informal supply

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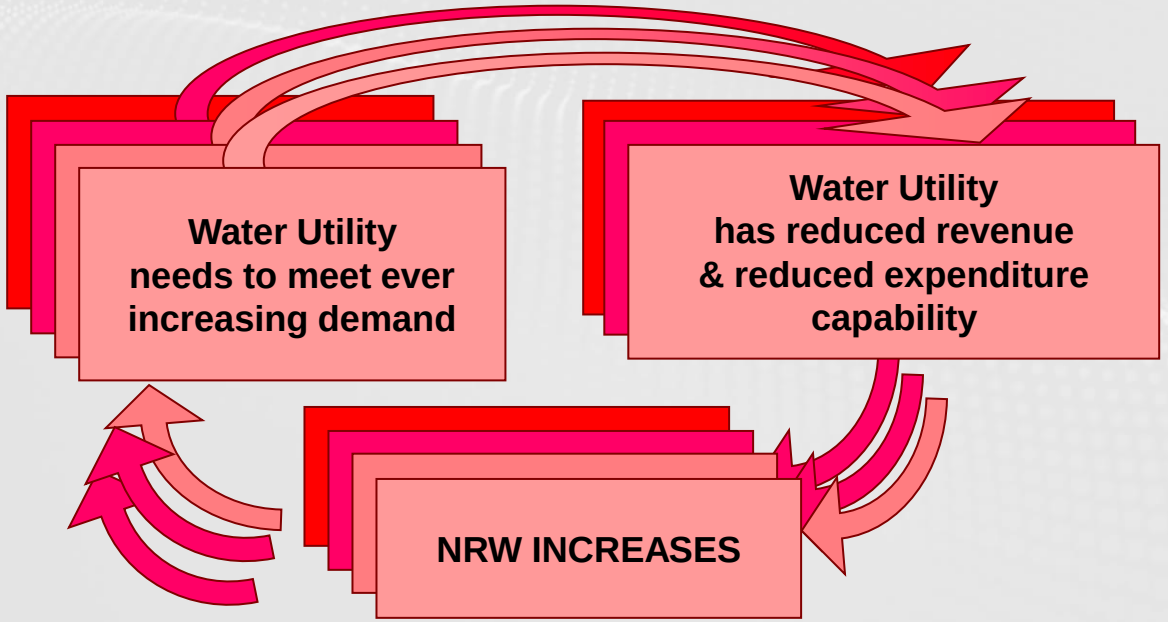
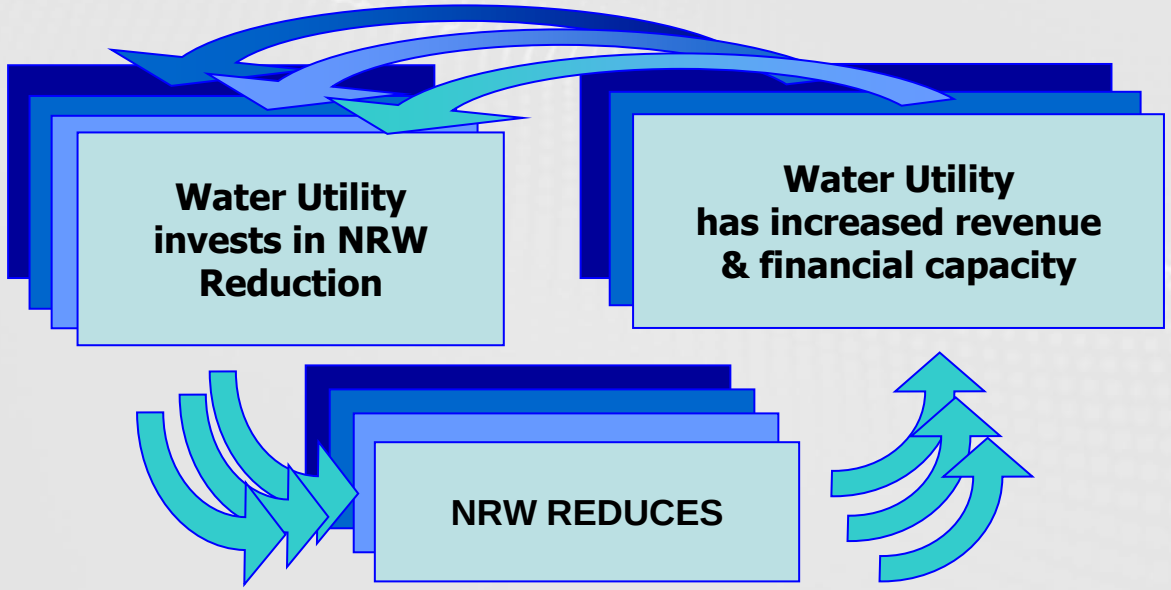
The vicious cycle



The vicious cycle



Fighting Real losses

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Pressure Management

Speed and Quality of Repairs

Current Annual Volume of Real Losses

Economic Level of Real Losses

Unavoidable Annual Real Losses

Active Leakage Control

Pipeline Materials Management

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Fighting Apparent losses

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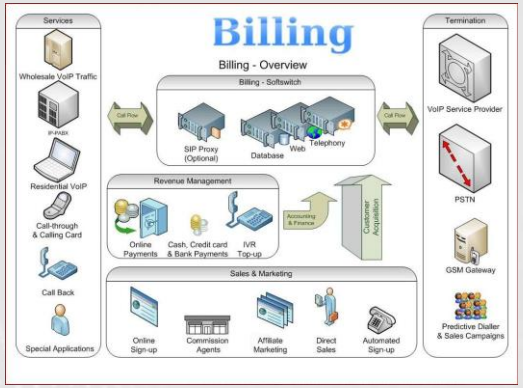
Customer Meter Management



Policy and Enforcement

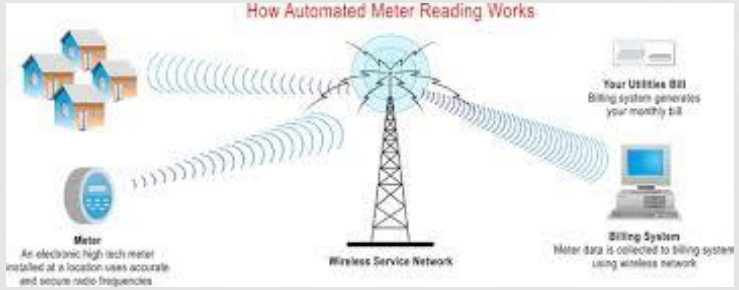
Current Annual Volume of Apparent Losses

Economic Level of Apparent Losses

Unavoidable Annual Apparent Losses

Water Accounting Controls

Data Handling Controls



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Apparent Losses

Data Analytics

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Is your data telling you the truth?

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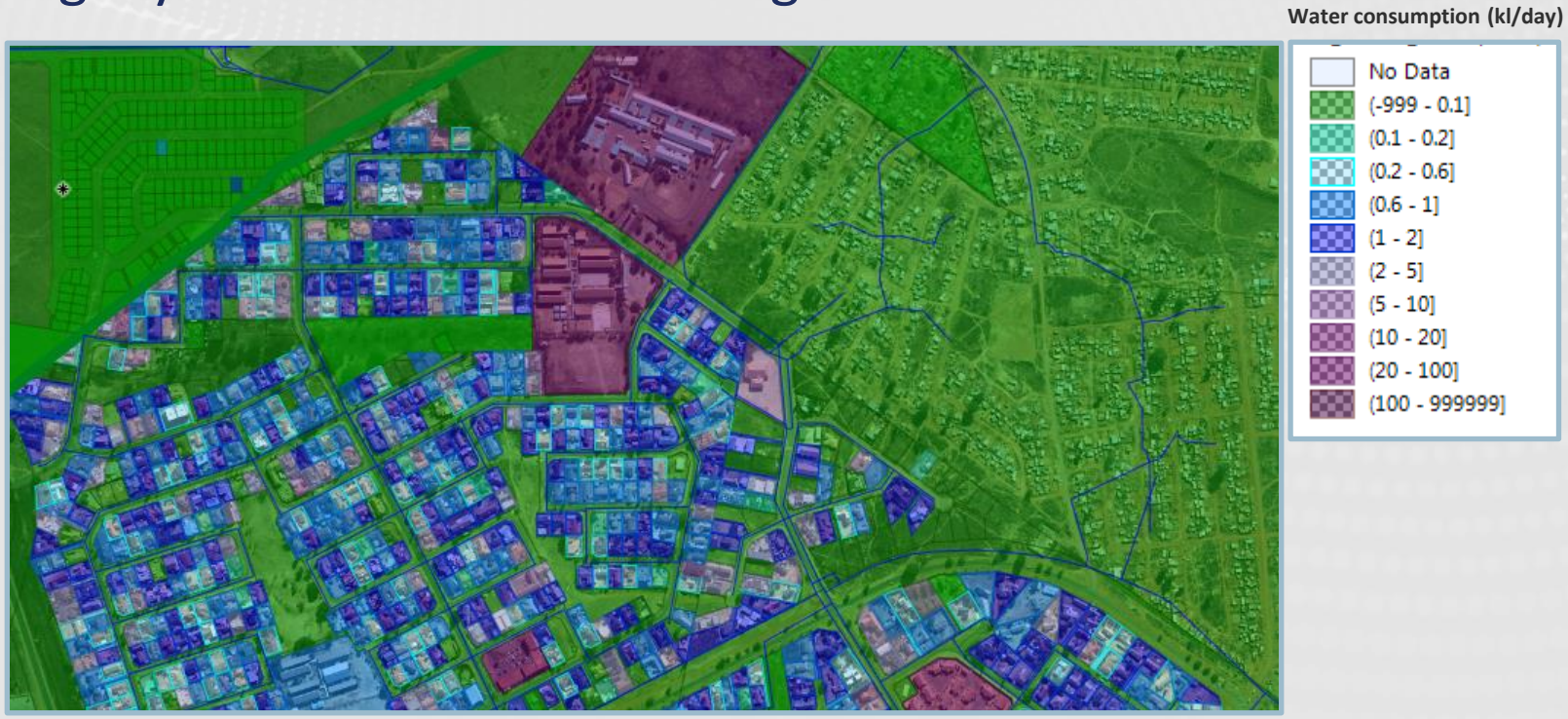
- Billing system analysis is required
- Swift is used to absorb billings system info and GIS linking is done to cadastral map of utility
- Provides line of sight
- Aerial photography
- Spatial visualisation



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More detail

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- **Spatial Link**
  - Required for mapping
  - Important for data integrity
    - Quantify in % of stands unlinked
    - Quantify in % of consumption unlinked
- **Billing system data**
  - Stands
  - Accounts (rates, electricity, water, refuse)
  - Meters (water, electricity)
  - Meter readings (water, electricity)
- **Prepaid meter data**
  - If available – link to billing data

  Or
  - identify through availability account tariff code
  - Estimated consumption
- **Arrears data**
  - Age of debt per account
  - Aggregated to debt per stand

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Identify Unbilled stands

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- Calculate Consumption from meter readings
- Map stands with and without consumption
- Average consumption per land use per suburb
- Over aerial photo
- Identify unbilled stands
- Estimate consumption

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How much again?

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- **Estimate consumption - average consumption suburb & landuse**
  - Limited in High risk suburbs (residential)
    - ❖ 18 kL/month (WDM)
    - ❖ 600 kWh/month (Prepaid)
- **Estimated Billed amount**
  - Predominant tariff code / most likely for landuse
- **Risk Based Approach**
  - Estimated Bill x Likelihood of payment (suburb)

Electricity:	Billed Revenue (R million/annum)	Ave Collection Rate (%)	Probable Revenue (R million/annum)
Availability	R 16.7	36%	R 6.0
Consumption	R 108.3	39%	R 51.7
Prepaid installations	R 17.9	100%	R 17.9
Water:	**Probable Revenue/Saving* (R million/annum)**	**Ave Collection Rate (%)**	**Probable Revenue/Saving* (R million/annum)**
Availability	R 13.0	23%	R 3.0
Consumption	R 140.9	37%	R 52.6
WDM/Retrofitting	R 48.7	100%	R 48.7
TOTALS	**R 345.5**		**R 179.9**

** Savings due to reduced SIV through water demand management or retrofitting to curb unpaid for excessive water consumption*

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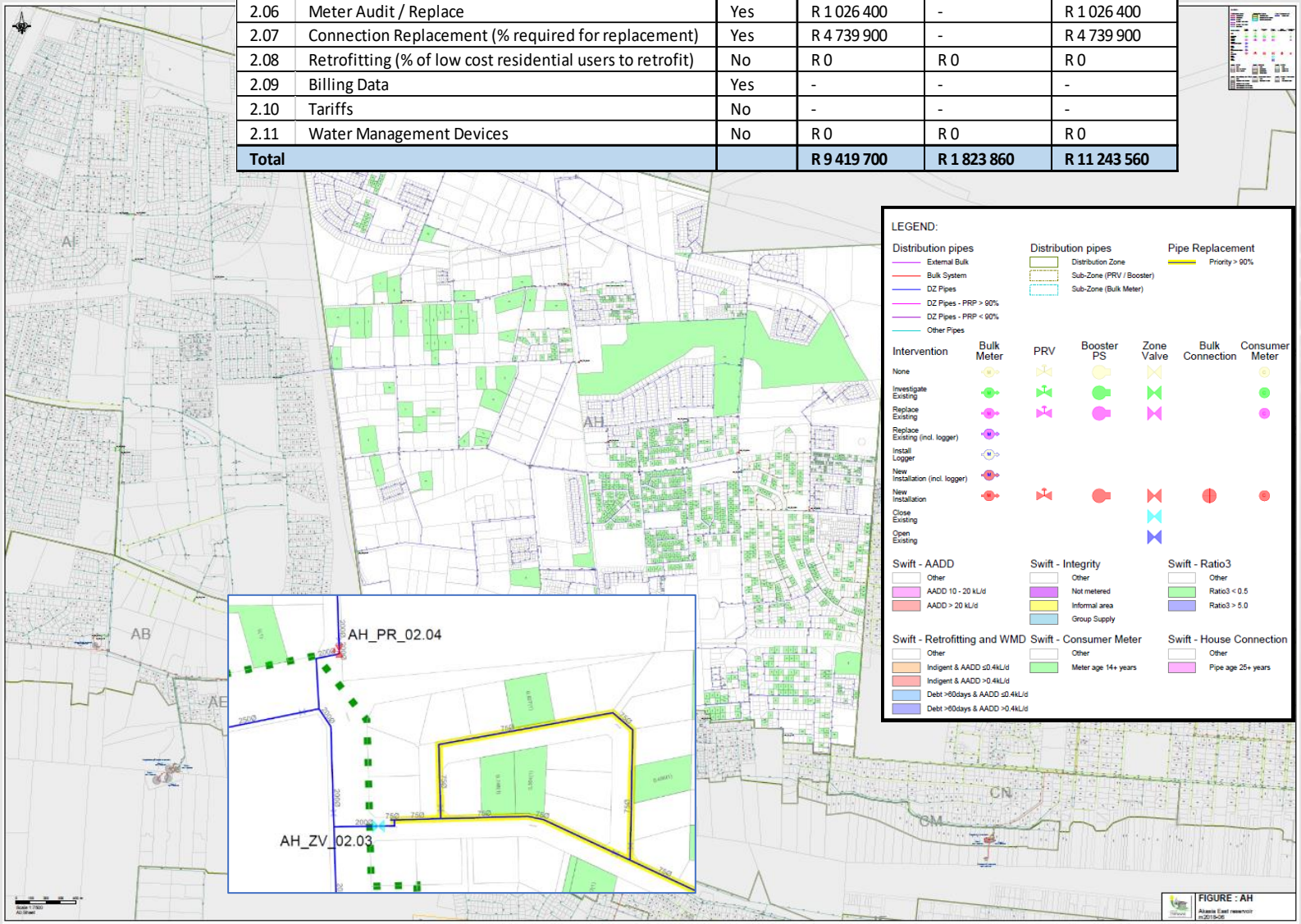
How much again?

- **SoW**
- **Map**
- **BoQ**
  - Template (all possible items)
  - Capex
  - Opex
  - Recurring capex
  - P&G, Contg., Fees, exc.VAT
- **Summary**
  - Intervention (v)
  - Capex
  - Opex
  - Total

	Description	Indicated	Capex	Opex [1]	Total cost
			Once-off cost	Recurring cost	
2.01	Install / Fix / Log Bulk Meters	No	R 6 000	R 330 000	R 336 000
2.02	Pressure Management	Yes	R 3 003 000	R 602 000	R 3 605 000
2.03	Leak Detect / Fix	Yes	R 571 400	R 891 860	R 1 463 260
2.04	Pipe Replacement	No	R 0	-	R 0
2.05	Boundary Discreteness	No	R 73 000	-	R 73 000
2.06	Meter Audit / Replace	Yes	R 1 026 400	-	R 1 026 400
2.07	Connection Replacement (% required for replacement)	Yes	R 4 739 900	-	R 4 739 900
2.08	Retrofitting (% of low cost residential users to retrofit)	No	R 0	R 0	R 0
2.09	Billing Data	Yes	-	-	-
2.10	Tariffs	No	-	-	-
2.11	Water Management Devices	No	R 0	R 0	R 0
Total			**R 9 419 700**	**R 1 823 860**	**R 11 243 560**



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Real Losses
Pressure & Pipe Material Management
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Hydraulic modelling

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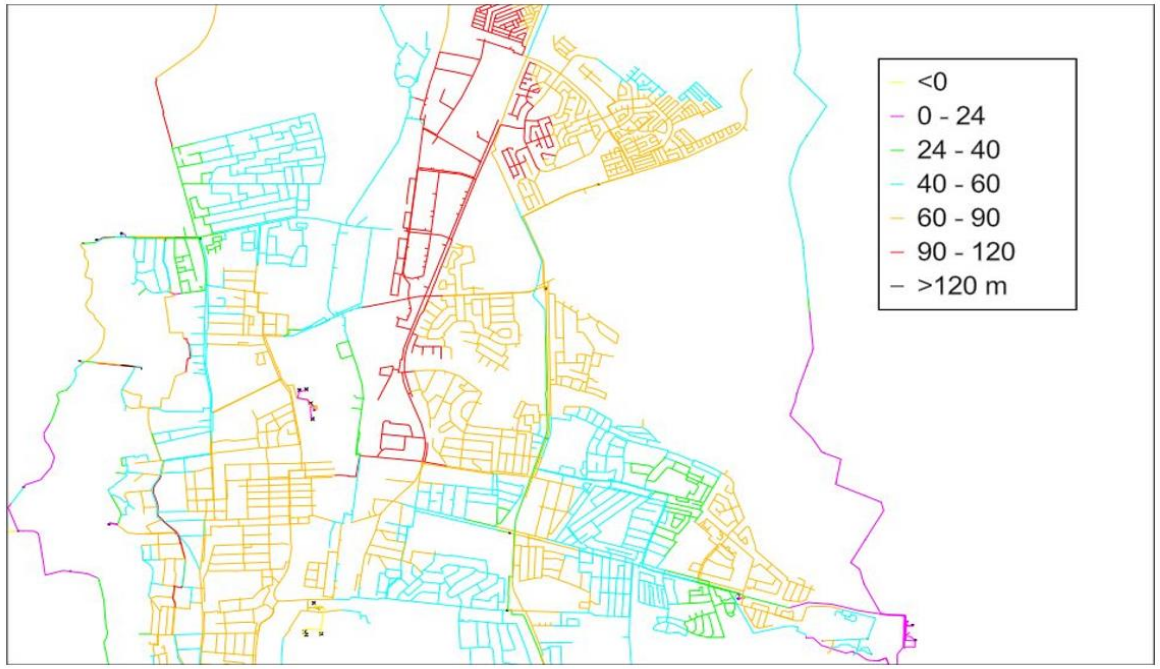
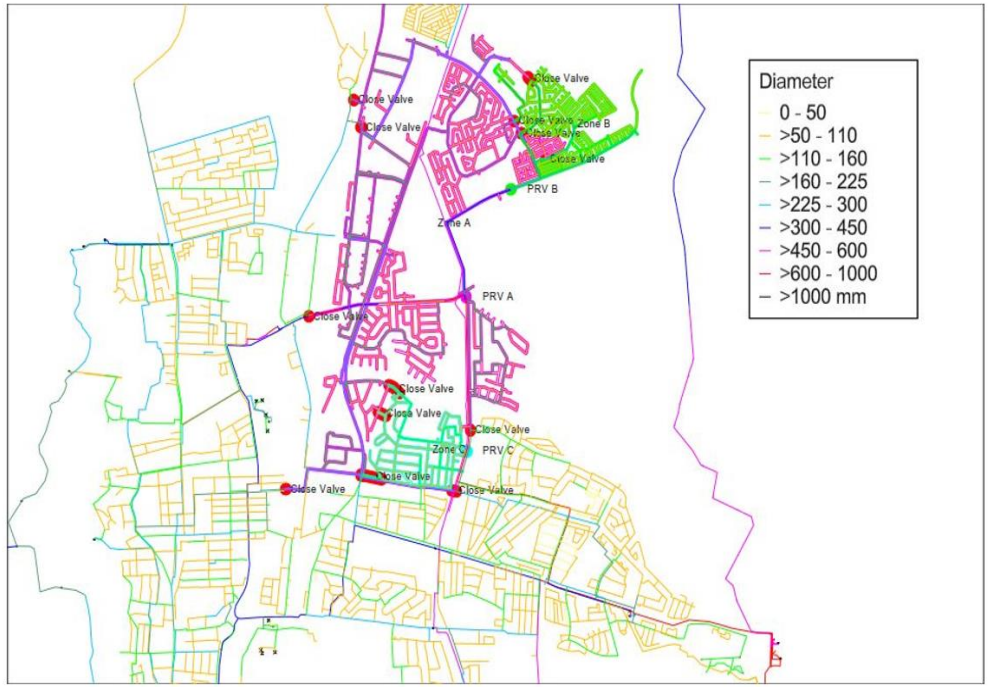
- Water distribution system hydraulic modelling
- Understand optimal demand management areas
- Optimal placement of pressure regulating valves

High pressures in zone



3 New Zones Proposed



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Hydraulic modelling

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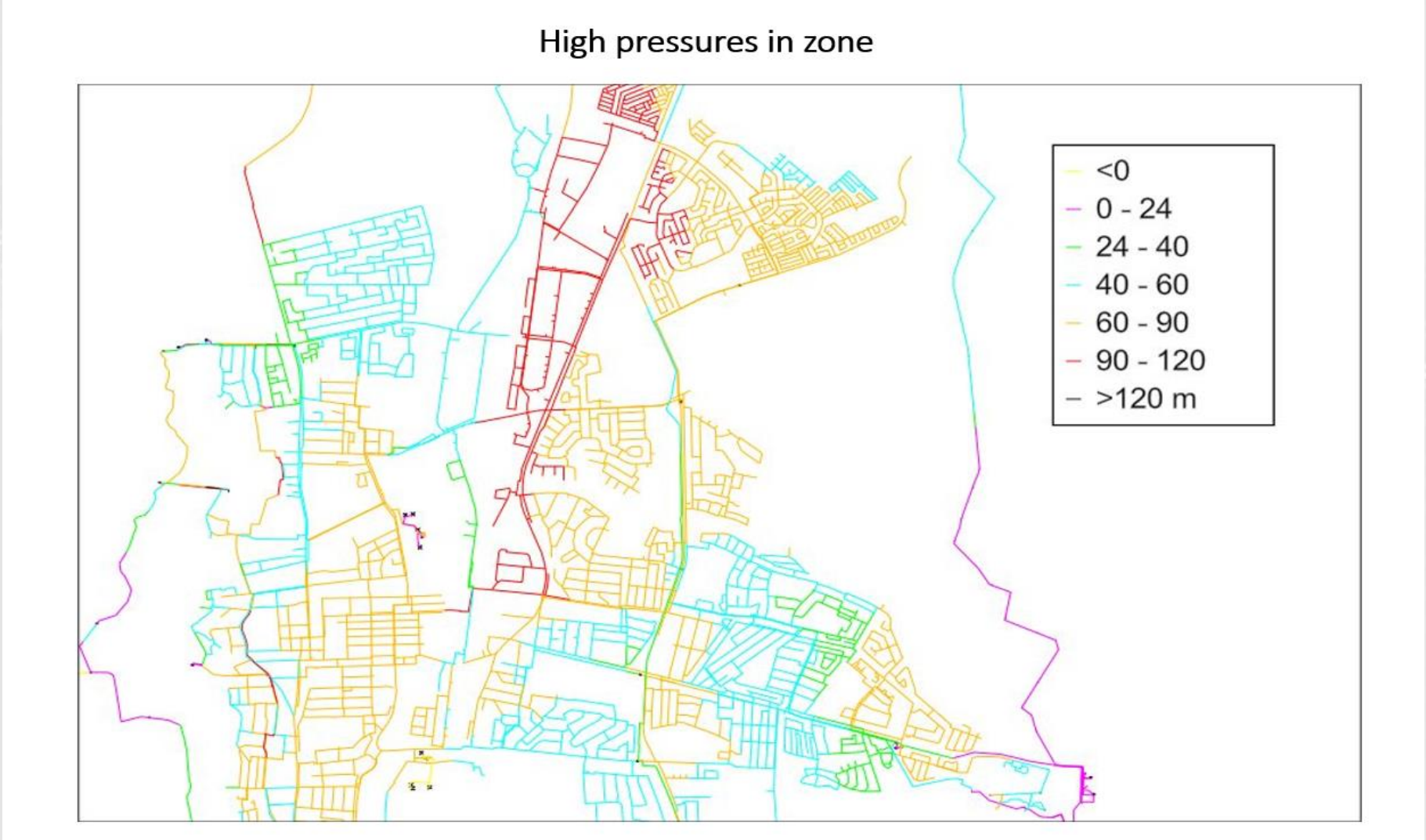

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Hydraulic modelling

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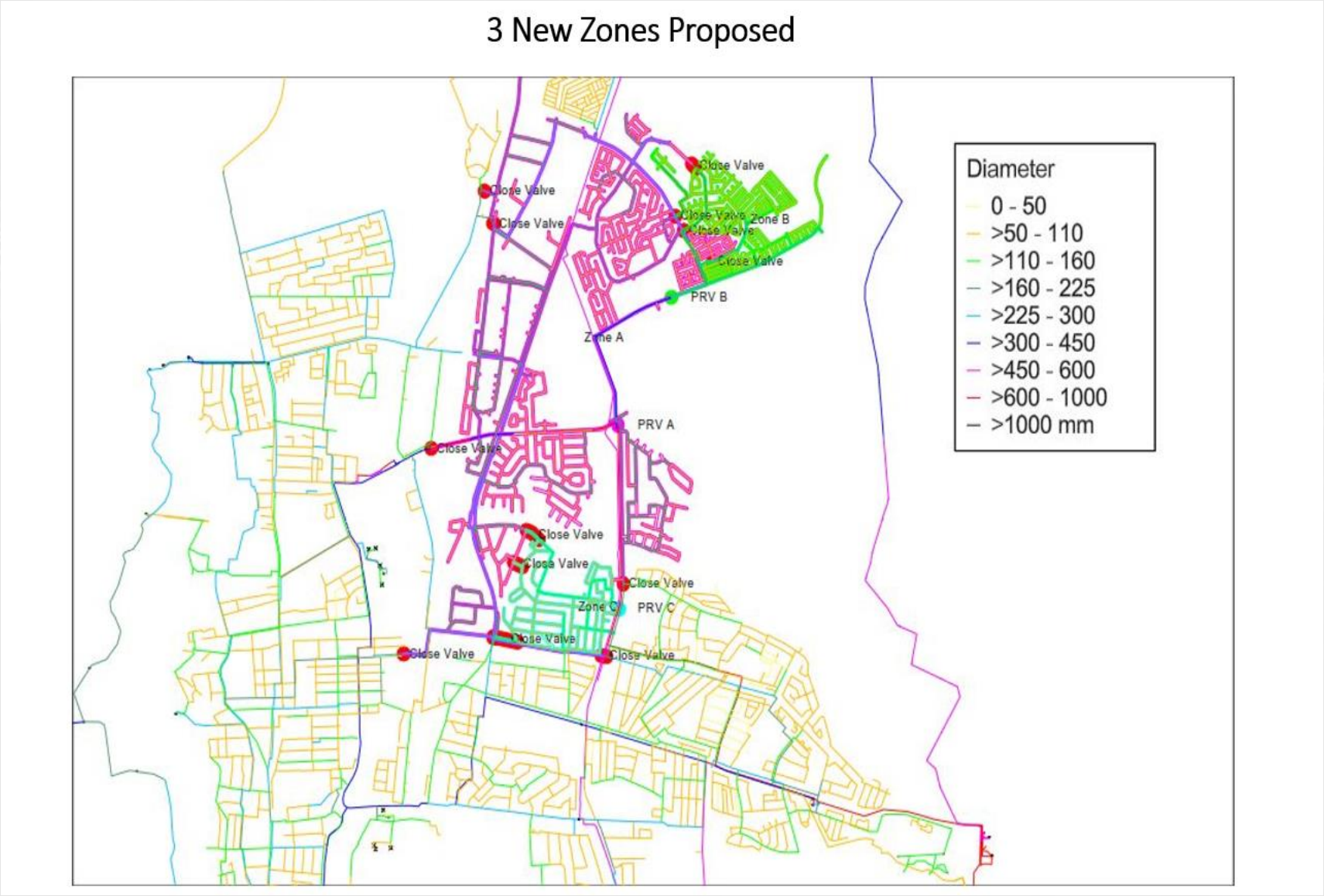

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Pressure Management

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- In line pressure management
- I20 solution self learns water patterns
- Deployed in major cities in SA
- Key intervention during City of Cape Town's drought period
  - Advanced pressure management on 83 zones (new and existing)
  - 76 ML/d savings at height of program

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Pipe replacement programs

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- Pipe failures lead to leakages and bursts
- PRP = Likelihood of Failure x Consequence of Failure
- Various input factors
- Capital replacement program

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Pipe replacement programs

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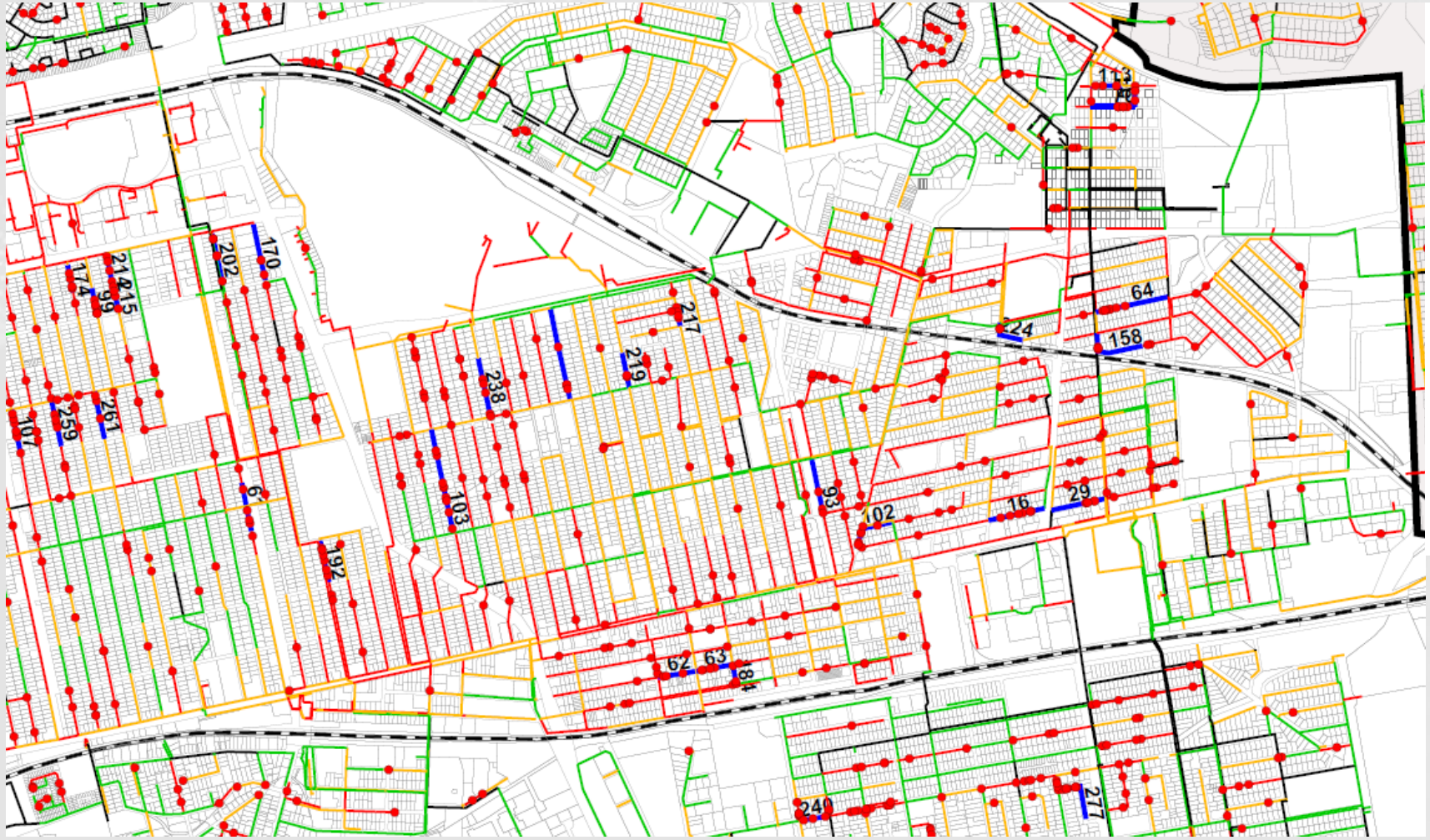

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Just do it

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SIV 839.0	Authorised Consumption 631.5 75.3%	Billed Authorised 622.4 74%	Billed Metered Consumption 580.2 69%	Revenue Water 622.4 74%
			Billed Unmetered Consumption* 42.1 5%	
		Unbilled Authorised 9.2 1%	Unbilled Metered Consumption 0 0%	Non Revenue Water 216.6 26%
			Unbilled Unmetered Consumption 9.2 1%	
	Water Loss 207.4 24.7%	Commercial Losses @28% 58.1 7%	Unauthorised Consumption @10% 20.7 2%	
			Customer Meter Inaccuracies @10% 20.7 2%	
			Data Transfer Errors @8% 16.6 2%	
		Real Losses @72% 149.4 18%	Real Losses 149.4 18%	

* Informal supply

Potential:

- To reduce NRW by 5%
- SIV down by about 60 ML/d or R 275m per year
- Reduce apparent and real losses

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And action!

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- Reticulation leak detection and repair was completed on 5000 km of pipeline with COCT;
- 32 141 properties within the metro was inspected, fining and repairing 8704 leaks within indigent households;
- 22 New pressure management zones created;
- Advanced pressure management completed on 83 new and existing zones, with a savings 0f 76ML/day at the peak of the project

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Conclusion

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Thank You!

No questions please…

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