

ENVIRONMENTAL MANAGEMENT CHALLENGES OF UNDERGROUND BULK WATER SERVITUDES IN AN INCREASINGLY URBANISING ENVIRONMENT.



The implications of the urban edge .
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Rand Water

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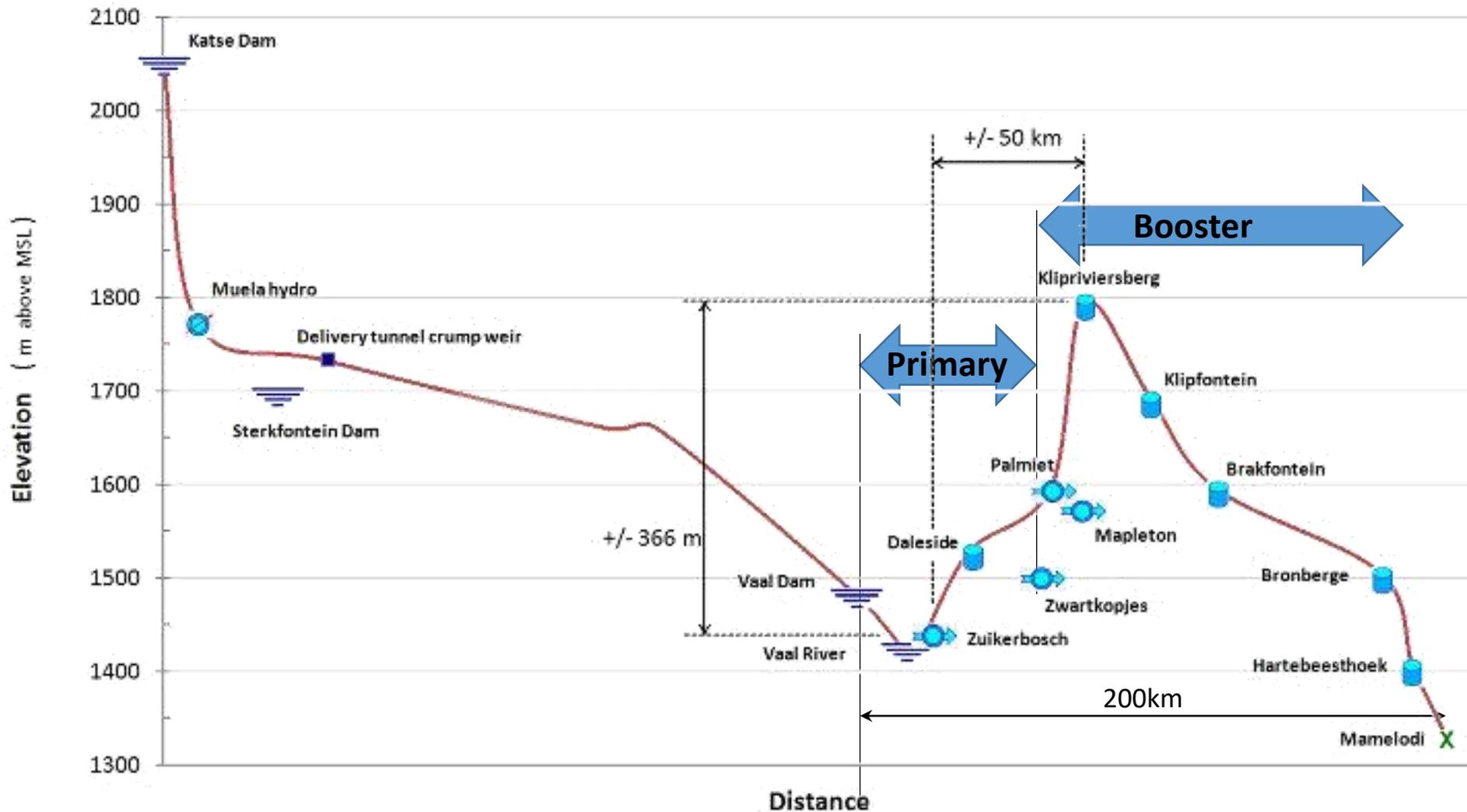
Rand Water - Bulk Water - RIGHT OF WAY



Globally and locally the world is faced with an increased demand for the provision of services

- Government-owned para-statal entity
- Purifies & transports potable water (mainly) to municipalities
- Income (potable) is derived from rate-payers
- No funding from National Treasury
- Some Augmentation Capex is funded by borrowing
- All Renewal Capex is self funded

Supply topography (Palmiet)



Sources of Water

Lesotho Highlands



Vaal Dam



Purification



Lesotho Highlands Scheme augments Vaal River System (about half of our water is LH Water)

Raw water from Vaal Dam purified and pumped to foothills of Witwatersrand ridge

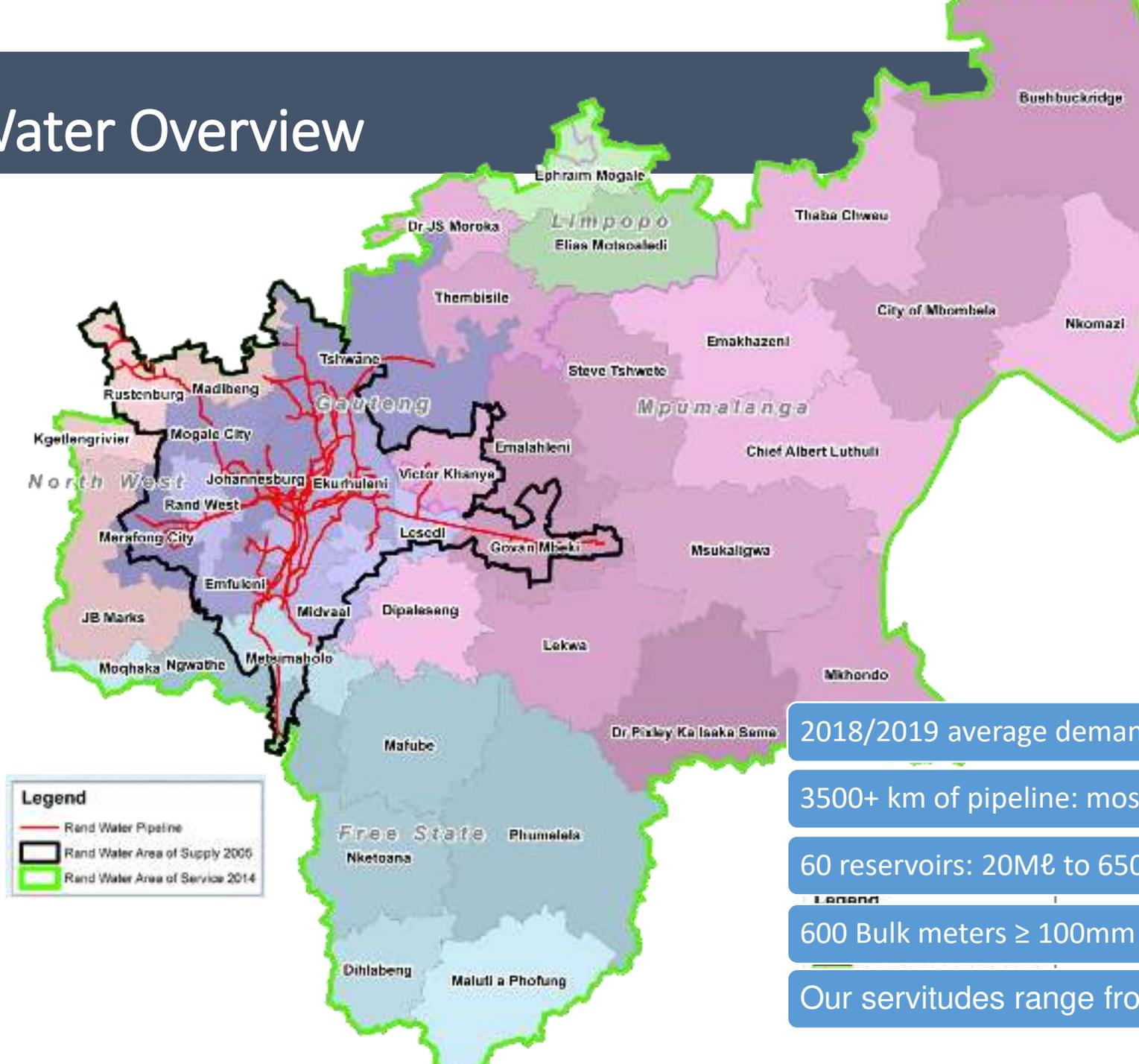
Rand Water Overview



RAND WATER

Rand Water is a public utility now wholly owned by government

Rand Water has been existence for 110 yrs



2018/2019 average demand: ~4300 Mℓ/d

3500+ km of pipeline: mostly > 600 mm

60 reservoirs: 20Mℓ to 650 Mℓ

600 Bulk meters ≥ 100mm dia.

Our servitudes range from 3m to 42m in width



RAND WATER

Activities in our R.o.W/Servitude for Operation

Negotiate space for new pipeline/ Authorisations

Install and rehabilitate the site

Monitor integrity of the environment . Fix soil erosion

PREVENTATIVE AND REACTIVE MAINTENANCE ACROSS FULL ASSET LIFECYCLE

- LIFECYCLE CURVE
- DETERIORATION CURVE
- ◆ PPCA INTERVALS
- REHABILITATION
- REPLACEMENT



Environmental Management Challenges of Underground Bulk Water Servitudes In An Increasingly Urbanising Environment.

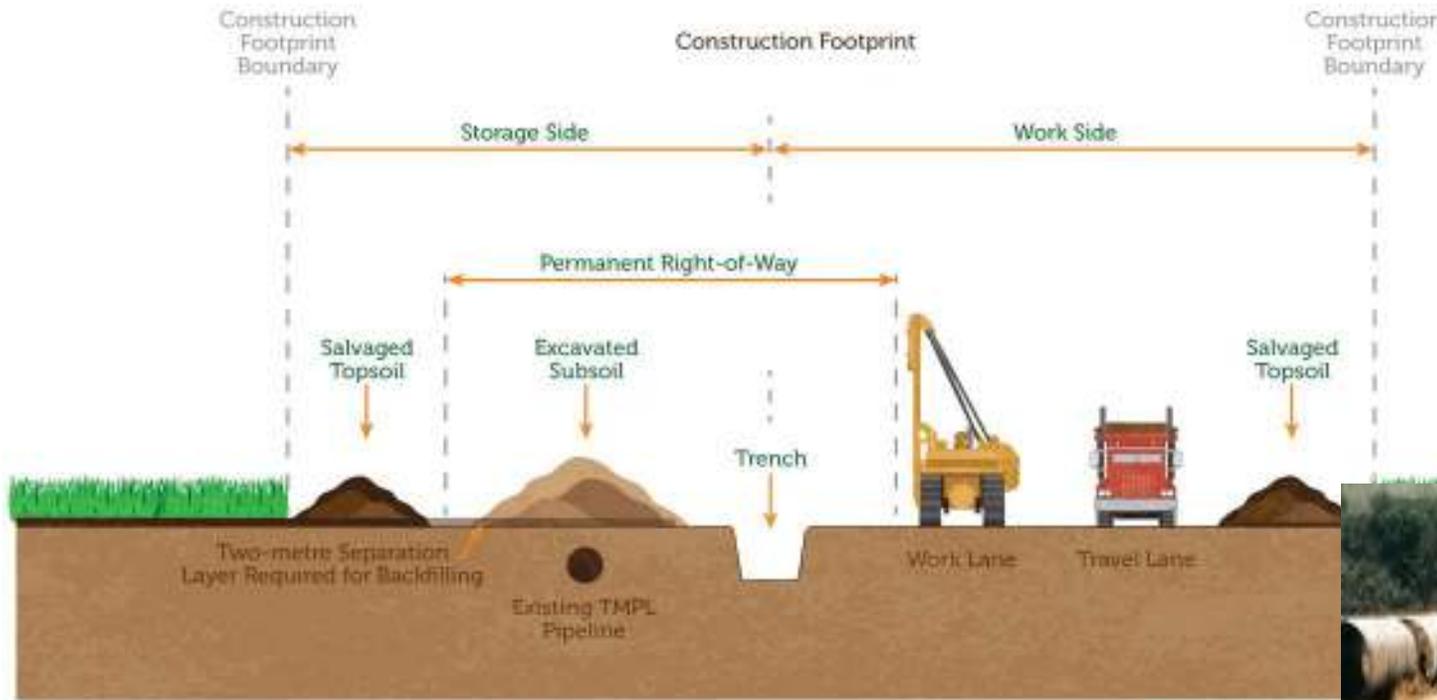
- Increased urbanisation
- Space limitations
- Maintain servitudes
- Access
- IAP's – Socio/political/economic agenda
- Corrosion from stray current
- Erosion threatening pipe integrity
- **Very sensitive fauna and flora**
- Vandalism
- Servitude rights (inconsistent)
- Cost of maintenance
- Expropriation
- Encroachment



Maintaining soil stability, to retain the integrity of the pipe

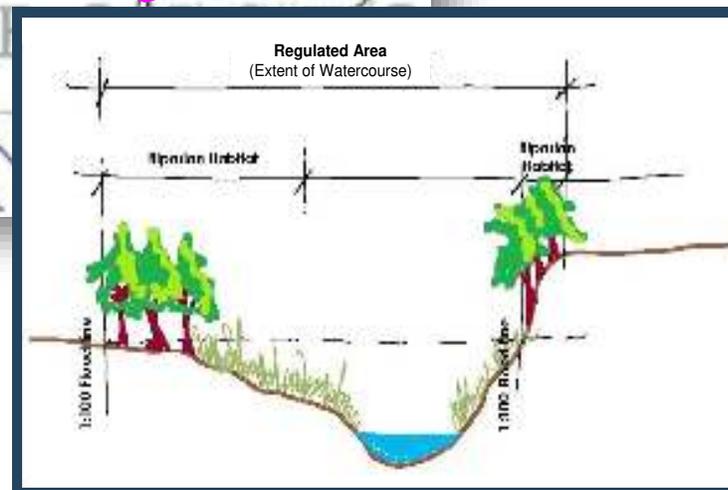


Typical layout of a Construction Working Strip



Pipeline being laid

Regulated areas - Legislation



- Heritage
 - Plants
 - Protected
- land**
- Delineated wetland zone
 - Pipeline
 - - - 500m radius



Take care to contain impacts



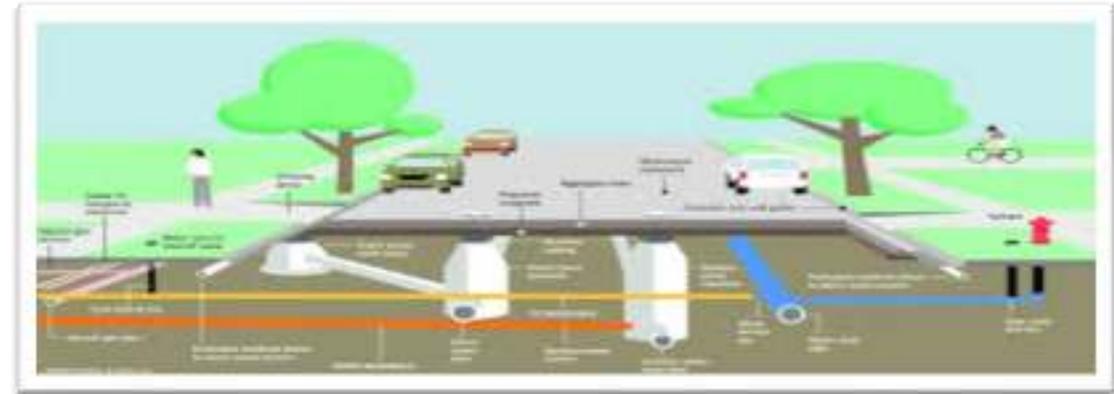
Silt settling and flow reduction



Expectation to look after the environment and keep degradation to a minimum



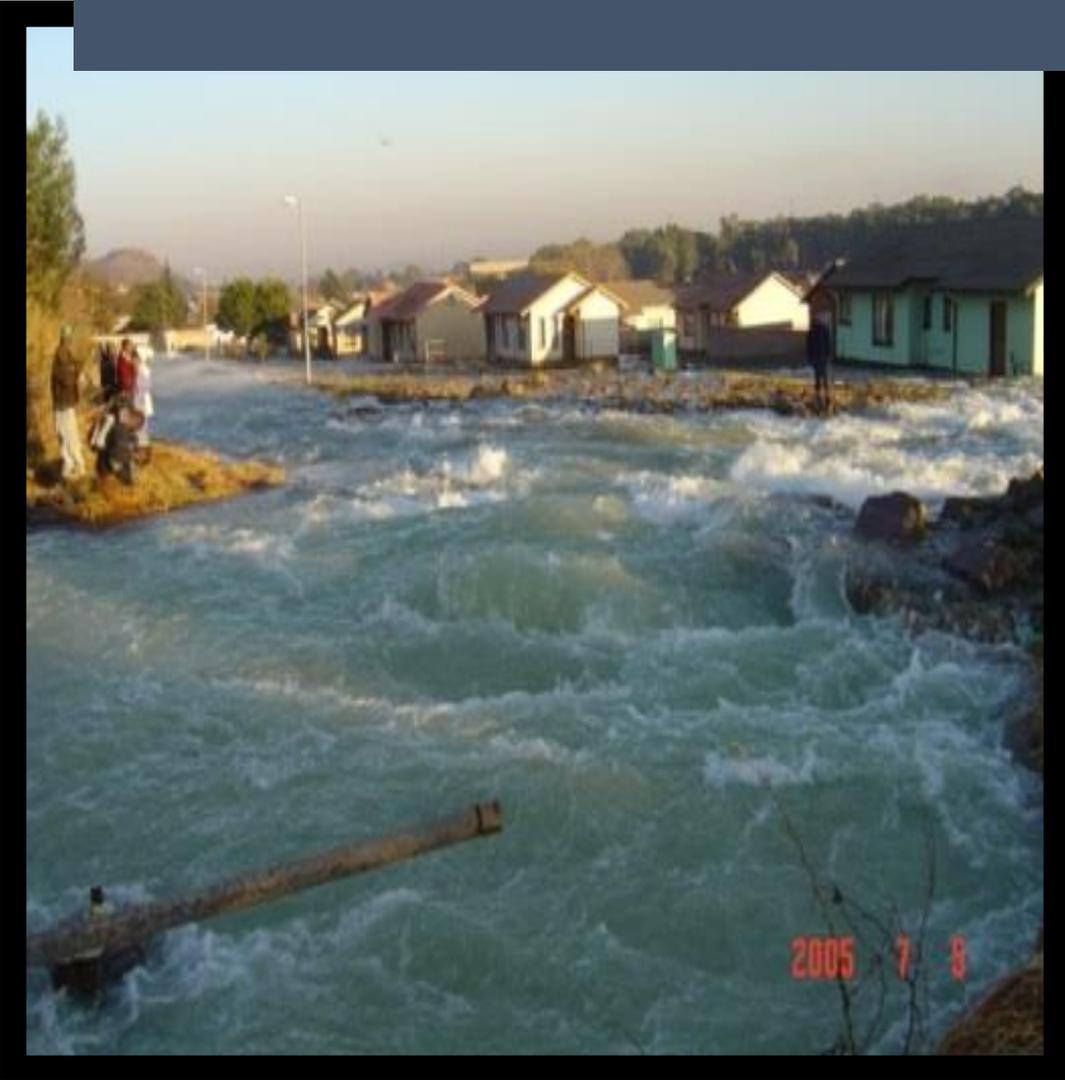
Services under the ground/ small spaces- hand digging



R5 Encroachment (Savana Estate)



Leaks can be very dangerous



Islands of very sensitive fauna and flora



Lycaenidae

- **Aloeides dentatis dentatis**

https://upload.wikimedia.org/wikipedia/commons/e/e3/Aloeides_dentatis%2C_J_Dobson%2C_a.jpg



Cineraria longipes S.Moore



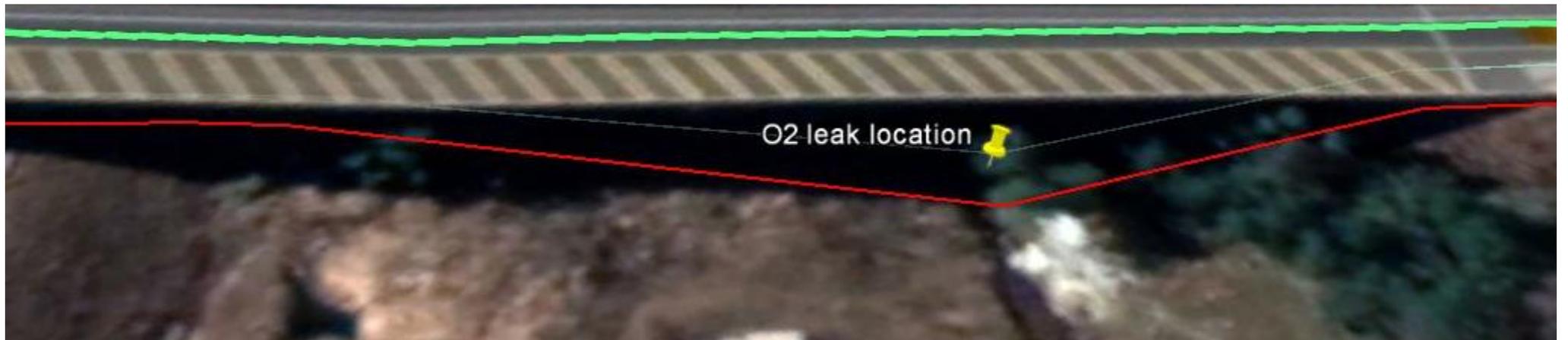
Regional Red List status (2016)	Endangered B2ab(iii)*
Bronberg Ridge subpopulation	Critically Endangered B1ab(ii,iii,iv) + 2ab(ii,iii,iv)*†
National Red List status (2004)	Vulnerable B2ab(ii,iii)
Bronberg Ridge subpopulation	Critically Endangered A2c; B1ab (i-v) + B2ab (i-v)

Julianae Golden Mole

Daily encounters



When we impact on other services
“Changing a river to suit a bridge”



What can SARWA do about these challenges??



Grow the business, reduce your foot print

Literature review

Green areas in our ever increasing urbanising spaces need to be more valuable as a **business case**.

Servitudes form part of “**green land**” which includes natural and artificial green spaces which range from urban parks to forest, farmlands to street-side green strips providing ecosystem services such as maintaining microclimates, filtering air, developing biodiversity or providing aesthetical appeal to urban environments. *Li et al., 2016*

Secondary values of ecological services,..... biodiversity, recreational and physiological services can be obtained from the same spaces

Biodiversity ?

- Servitudes in urban space has received growing innovative recognition globally for their potential to preserve and enhance biodiversity ([Farinha-Marques, et al., 2015](#))
 - viable biodiversity corridor is thought to be 40m, however the wider servitude the better the potential for a biodiversity corridor
- Many rail way edges and road reserves foster orchids ([Kloof conservation project](#)).
- Many reptiles, birds and small animals can retain an existence in these servitudes ([Farmer-Bowers., 1999](#)).



Compatibility of shared servitudes for multiple uses for society ?



Aspect	Rand Water	Eskom	Sasol
Fire	neutral	no	no
Digging	no	neutral	no
Recreation cycling	possible	no	possible
Working with a crane	neutral	no	neutral
Graves	no	possibly	no
Biodiversity	Yes	yes	yes
Out door church	possible	possible	possible
Trees	no	no	no

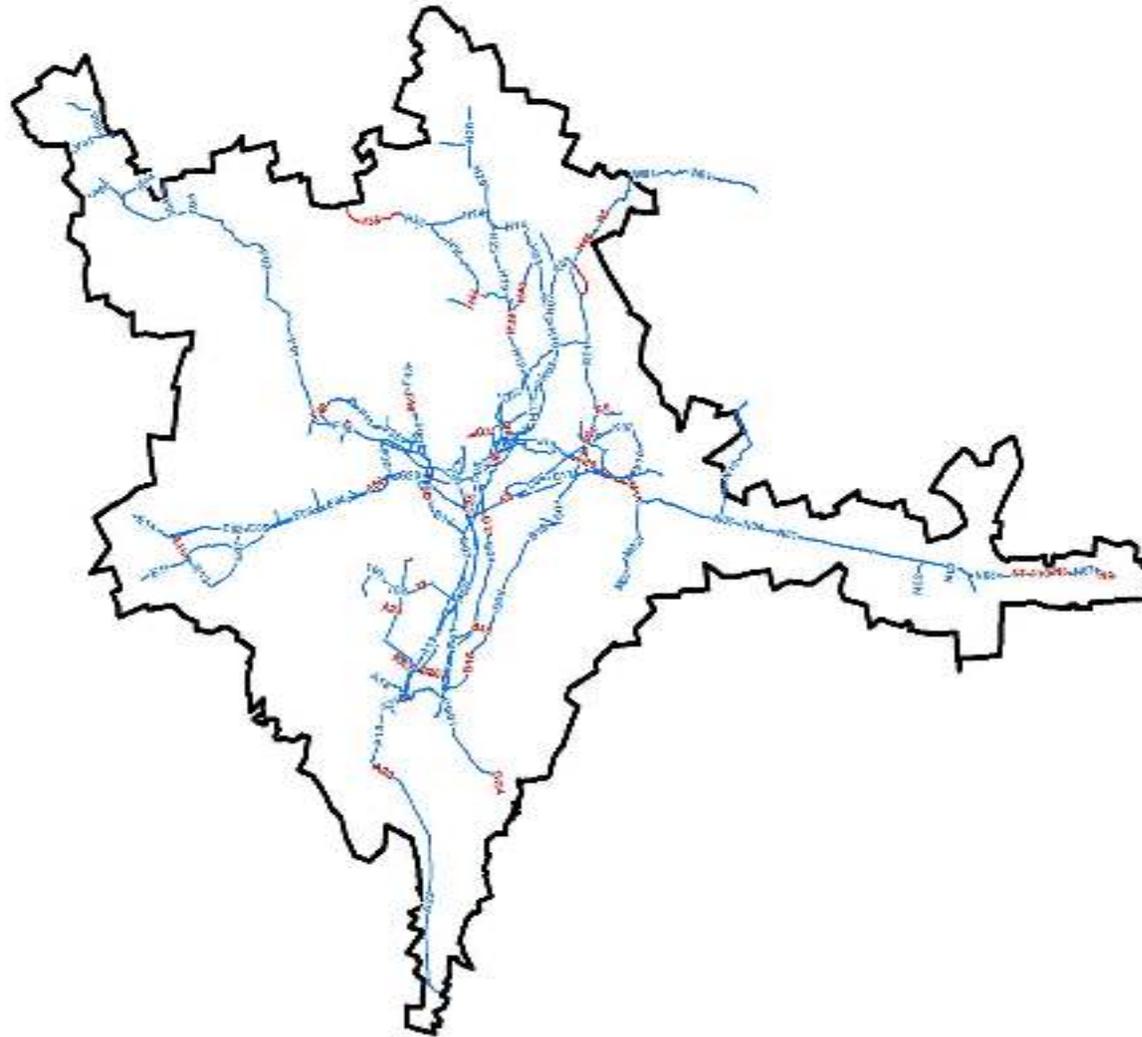
Area of Supply - Rivers and Wetlands

Area of Supply - Ridges

Area of Supply - Protected Areas

Area of Supply - Ecological Support Areas

Area of Supply - Pipelines



Legend
— Ridge
— Pipeline
— River



RAND WATER



Green
value
Green
assets

Change the mind set!



Recommendation and conclusion

*There's a reason that
justice is often
referred to as a seed...*

it's not something we can
expect to see results or feel
changes from overnight.

Christine White
#JVReflects



*Our servitudes can be
"Green infrastructure" with a
"value!"*

- **The value of underground pipeline servitudes is less than that of pristine land but it still has a value ([Chenowetha et al., 2018](#)).**
- The challenge is in co-operative thinking to will it in to existence!

