



# Alternative water sources

Overview and specific opportunities in the construction sector

**28 February 2018**

# GreenCape



- Sector development agency
- We work closely with technology providers, businesses, academia and government
- We help businesses identify opportunity areas for adopting green technologies and services
- Independent, do not endorse specific brands or companies



Waste



Water



Renewable energy



Energy efficiency



Industrial symbiosis



Sustainable agriculture



Atlantis SEZ



Gas



Green finance



Bioeconomy

# Why do we need a thriving construction industry?



- 228 000 jobs
  - StatsSA Q1, 2017
- Contribution to national economy
  - Generally 30% of building plans registered in Western Cape
- Contribution to provincial economy
  - One of the top 3 sectors boosting economic growth in province
- Contribution to local economy
  - Significant in most Western Cape municipalities
    - Up to 10% GVA

# Construction industry in the Western Cape



Between Jan-Aug 2017:

- **Residential properties:** R6.8 bn completed, and R10.7bn in building plans passed
- **Office, banking and shopping space:** R1.2 bn completed (160,000m<sup>2</sup>) and R1.4bn (170,000 m<sup>2</sup>) building plans passed.

These developments require water and therefore need to be resilient.

# Key interventions for the construction sector



| Water metering and monitoring   | Water efficiency and reuse   | Alternative water supply  |
|---|--|---|
| <ul style="list-style-type: none"><li>• Smart water metering</li><li>• Water quality monitoring</li></ul> | <ul style="list-style-type: none"><li>• Water exchange/access networks</li><li>• Greywater reuse</li><li>• Water efficient devices</li></ul> | <ul style="list-style-type: none"><li>• Treated effluent</li><li>• Basement water</li><li>• Rainwater harvesting</li><li>• Groundwater supply</li></ul> |

# Alternative water supply

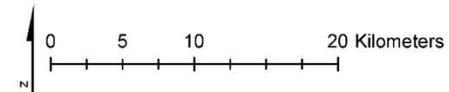


- Treated effluent
- Basement water
- Groundwater abstractions



City of Cape Town Treated Effluent Collection Points

- ▲ Waste Water Treatment Works
- Local Municipalities

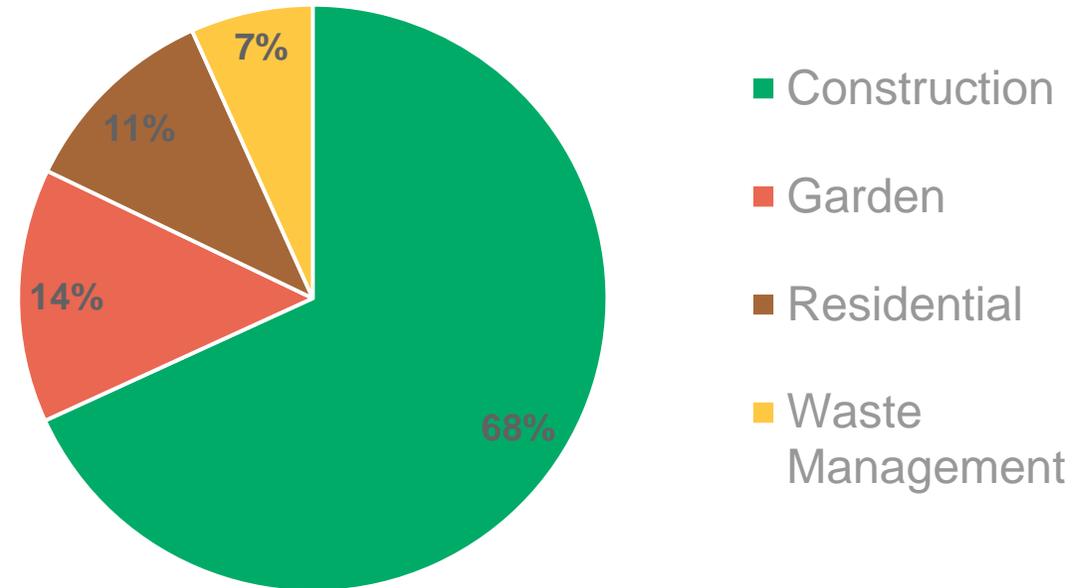




# Treated effluent

- From municipal WWTW
- Applications - toilet flushing, fire systems and construction
- Construction sector is already a big user in Cape Town
- Supplied at R5.30 per kl collected (CoCT)
  - Cf. industrial/commercial water tariffs: ~WAS R29 per kl, NOW : ~R57 per kl

Macassar Waste Water Treatment Works:  
treated effluent usage by sector





# Treated Effluent – Applications and Concerns

- Application
  - Only concern regarding concrete mixing water
    - SANS 51008
    - Eg Rabie, Aurecon and Potsdam treated effluent
- Water chemistry
  - Variability
  - Regular testing
- Assurance of supply

# Case Study: Rabie Group

- Feb 2018
  - Construction activities on-site **100% off potable water**
    - Except for drinking water and hand washing
    - Treated effluent from Potsdam
      - Cube strength tests
      - \*\*\*suitable for mortar and structural concrete (if necessary)
  - Saving at least 2000 m<sup>3</sup> potable municipal water per month



# Case Study: Rabie Group



- Water efficiency approaches
  - Readymix
    - No concrete mixed on-site
    - Half readymix suppliers are off potable water use
  
- Total water reporting
  - Aggregated under each project
  - Contractors invoiced for treated effluent supplied on-site



# Case Study: HHO Consulting Engineers

- Roadworks

- High water demand
  - Dust suppression
  - Compaction



- Kommetjie road upgrade project – water demand

- Water pipe pressure testing, disinfection and flushing before commissioning;
- Dust control;
- Mixing and compacting for gravel layer work construction;
- Backfilling of pipe trenches to obtain optimum moisture content
- Cement stabilisation of gravel subbase layers.

# Case Study: HHO Consulting Engineers



- Range of water sources accessed
  - Rainwater (20kL tanks on car ports)
  - Local municipal borehole
  - Old agricultural well
  - Treated effluent – issues with traffic congestion

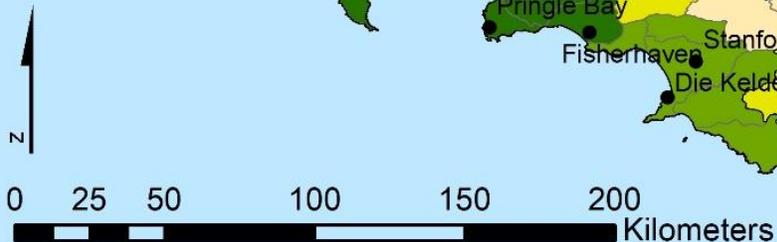
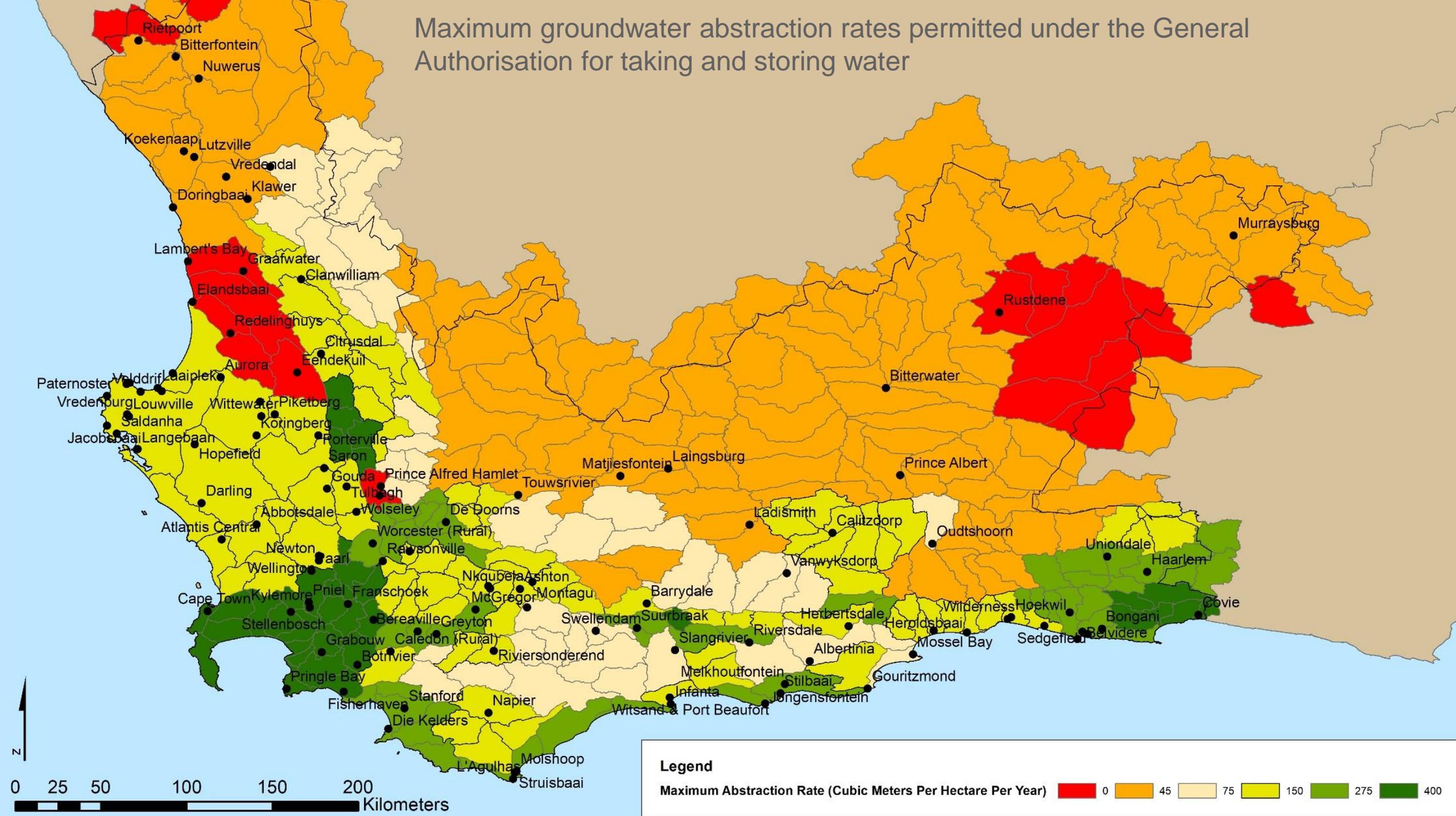
Potable municipal water – ONLY drinking water

Current water usage – 60-70 kL per day

Next phase (increased demand)

- Layerworks compaction
- **120-140 kL per day** Cement stabilisation of subbase
  - 2400-2800 kL total

# Maximum groundwater abstraction rates permitted under the General Authorisation for taking and storing water



# Groundwater



- General authorisation generally 400 kl per ha per year in CT
  - 500 m<sup>2</sup> property = 20kl per year, but..
  - 45% reduction due to water restrictions = ~25L per day
- Large water users require a water use licence from Department of Water and Sanitation (National)
  - Application processing time is up to 300 working days

Local authorities may also require registration or approval of boreholes and treatment systems

**Treated effluent is a much quicker and easier option if available**

# Basement Water



- Classified as waste water by Department of Water and Sanitation
- May be used without authorisation in construction and property management
- Discharge may be regulated, depending on the water chemistry, volumes and point of discharge



# Alternative water in concrete

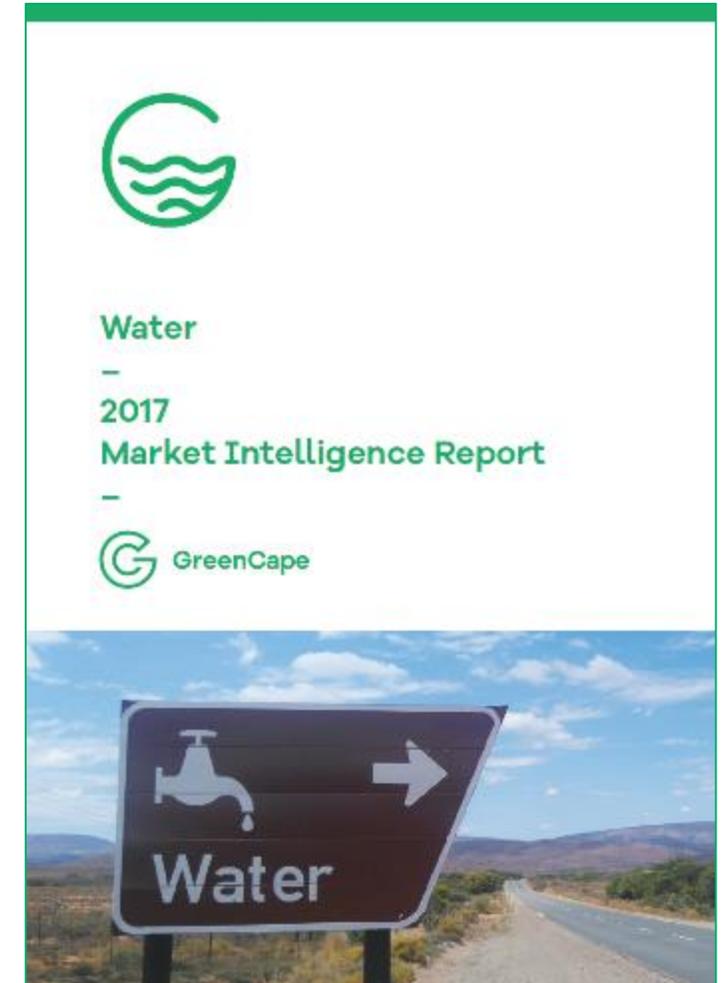
- 'Traditional concrete' recommended process
  - Access sample of alternative water
  - Water chemistry
  - Cube strength tests
  - Decision on application
- 'Low-water' concrete
  - Innovative materials – cement replacement with byproducts or wastes
- Designing 'concrete' for available water quality...



## GreenCape support

We're here to help, for free

- We can provide market intelligence.
- Our annual Market Intelligence Report on the water sector, available for free at:  
[www.green-cape.co.za/market-intelligence](http://www.green-cape.co.za/market-intelligence)
- Sign-up to be a member of GreenCape and receive invites to water-focused networking and information sharing events:  
<http://www.green-cape.co.za/become-a-member/>





# Thank You

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## City by-law and XB

Design considerations:

- Optimise design for rainwater collection and storage
- Plumbing, as retrofits can be difficult/costly
- Space for treatment and storage, where required

City of Cape Town's revised by-law proposes that all new developments take into account alternative water sources for non-potable use, and approval is required for alternative water systems.

Consult relevant municipal authority and by-laws



## Smart metering and sub-metering

- Online near real-time monitoring of meters
- Enable better management of water
- Can lead to significant savings

For example:

- GrowthPoint's The Estuaries (commercial building) achieved 70% water savings, which they largely attribute to smart metering
- Using smart metering, Vineyard Hotel was able to detect significant leaks from their dishwasher which they replaced, and reduced its consumption from 14kl/day to 1 kl/day.

In new build design critical to design buildings to easily accommodate smart metering and submetering.



# Water efficiency and reuse



## Residential and commercial properties:

- Water efficient devices (e.g. spray aerators, low flush toilets)
- Greywater reuse

Many systems difficult/costly to retrofit, but significant opportunities in new developments: WC new development market: ~R900 million (for 2018)

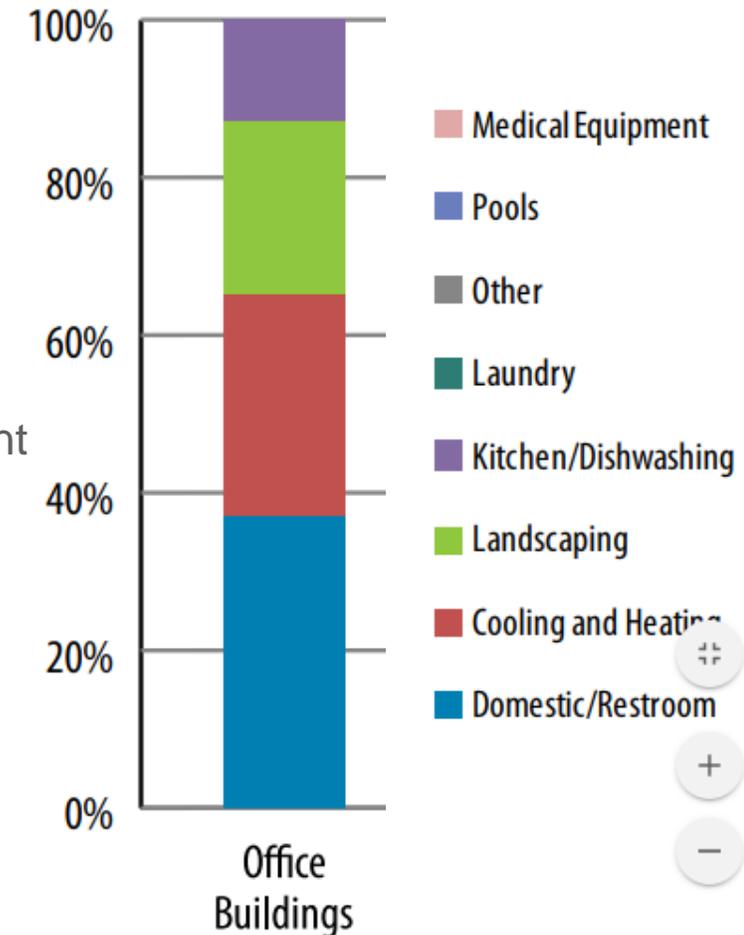
Important to include appropriate plumbing in design for greywater systems

Regulations increasingly stringent – e.g. CoCT bylaw review proposes more stringent limits on toilet cistern capacity and showerhead flows

In commercial buildings HVAC systems are large water users, and passive design therefore important.

## Industrial properties:

- Opportunities to design industrial complexes that can share water treatment resources and cascade water use (~3200 manufacturing sites in CT)



Source: US EPA 2012



## Market perspective - Gumtree South Africa

- “Explosion” in demand for water-related products and services, including plumbers and borehole service providers - which in Cape Town has doubled in a year.
- In the Western Cape, more than 50 specialist suppliers of water-recycling systems are now listed; there are over 1,300 listings for pool covers (which is traditionally a small category) and over 1,400 listings for water tanks.
- The demand for and supply of water efficient landscaping products (e.g. artificial grass, water-wise plants, paving and decking) has also significantly increased on the website.

