# Irrigating street trees with a permeable kerb


- **Chris Szota (0427417664)**
- cszota@unimelb.edu.au
- Waterway Ecosystem Research Group
- The University of Melbourne


# Big team

Peter Poelsma, Rob James, Vaughn Grey, Victor Berger

| | |
|---|---|
| Mahdi Disfani<br>Amir Mehdizadeh<br>Jamie Tainton | Porous Lane |
| Micah Pendergast<br>Cameron Schmelitschek | Water Studio |
| Arezou Houshmand<br>Naomi Clarke | Melbourne Water |
| Sylvie McLean<br>Adrian Murone | City of Merri-bek |
| Dushy Siva<br>Max Greenbury | CDN Construction |

# Irrigating the urban forest with stormwater

- Reduce impact of urbanisation on waterways AND rapidly establish canopy cover for urban cooling, amenity etc.

- Restore natural hydrological processes
  - Infiltration, evapotranspiration --- at scale

- So far, this is typical design…
  - Small catchments
  - One tree, one system
  - Inlets & storages

# What tree-related benefits can we expect?

No passive irrigation

- With typical passive irrigation designs
  - Double initial tree growth rate of establishing trees (compared with standard planting)
    - With adequate exfiltration/drainage
    - Duration of benefit determined by soil volume
  - Can have no growth or water stress impacts on established trees
    - Perth 2023/2024…?
    - “Millenium drought”


Grey *et al*. 2018. *Landscape and Urban Planning* **178:** 122-129.
Szota *et al*. 2019. *Landscape and Urban Planning* **182:** 144-155.
Thom *et al*. 2022. *Water Resources Research* **58**: e2020WR029526.


Passively irrigated

# What volume reduction benefits can we expect?

- With typical passive irrigation designs:
  - Capture ~20% of runoff
    - Constrained by:
      - Inlet (capacity/blockage)
      - Exfiltration rate (soil type)
  - Establishing (<2 yr old) trees use ~2% of runoff
    - ~2.5 L water/day
  - Established (>20 yr old) trees use >70% of runoff
    - ~35 L water/day


Thom *et al*. 2020. *Water Research* **173:** 115597.

Szota *et al*. 2019. *Landscape and Urban Planning* **182:** 144-155.

Thom *et al*. 2022. *Water Resources Research* **58**: e2020WR029526.

# Try not to concentrate...

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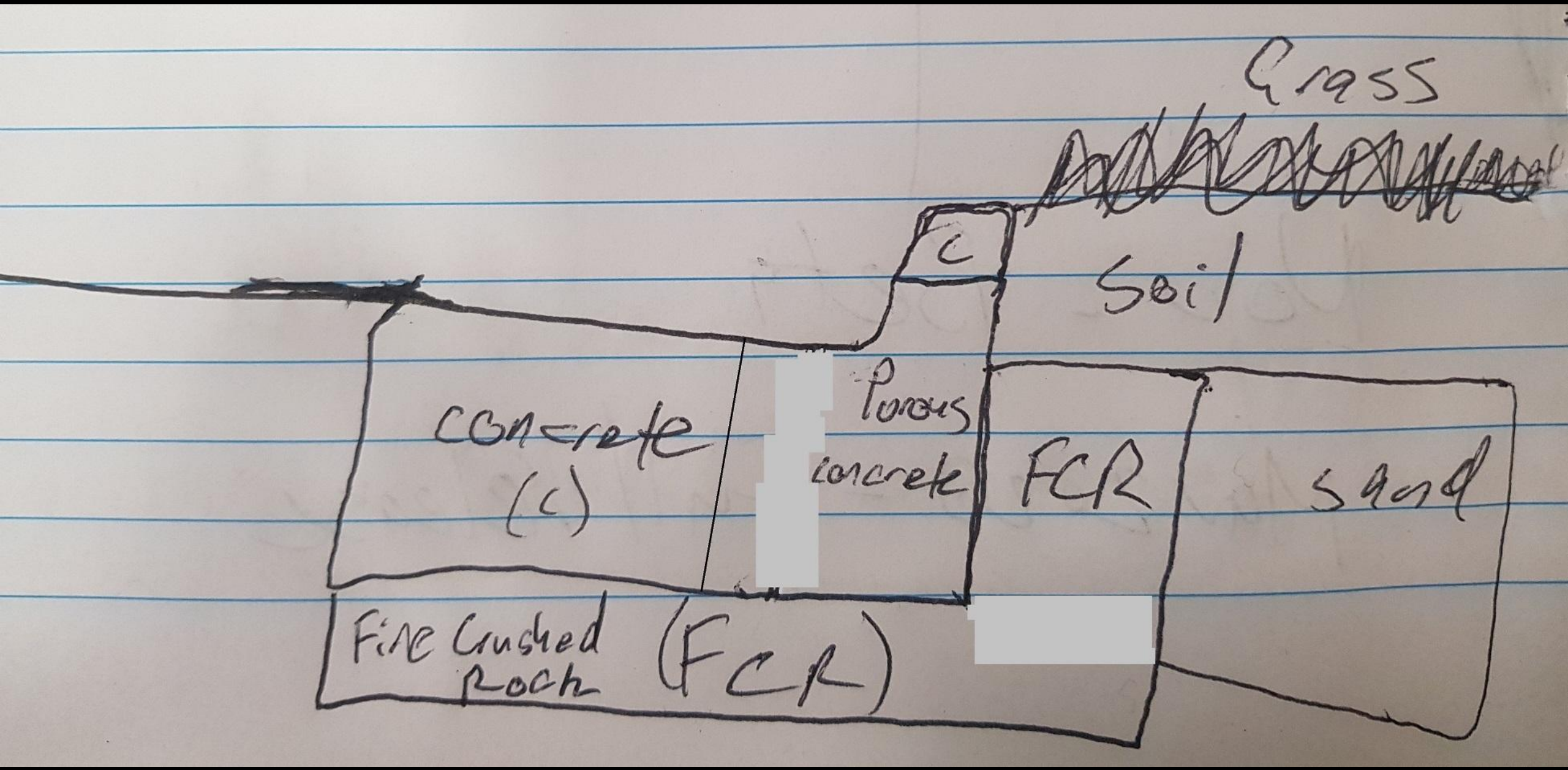
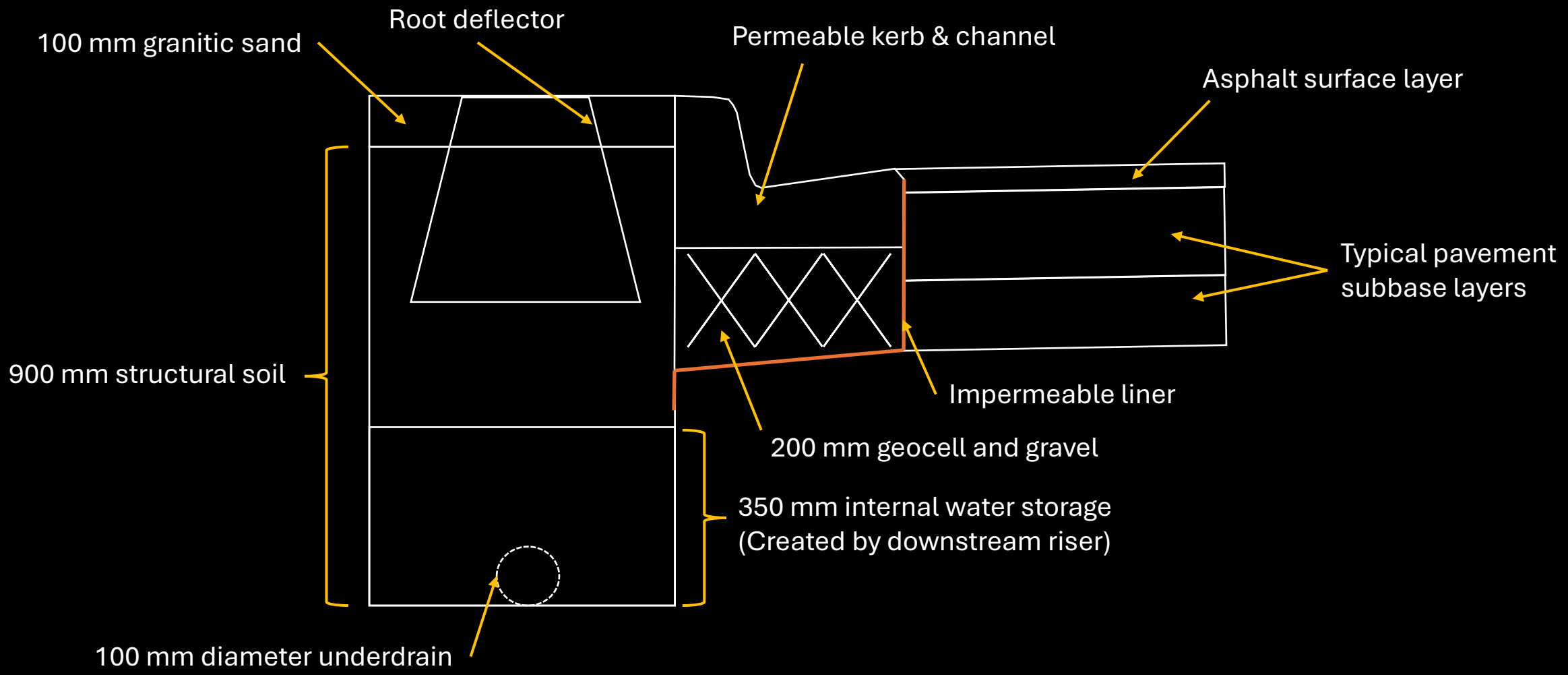
# Distribute flows, sediment & debris; but kerb removal not always good…

Henry Rd, Pakenham


Lynbrook Blvd, Lyndhurst




100 mm granitic sand
Root deflector
Permeable kerb & channel
Asphalt surface layer
Typical pavement subbase layers
900 mm structural soil
Impermeable liner
200 mm geocell and gravel
350 mm internal water storage
(Created by downstream riser)
100 mm diameter underdrain


This is not a carpark...
CB SMITH SPORT & EDUCATION FACILITY
~3.5 m


Regular kerb
Upstream interception pit
(Controls catchment size)
Permeable kerb

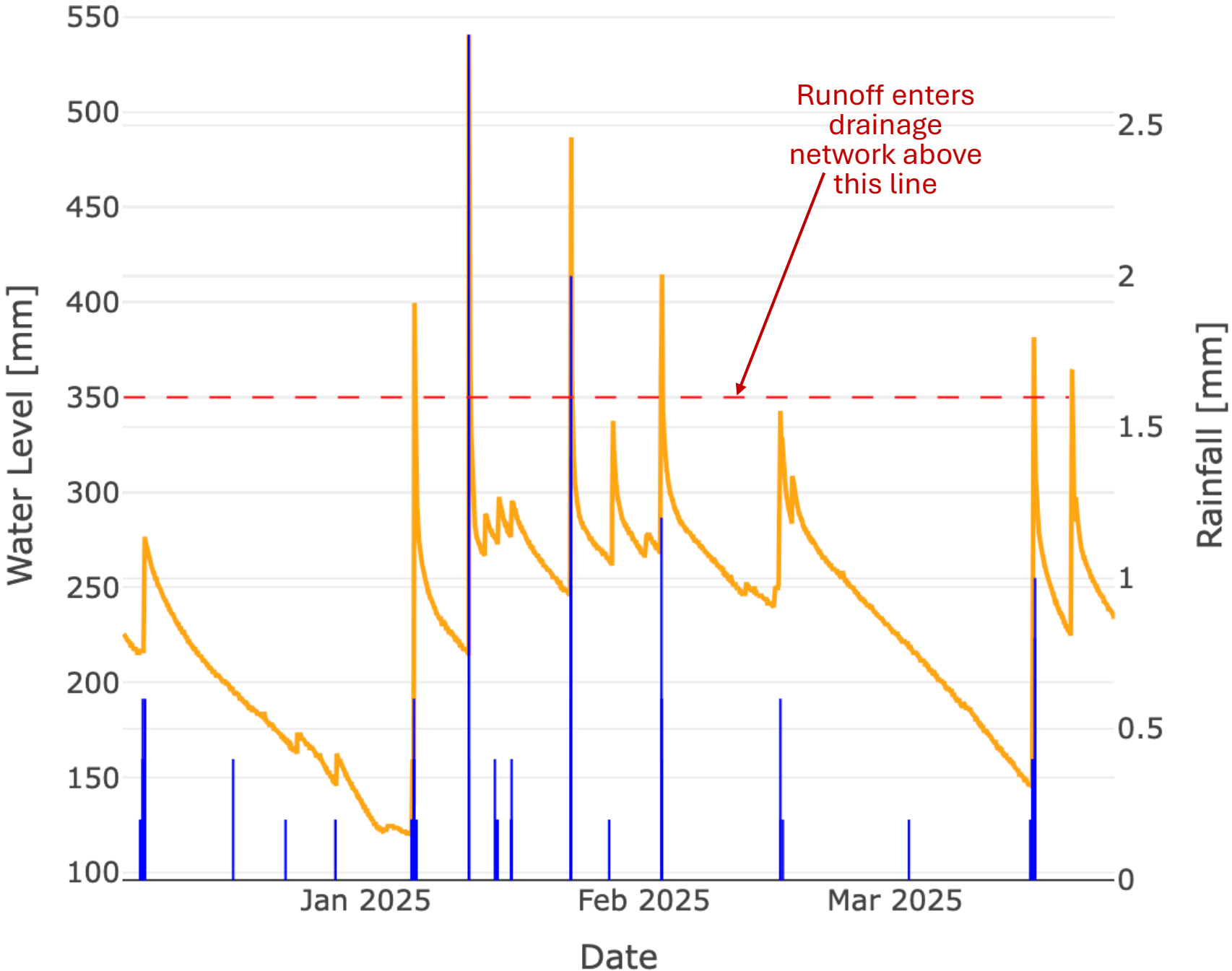



HIRE

# Monitoring

- Installed September 2024
- Instrumented October
- Clean data from December 2024
- Continue monitoring until December 2025
  - No maintenance

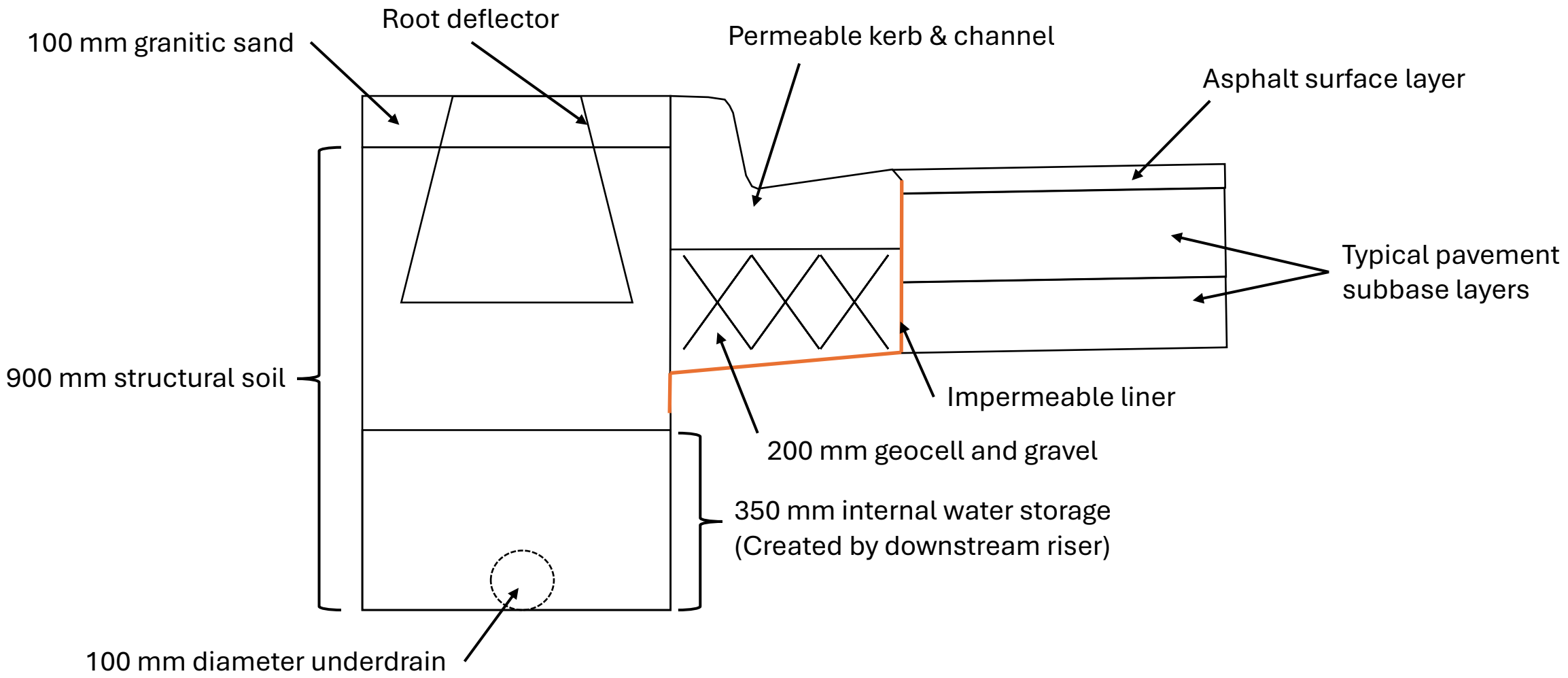
- Data collection:
  - Volume of stormwater reta
  - Peak flow rate reduction
  - Soil moisture
  - Tree growth
  - Infiltration rate
  - Kerb & channel stability
  - Asphalt stability




# Observations

- Structural soil internal water storage
  - 20m x 0.6m x 0.35m
  - Porosity ~0.26
    - ~1.1 $m^3$ of water storage
- Not much rain so far…
  - 15 events
  - Largest event = 8.4 mm
- Exfiltration rate ~1 mm $hr^{-1}$
  - ~ 6 weeks to empty

Victor Berger
Peter Poelsma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