



Auckland Transport

Keeping our rain gardens safe – Auckland Transport's Safety Bulletin

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Stormwater 2023
Te Roopu Wai Āwhātanga
23–25 May | Cordis, Tāmaki Makaurau Auckland

Pepeha

Kia Ora Tātaou

Greetings All

Ko Himalayas Te
Maunga

Himalayas is the mountain

Ko Ganges Te Awa

Ganges is the river

Nō India Ahau

I am from India

Ko Sharma Tōku
Whānau

Sharma is my family

Ko Abby Tōku Ingoa

My name is Abby

परिचय

सुप्रभात

Greetings

हिमालय मेरा पर्वत है

Himalayas is my mountain

गंगा मेरी नदी है

Ganges is my river

मैं भारत से हूँ

I am from India

शर्मा मेरा परिवार है

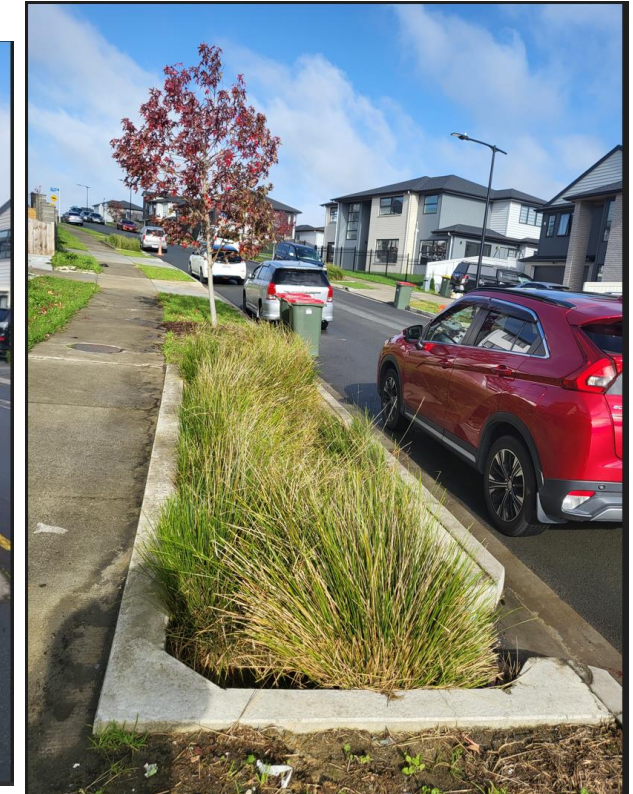
Sharma is my family

मेरा नाम एबी है

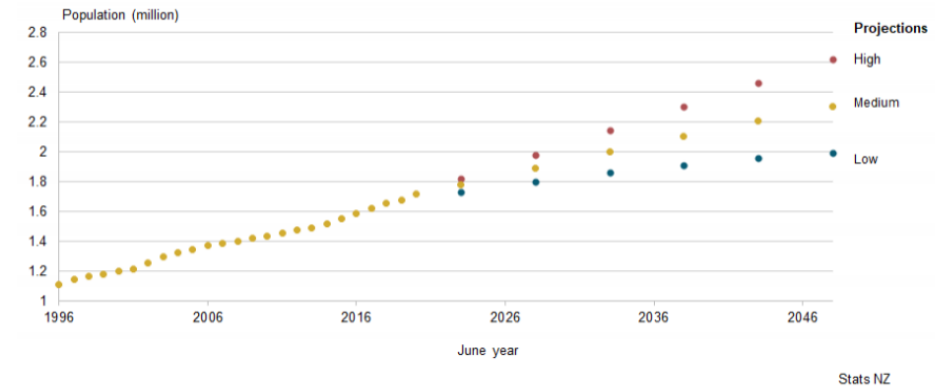
My name is Abby

The situation...

- Auckland is experiencing significant population growth across the region
- High demand for housing developments
- Limited space for roads and stormwater devices
- Poorly designed devices usually are the result of:
 - Maximised lot yields.
 - No option assessment(s)
 - Implemented on slopes
 - Insufficient education on Auckland Transport (AT) design guides
 - Lack of communication with AT



Auckland region population, estimated (up to 2020) and projected (from 2023), 1996–2048



Recent growth was driven by high net migration in the seven years before COVID-19. The highest value in the graph is the projected population of Auckland in 2048 with a value of 2,624,300.

Prime Example - Raingardens

- Small and deep concrete raingardens.
- Insufficient surface area
- Most implemented in residential streets NOT high use roads.
- AT owns around 5,500 raingardens devices (as of Sept 2022) and counting.
- Smaller concrete boxes pose a safety hazard.



What is a Raingarden?

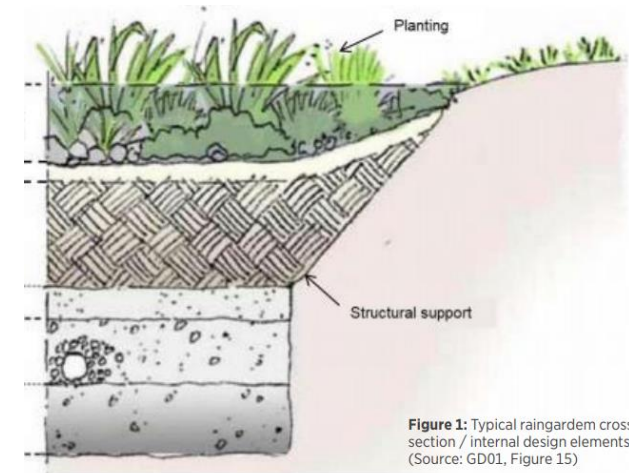
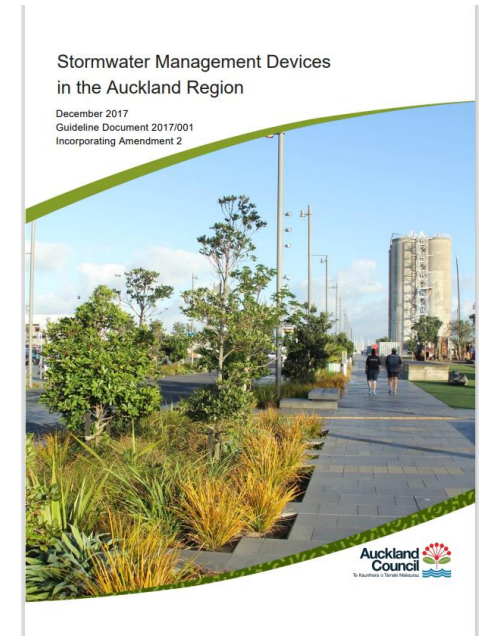


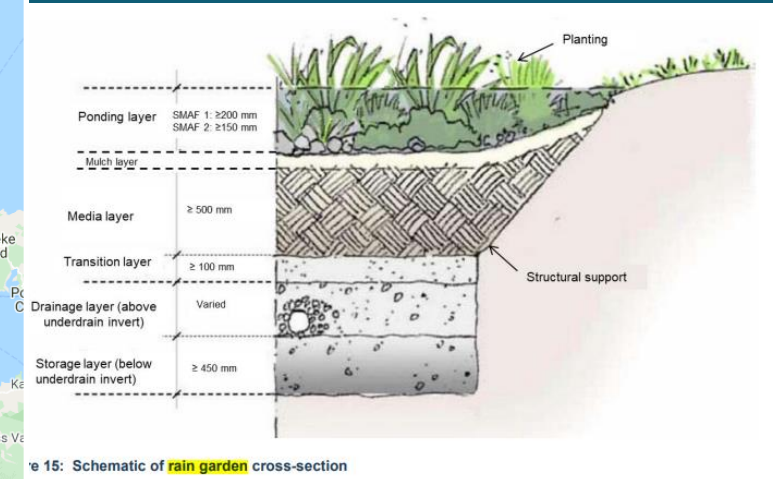
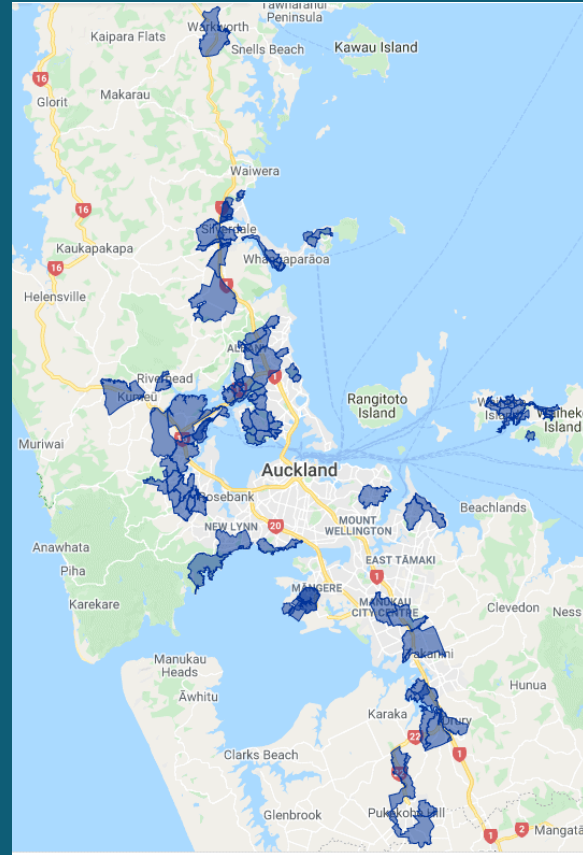
Figure 1: Typical raingarden cross section / internal design elements (Source: GD01, Figure 15)

- A bioretention device
- Often incorrectly coined 'synonymous' to a swale, tree pit, planter boxes etc
- AT Bioretention Design Guide and Planting Guide cover corridor specific requirements
- AT Bioretention Design Guide – to be updated
- Design philosophy is aligned to Council's GD01/2017 (*Stormwater Management Devices in Auckland Region Guidance Document*).



- AT loves well designed raingardens which provide for water quality and retention.
- Under GD01 and/or Council Network Discharge Consent, raingardens designed to include:
 - quality
 - hydrology mitigation (detention aka SMAF)
- What is a SMAF? (Stormwater Management Areas Flow)
- Best Practicable Option (BPO)

Blue highlighted areas highlighting SMAF areas across the Auckland Region.



What is the issue with Road Corridor Raingardens?

- Insufficient berm width
- Poor design.
- Safety hazard - drop-off > 150mm
- Serious injuries
- AT's Vision Zero.



How do we resolve it?

- Primary Focus: Fewer, Larger Communal Device(s)
- Apply BPO approach
- AT developed a Safety Bulletin (Draft) for new and existing raingardens.
- Small residential raingardens are NOT the only option
- AT acknowledges that these changes may result in small raingardens unable to fit within small residential streets - this is a good thing: less concrete and safer streets count too
- Designers need to consider not achieving GD01 level mitigation – take a BPO approach



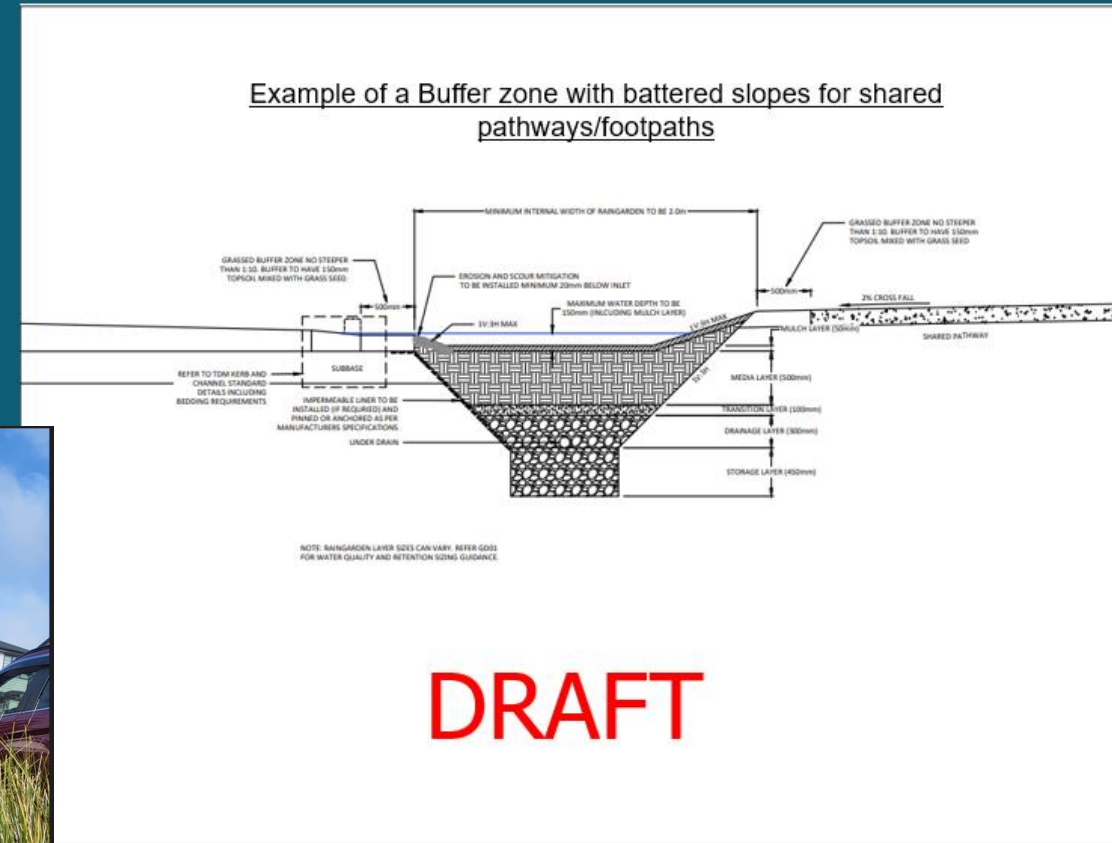
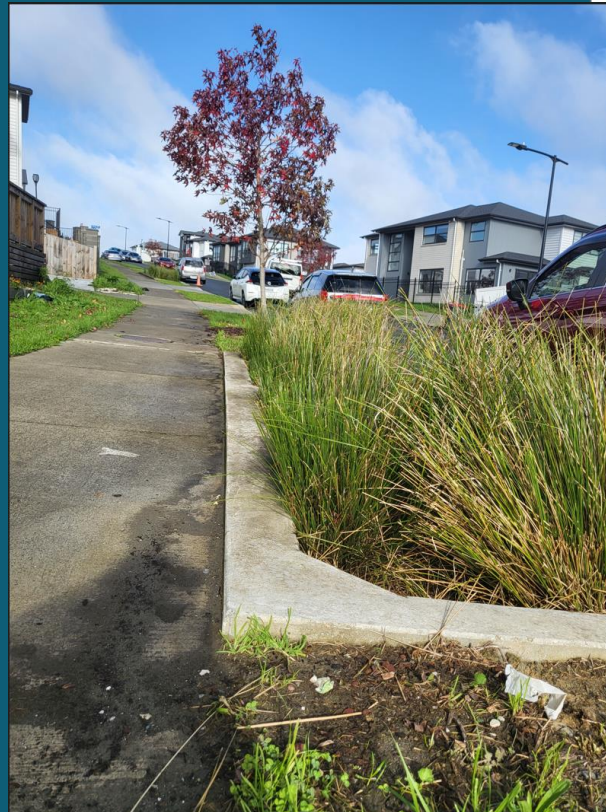
Greenfield Development(s)

- Few existing space constraints
- A vacant lot subdivision consent with a road corridor is proposed that is eventually vested to AT
- Priority is maximum lot yield
- Priority should be larger communal device(s)
- Think BPO



Greenfield Raingarden Design Standards in Safety Bulletin (Draft)

1. Battered slopes
 - Drop-off $\leq 150\text{mm}$
 - 1V:3H
 - Stable Material
2. Road Gradient
 - Sufficient space
 - Design for the length required
 - No raingardens on roads greater than 5%
3. Buffer Strip
 - 500mm both sides (with battered slopes)
 - Minimum width should be 3.0m
 - Grassed for visual cues



Greenfield Raingarden Design Standards in Safety Bulletin (Draft) contd..

4. Media Settlement

- Media installed in layers $\leq 300\text{mm}$
- Inspected 12 months after completion
- Good to have: infiltration test of the media

5. Rain Garden widths

- Internal width $> 2\text{m}$
- Minimum width 3.0m (including the two 0.5m buffers either side)



Detroit, USA



Mentone, Vic, Australia

Brownfield Development(s)/Existing Raingardens

- Existing raingardens pre GD01/AUP(OP)
- AT proposes a hierarchy of retrofitting options, in order of preference from 1 to 4
- Designers should only investigate the less favourable options when the preferred options are proven to be infeasible



Existing Raingarden Design Standards in Safety Bulletin (Draft)

Option 1: The Battered Side Slopes

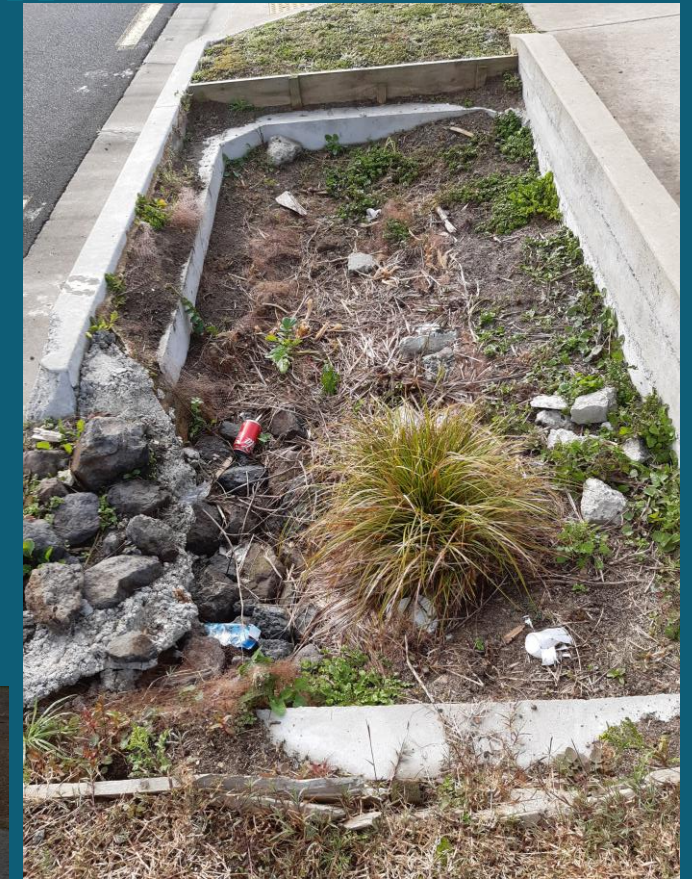
- The preferred option
- Applicability: Is there space available around the raingarden?
- Mitigation Measure :
 - Constructing 1:3 battered side slopes.
 - Ponding/ Infiltration issues
 - Change the dimensions
- Observation(s):
 - Higher capital costs
 - Maintains function of raingarden



Existing Raingarden Design Standards in Safety Bulletin (Draft) contd...

Option 2: Raising the media bed level

- Applicability: Is there limited space and raingarden volume is NOT critical?
- Mitigation Measure:
 - Raise media bed to 50mm below inlet
 - Constructing 1:3 battered slopes (if required)
- Observation(s):
 - Increased operation & maintenance costs
 - Decreases raingarden function
 - Needs to account for media settlement
 - May be combined with option 3



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Existing Raingarden Design Standards in Safety Bulletin (Draft) contd...

Option 3: Physical Barriers

- Applicability: Is ponding and treatment function of raingarden critical?
- Mitigation Measures:
 - Physical barrier between path and raingarden
 - Physical barrier height $\leq 500\text{mm}$ above the kerb line
 - To be 500mm from carriageway
- Observation(s):
 - Useful where raingardens are located adjacent to pedestrian crossings
 - Potentially aesthetically unpleasing
 - Maintains treatment function of raingarden
 - May require restriction of parking adjacent to raingarden



Existing Raingarden Design Standards in Safety Bulletin (Draft) contd...

Option 4: Disestablish raingarden

- Applicability: Are options 1 to 3 infeasible?
- Mitigation Measure(s):
 - Disestablish raingarden or s127 consent (if relevant)
 - Filled with media up to the footpath level
 - Replanted as a street garden or grassed
- Observation(s):
 - Use ONLY if options 1-3 are infeasible
 - Cost of retrofitting > benefit of the treatment
 - Is a significant hazard



Take Home Message

- A comprehensive options assessment
- PRIMARY FOCUS ON fewer, larger and well-designed communal device(s).
- Think BPO
- Work with AT and Council's Healthy Waters Department
 - Is raingarden feasible?
 - Is it the right device?
- Relationship between the raingarden and the adjacent road space
- The Safety Bulletin (COMING SOON)
- Talk to us – The AT Environment Team

