



renew
SOLUTIONS



BMT

Point Break for the WSUD Asset Wave

Presentation by Brad Dalrymple

**Stormwater Australia Conference
10 October 2018**

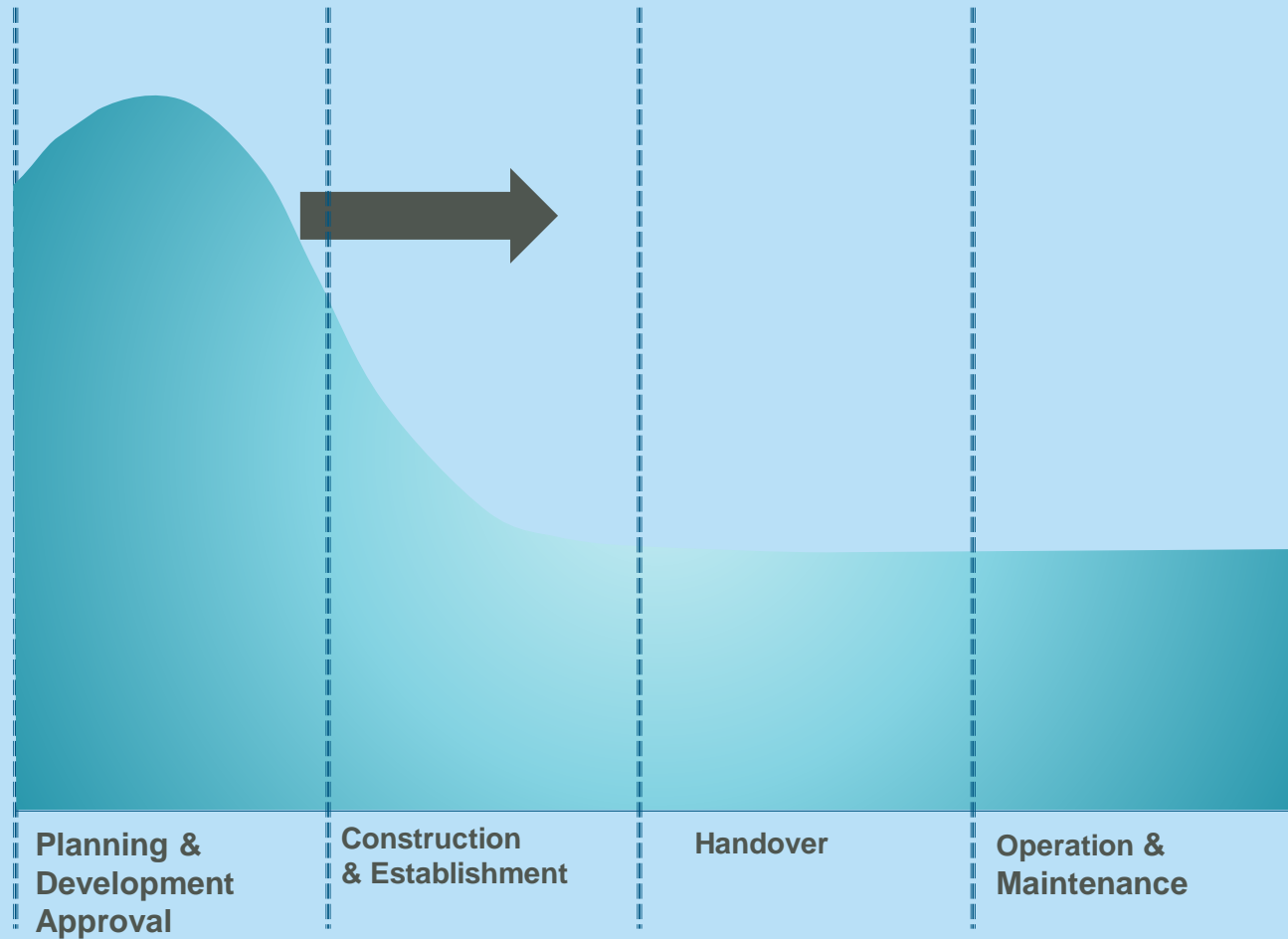


Intro



renew
SOLUTIONS

The 'WSUD Asset Wave'



Adapted from Leinster et al (2010)

Objectives

- **Collate and review stormwater control measure (SCM) asset condition data from a range of sources within Australia**
- **Provide recommendations for the future management of SCMs**

Methods



Location	SCM Asset Information	Source
Moreton Bay Regional Council local government area, Queensland	Condition assessments on 318 Council-owned bioretention systems in the Moreton Bay Region), undertaken in August to October 2017.	Jonathon Whitcombe (MBRC, 2018: <i>Pers.Comm.</i>)
Un-named Council A in Queensland	Condition assessments on 213 Council-owned vegetated SCMs, including 12 swales, 70 sediment basins, 44 wetlands, 5 infiltration basins, and 82 bioretention basins, undertaken in September and October 2016.	Un-named Council (2018: <i>Pers.Comm.</i>)
Un-named Council B in Queensland	Condition assessments on 52 Council-owned gully baskets, undertaken in June 2018.	Study authors
Un-named Council C in Sydney, NSW	Condition assessments on 30 Council-owned SCMs, including 5 bioretention systems, 4 GPTs and 21 gully baskets, undertaken in March 2018.	Study authors
Un-named Council D in Sydney, NSW	Condition assessments undertaken on 291 Council-owned primary treatment devices (e.g. gross pollutant traps), undertaken in November 2017.	Study authors
Un-named Council E in NSW	Condition assessments undertaken on 236 Council-owned gully baskets, undertaken in September 2017.	Study authors

Condition Assessment Ratings

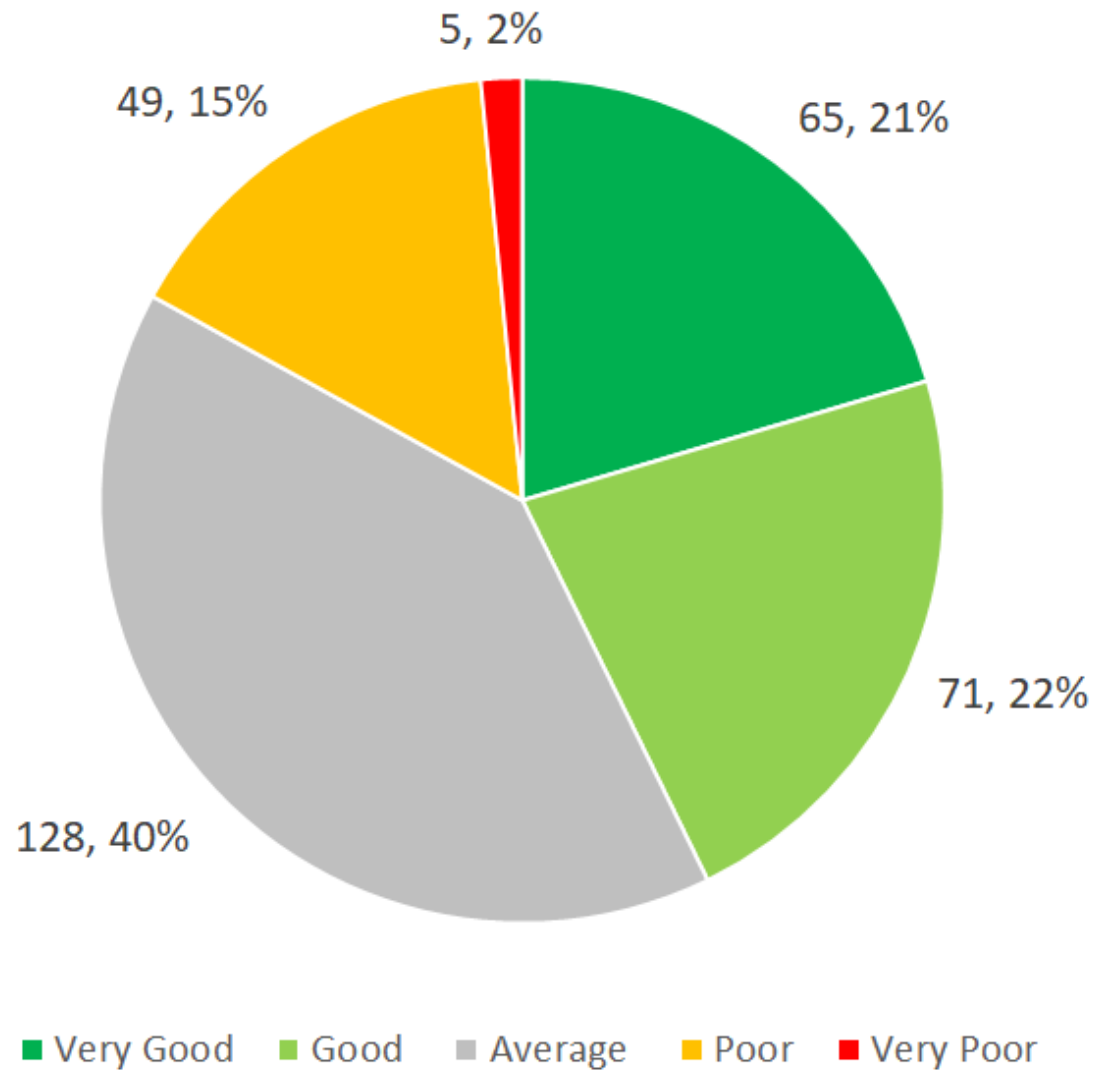
Rating	Condition	Description	Response
1	Very Good	The asset is in very good condition and fully functioning with no visible degradation.	Routine maintenance only
2	Good	The asset is in good condition and fully functioning with some minor visible degradation.	Extra maintenance as required
3	Fair	The asset is in fair condition with some loss of function and significant visible degradation.	Significant maintenance required to address defects
4	Poor	The asset is in poor condition with major loss of function and/or asset failure is imminent.	Further investigation & rectification required
5	Very Poor	The asset is in very poor condition with no function and/or has failed.	Further investigation & rectification/renewal required

Source: Whitcombe (MBRC, 2018: *Pers.Comm.*)

Results

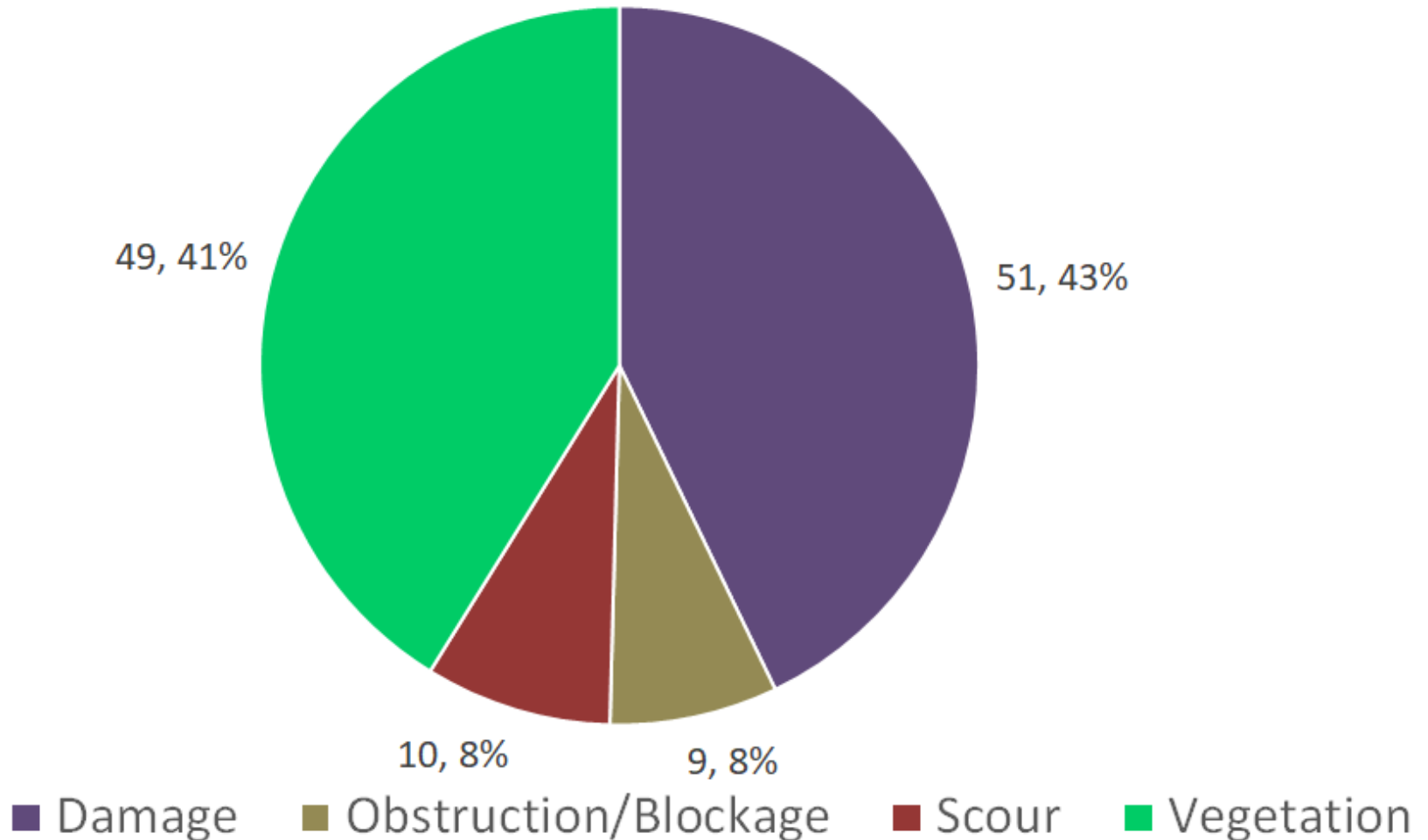


Bioretention



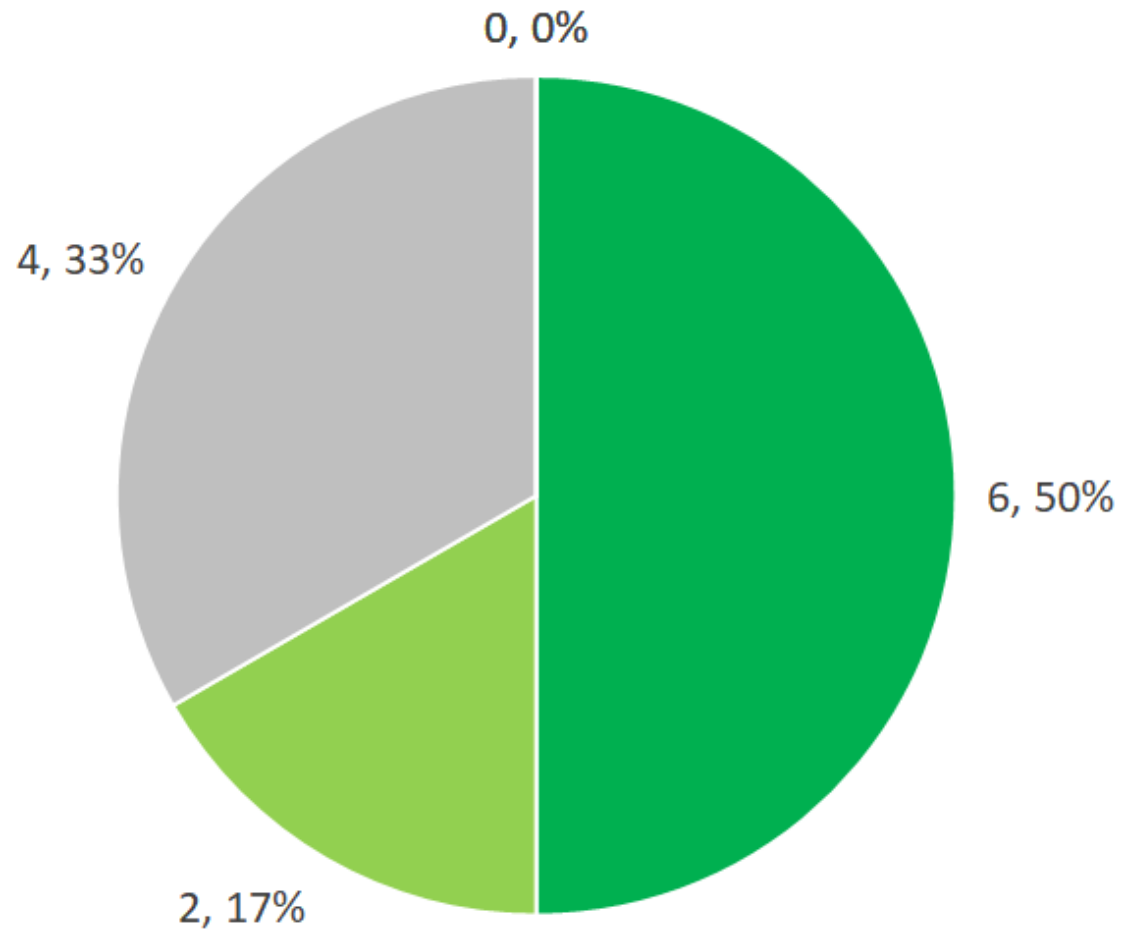
MBRC – Summary of Defects

Bioretention



Un-named Council A in Queensland

Swales

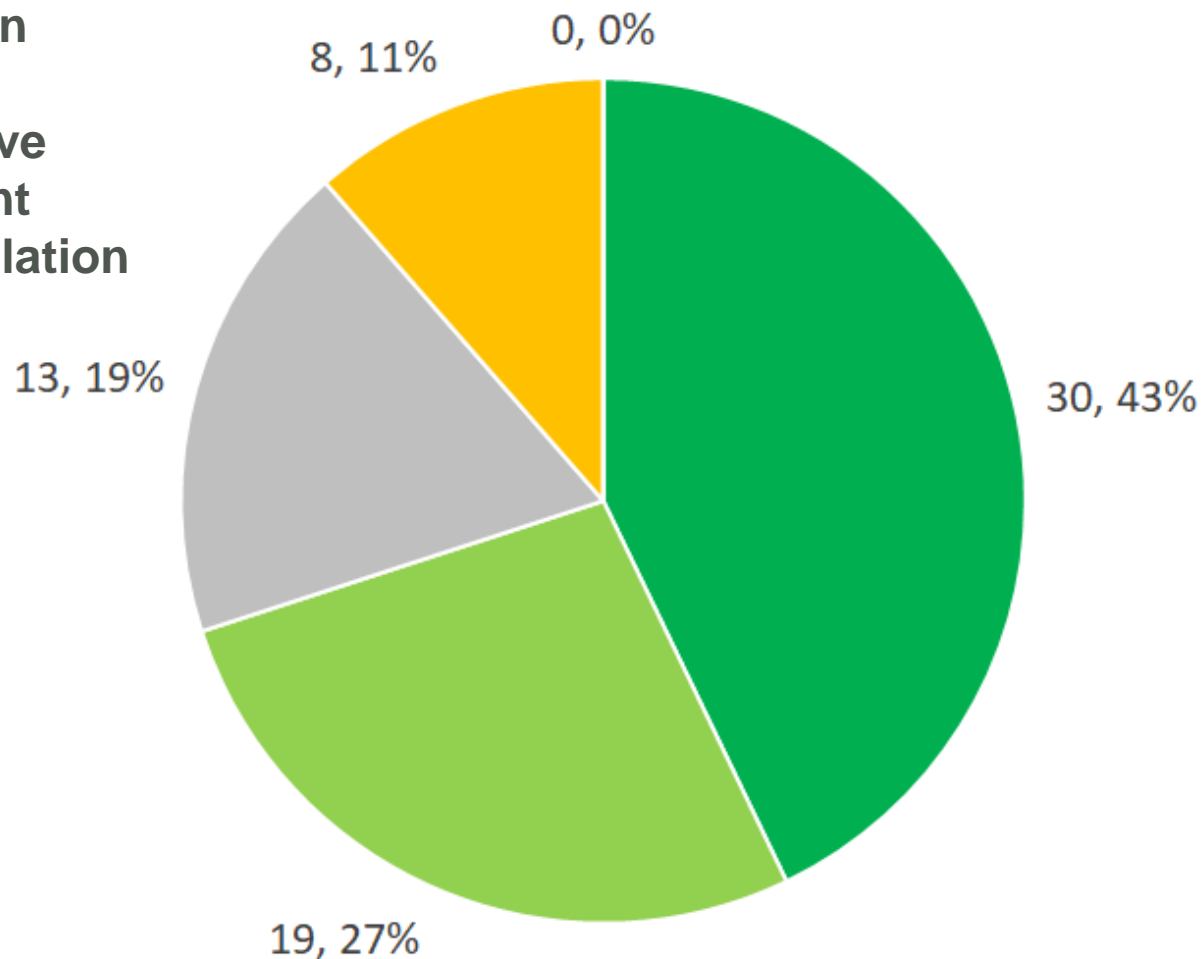


■ Very Good ■ Good ■ Average ■ Poor ■ Very Poor

Un-named Council A in Queensland

Sediment Basins

❖ Common defect = excessive sediment accumulation

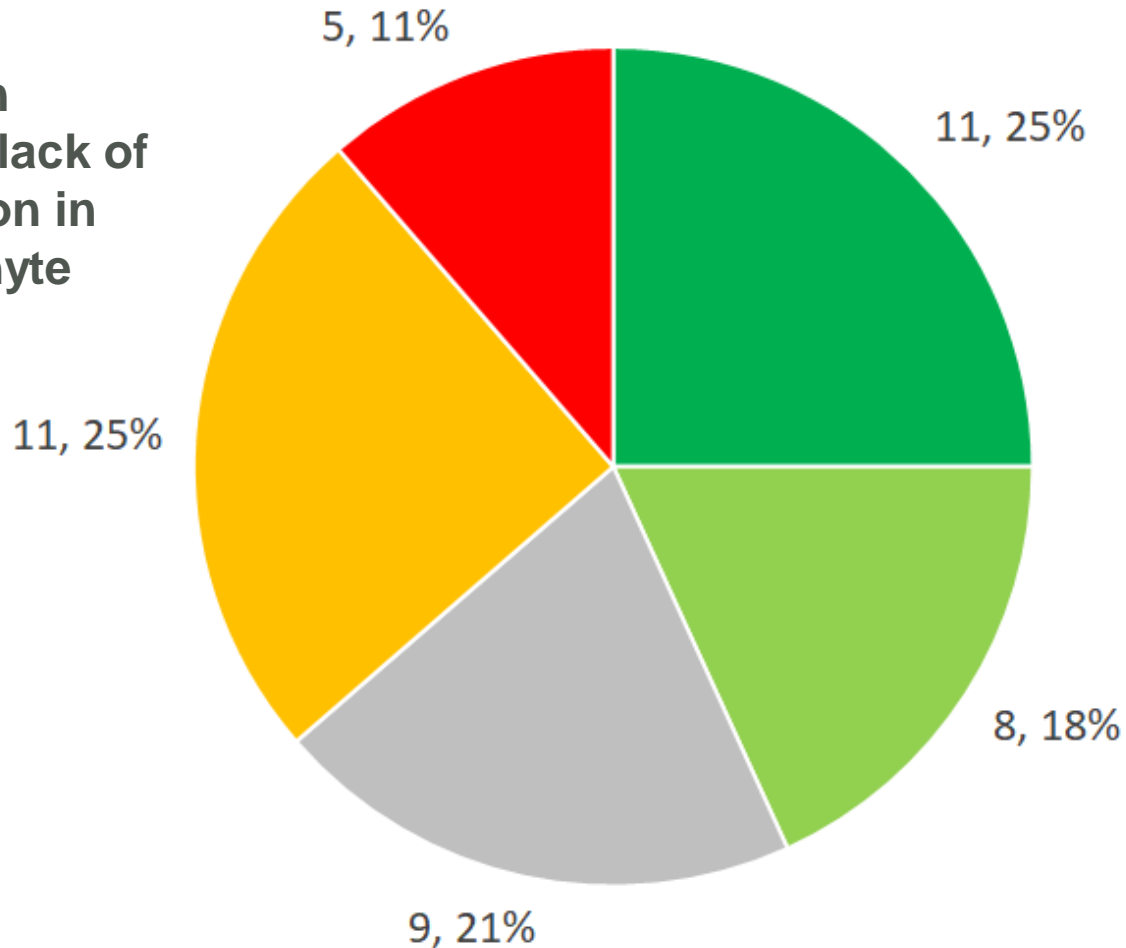


■ Very Good ■ Good ■ Average ■ Poor ■ Very Poor

Un-named Council A in Queensland

Wetlands

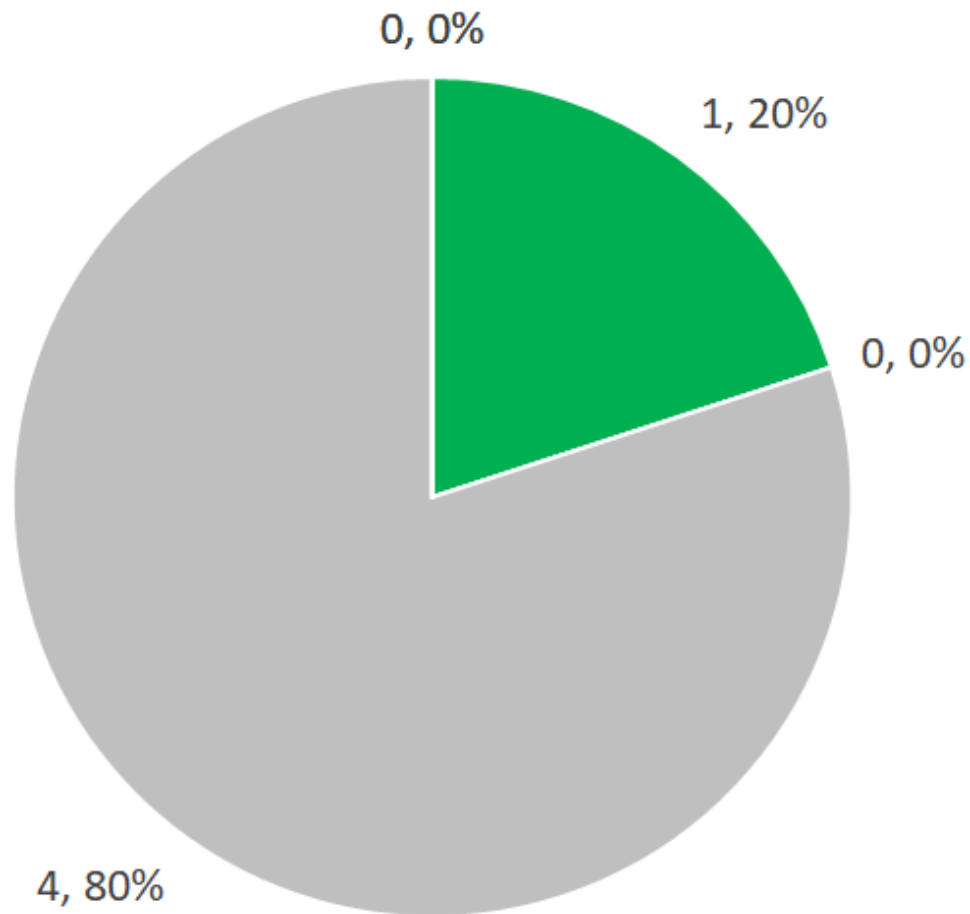
❖ Common defect = lack of vegetation in macrophyte zone



■ Very Good ■ Good ■ Average ■ Poor ■ Very Poor

Un-named Council A in Queensland

Infiltration

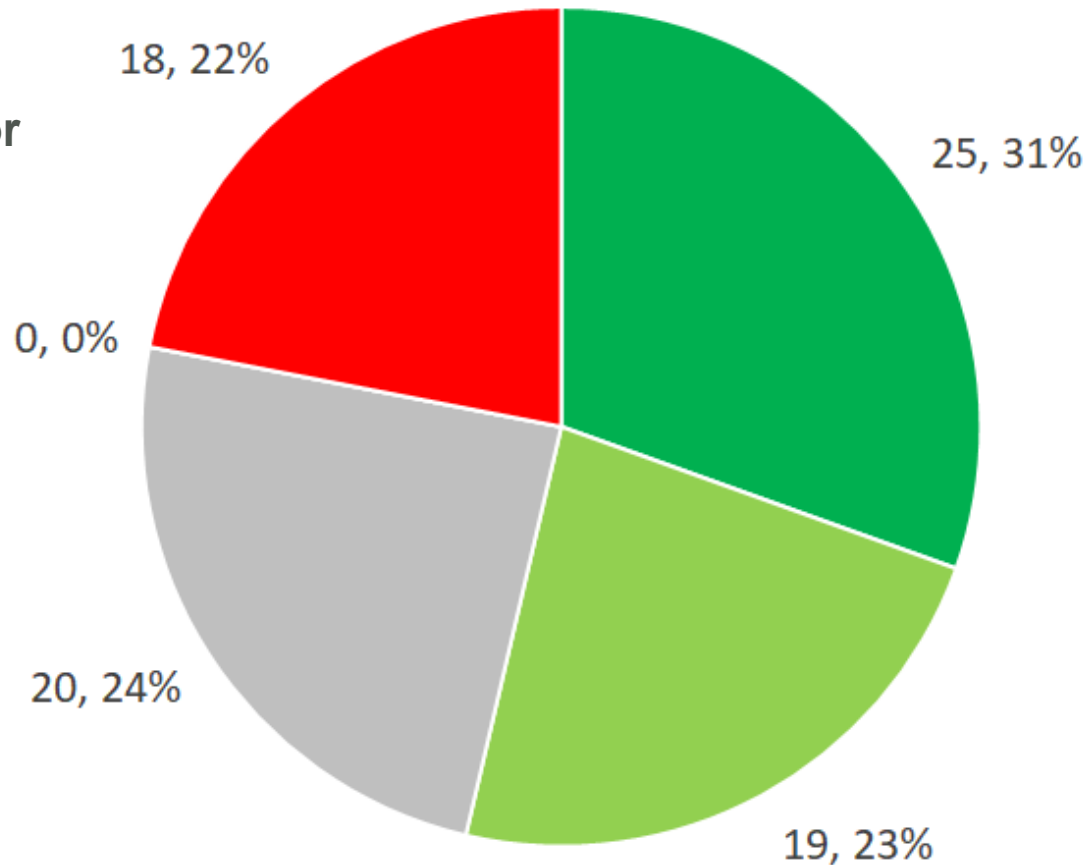


■ Very Good ■ Good ■ Average ■ Poor ■ Very Poor

Un-named Council A in Queensland

Bioretention

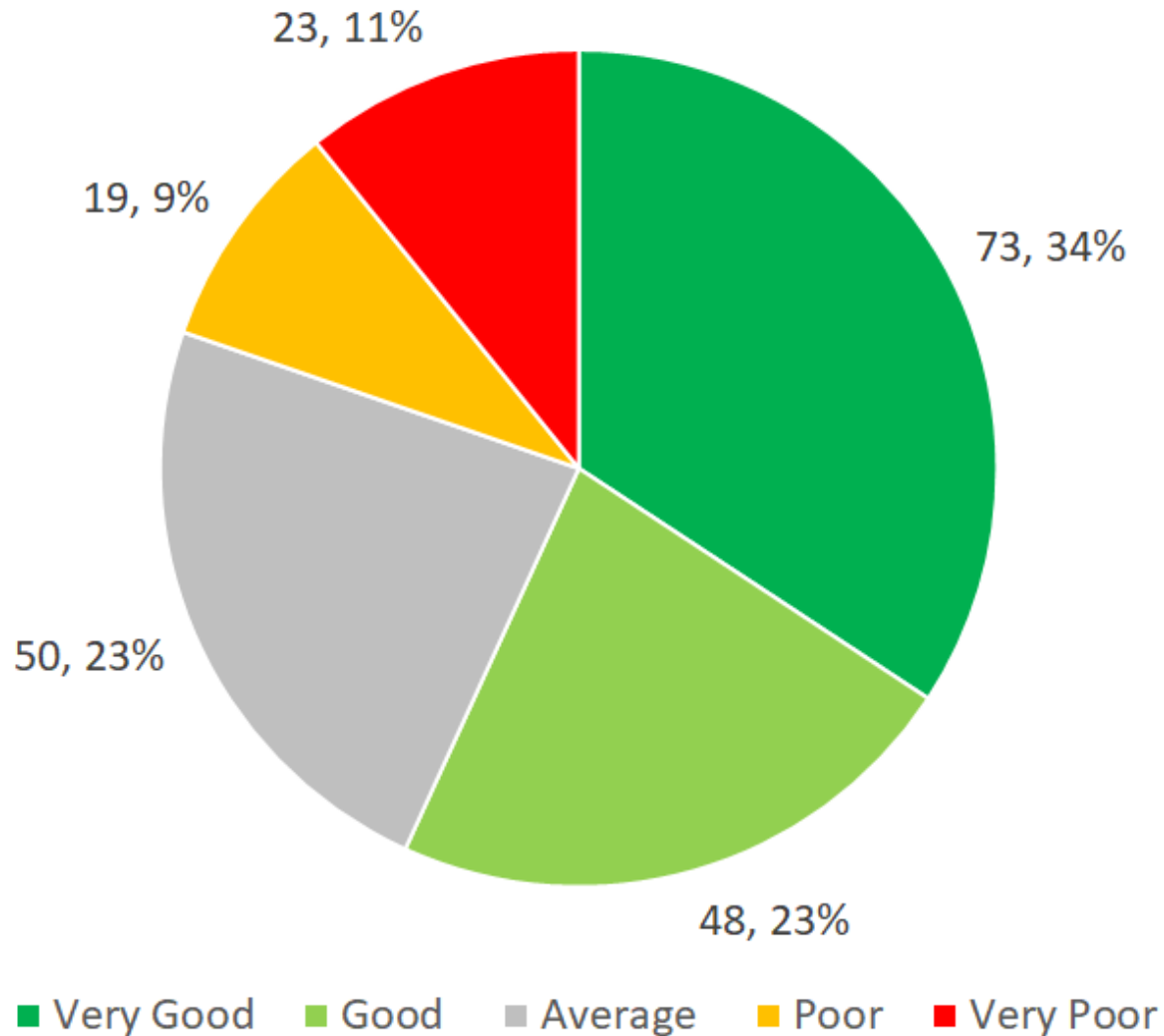
❖ Common defect = poor drainage/ infiltration (extended ponding)



■ Very Good ■ Good ■ Average ■ Poor ■ Very Poor

Un-named Council A in Queensland

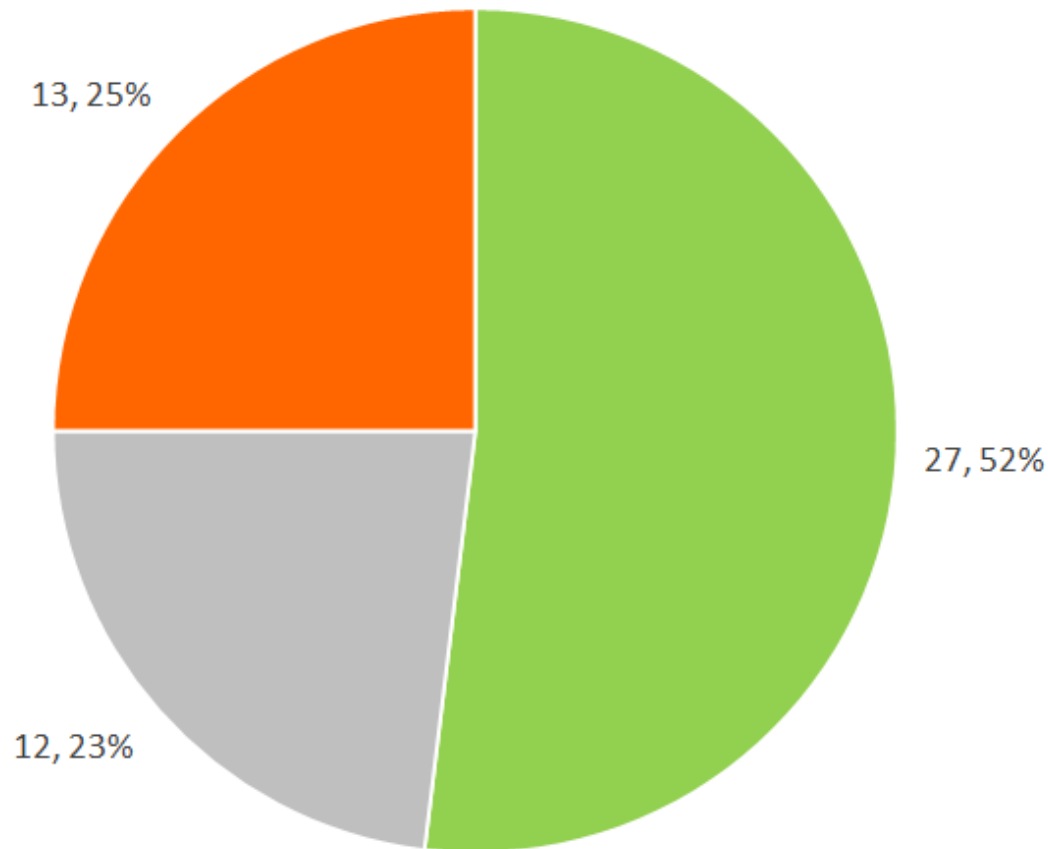
Total



Un-named Council B in Queensland

Gully Baskets

❖ Most common defect = basket simply not present (7 out of 52)

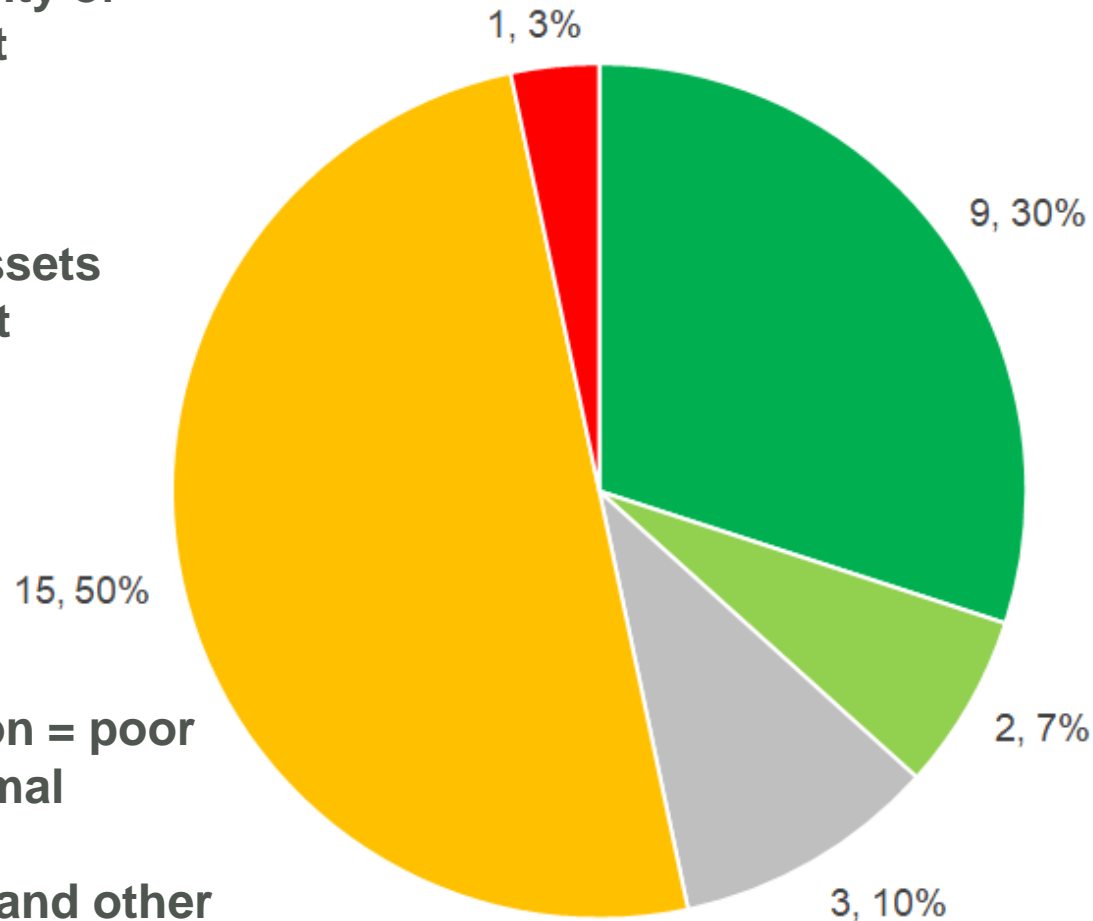


■ Very Good ■ Good ■ Fair ■ Poor/Very Poor

Un-named Council C in NSW

Total

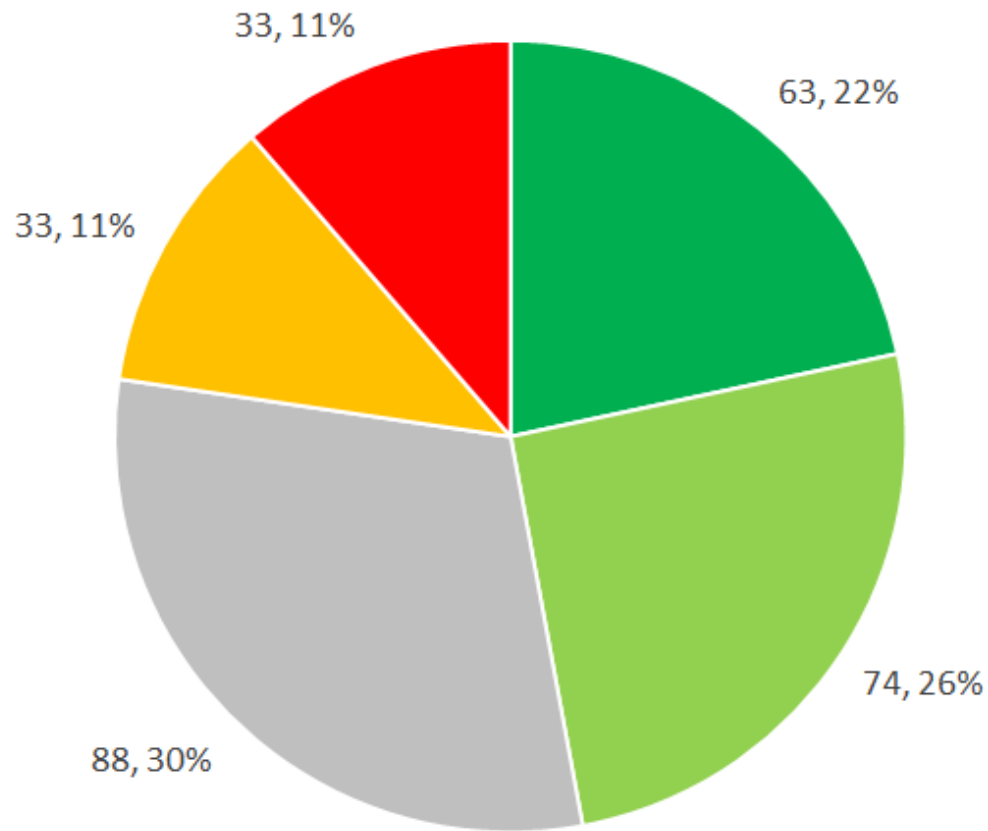
- ❖ Vast majority of baskets 'at capacity'
- ❖ 29 of 30 assets with defect
- ❖ 4 out of 5 bioretention = poor (with minimal vegetation coverage, and other defects)



■ Very Good ■ Good ■ Fair ■ Poor ■ Very Poor

Un-named Council D in NSW

Primary Treatment Devices (Privately Owned)



■ Very Good ■ Good ■ Fair ■ Poor ■ Very Poor

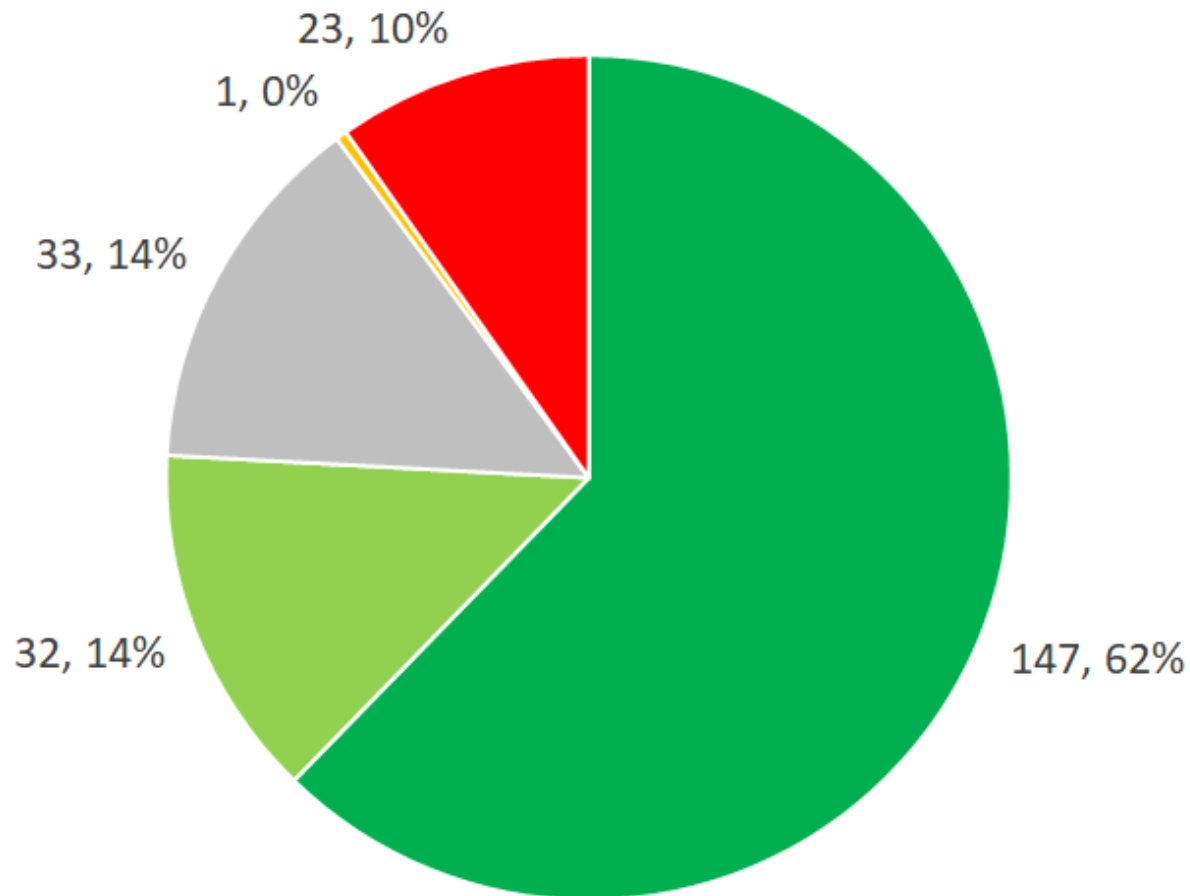
Un-named Council D in NSW

Key findings:

- **66 (22%) of the 291 SCMs were identified as being in a poor or very poor condition**
- **Of the 12 litter booms, 8 could not be located (and had likely washed downstream in a high flow event)**
- **Of the 95 accessible sites identified as having gully baskets present, the vast majority did not have a gully baskets present**
- **Of the wet-sump GPTs inspected, common defects included:**
 - **Structural defect causing a bypass of incoming flows (and pollutant loads)**
 - **downstream receiving environment causing backwater in/partial submersion of asset**
- **GPT storage was over capacity (i.e. full of accumulated material) for many wet sump GPTs**

Un-named Council E in NSW

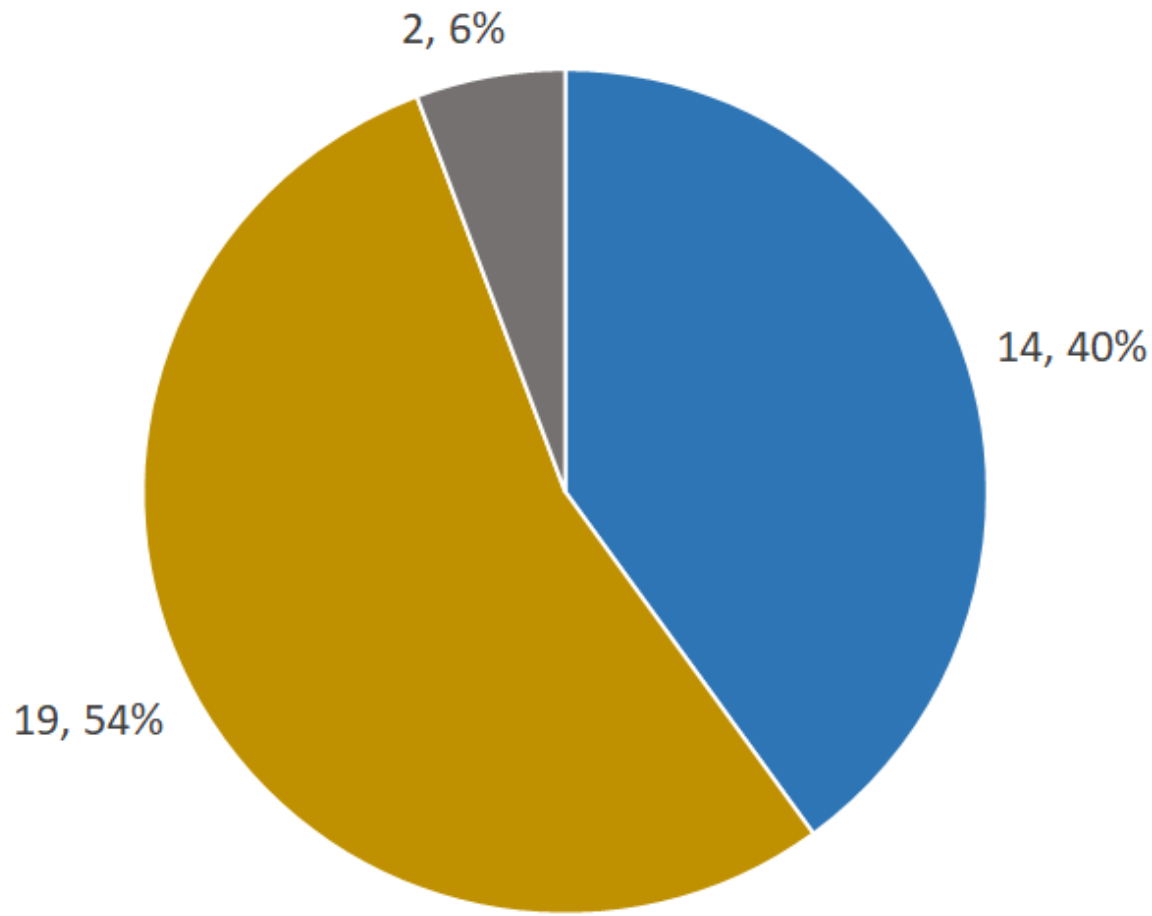
Gully Baskets



Very Good Good Fair Poor Very Poor

Un-named Council E – Summary of Defects

Gully Baskets



■ Basket collapse ■ Bent or broken flap ■ Burnt device

Published SCM Condition Data in Australia

- **Location:** Melbourne (Un-named Council A)
- **Assets:** 18 SCMS – 16 bioretention, 1 tree pit, 1 wetland
- **Source:** Thomas et al (2016)
- **Key findings:**
 - 76% of all SCM assets with a 'poor' rating (on a scale of 'good', 'fair' and 'poor')
 - Maintenance practices (or lack-there-of) = the lead reason for the high proportion of assets being in poor condition

Published SCM Condition Data in Australia (Cont'd)

- **Location:** Melbourne (Un-named Council B)
- **Assets:** 76 SCMS – 4 sediment basins, 16 sediment basin-wetland systems, 20 bioretention, 6 car-park swales, 4 retarding basins with wetlands, 3 ponds, 23 GPTs 16 bioretention, 1 tree pit, 1 wetland
- **Source:** Thomas et al (2016)
- **Key findings:**
 - 38% of all SCM assets with a 'poor' rating
 - Maintenance identified as being responsible for the highest proportion of poor condition ratings
 - 89% of assessed GPTs were also identified as full or overflowing

Published SCM Condition Data in Australia (Cont'd)

- **Location:** Melbourne (Un-named Council C)
- **Assets:** 83 SCMS – 13 'infiltration', 64 rain gardens, 5 swales, 1 wetland
- **Source:** Thomas et al (2016)
- **Key findings:**
 - 28% of all SCM assets had a 'poor' rating
 - Maintenance category seeing the highest proportion of assets rated as 'poor'
 - Maintenance assessment category also produced the lowest proportion of assets with a rating of 'good'

Published SCM Condition Data in Australia (Cont'd)

- **Location:** Penrith City Council
- **Assets:** 88 GPTs – 74 trash racks, 14 underground GPTs
- **Source:** Weaver et al (2016)
- **Key findings:**
 - 46% of SCM assets being either in 'poor condition' (working at less than 20%) or 'non-operational'
 - 52% requiring 'structural works/ major works' or decommissioning/ replacement.

Key Findings

- A large proportion of the SCM assets that had a condition assessment rating were in a 'poor' or 'very poor' condition, requiring significant rectification works to address the problem(s) with the asset
- A lack of maintenance activities is the key reason for these poor (or very poor) condition ratings

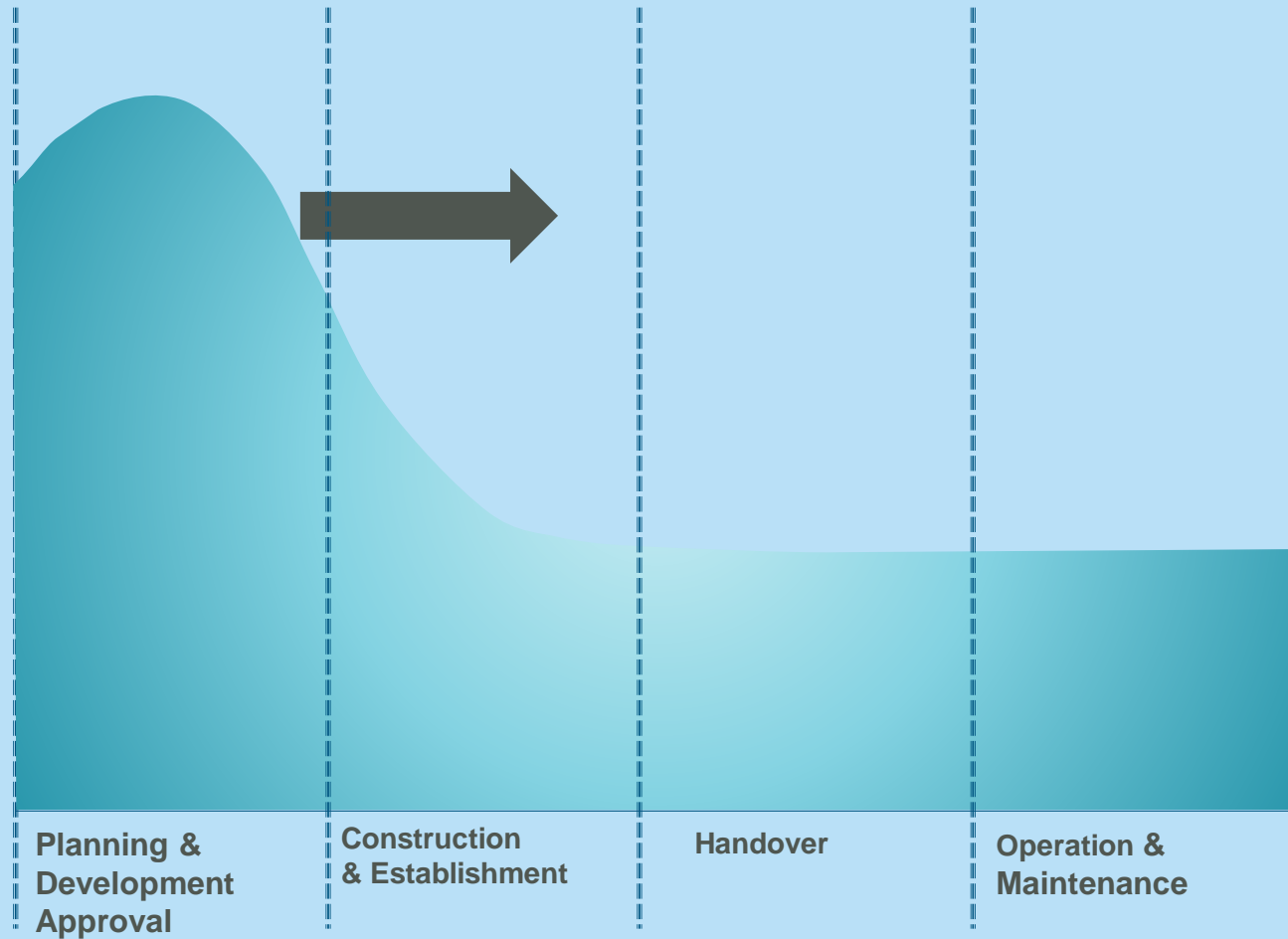
Study Limitations

- **Condition assessment rating methodologies utilised in this study (and literature review) are not consistent**
- **Condition rating does not necessarily correlate with stormwater treatment performance (or service delivery) and/ or operational life or life cycle costs of the SCM**
- **Study only includes results for SCMs that have had a condition assessment undertaken**

Conclusions & Recommendations

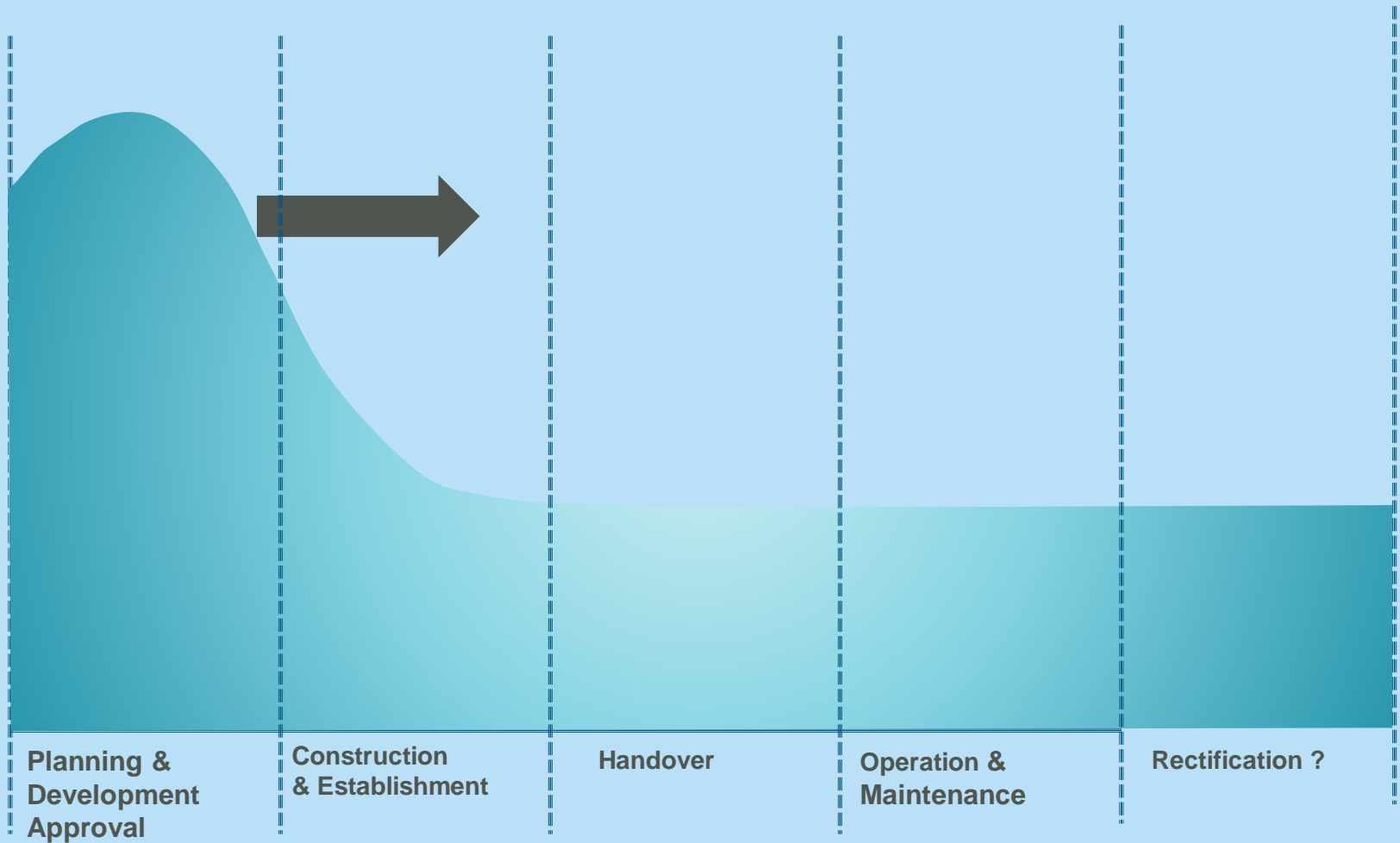


The 'WSUD Asset Wave'

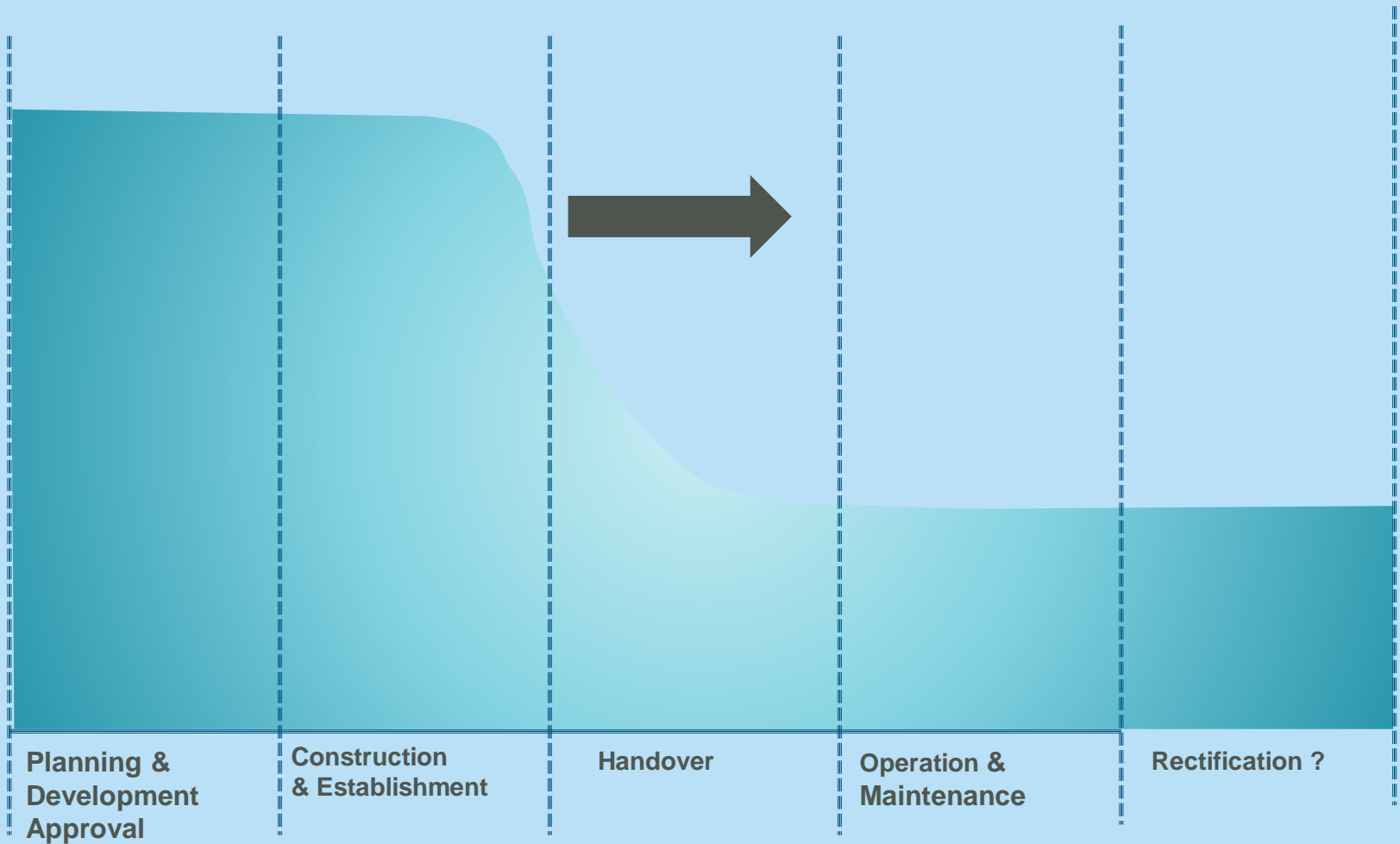


Adapted from Leinster et al (2010)

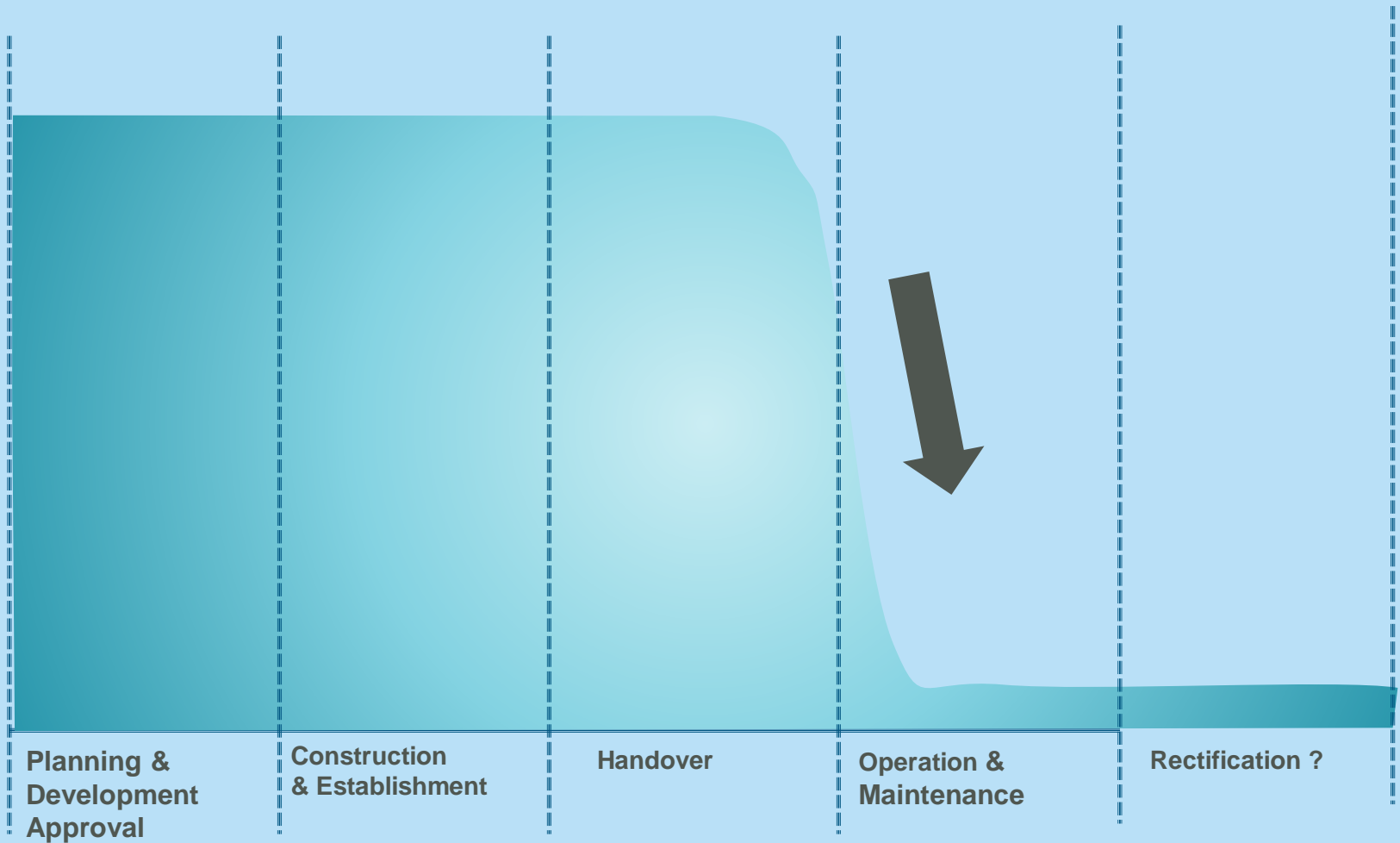
The 'WSUD Asset Wave'



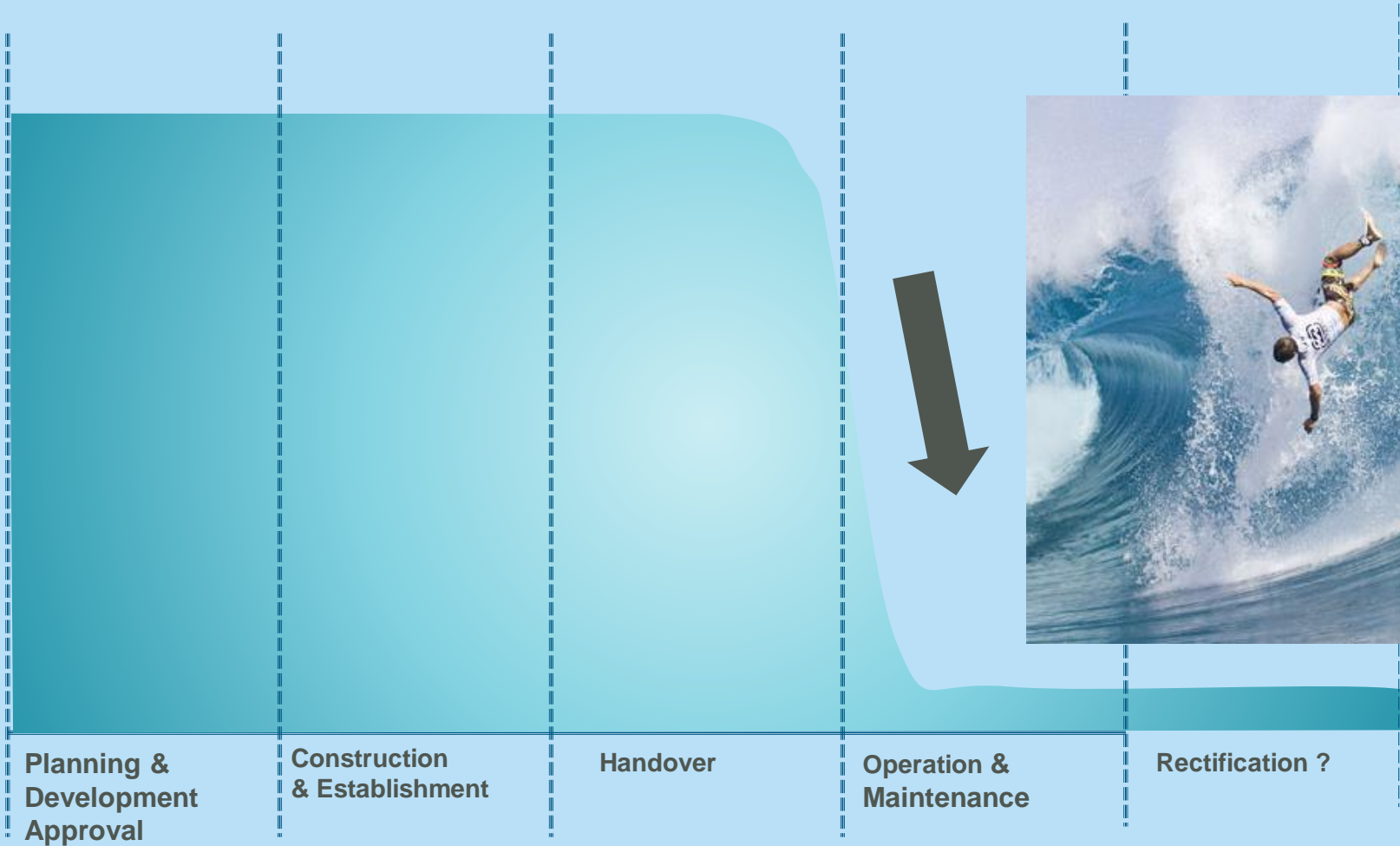
The 'WSUD Asset Wave'



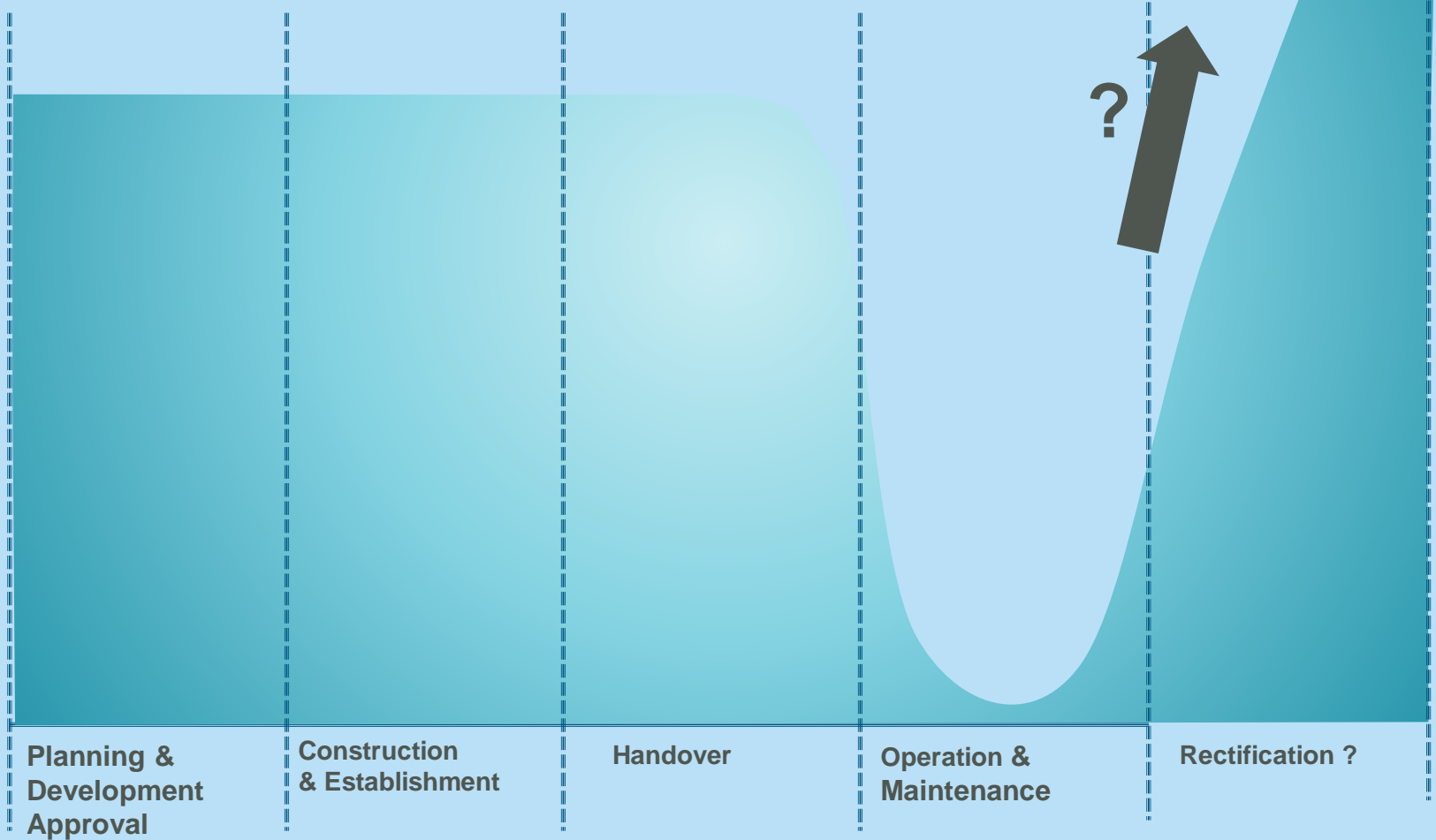
The 'WSUD Asset Wave'



The 'WSUD Asset Wave' – Future ?



The 'WSUD Asset Wave' – Future ?



“Business as Usual” Consequences

- Significantly reduced benefits of existing SCMs
- Reduced waterway health
- Poor decision-making
- Higher life cycle costs



Recommendations

- **Develop and implement an evidence-based approach to stormwater management**
 - Standardised condition assessment inspection protocol for SCM and other WSUD assets (for both government and privately owned assets).
 - Standardised monitoring protocols for asset performance (or level of service) and life cycle costs.
 - Regulatory authorities (e.g. local government) should also consider making appropriate evaluation, monitoring and maintenance of SCMs (and associated reporting) a legislative requirement



Thank you



Charles Coathup
Ben Penhallurick
James Coathup



Jonathon Whitcombe



Personnel from un-named
Councils