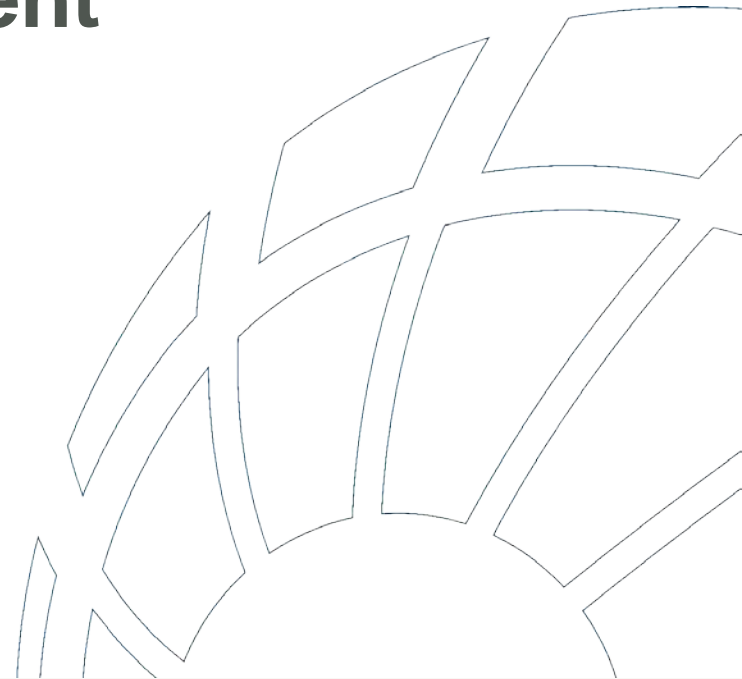




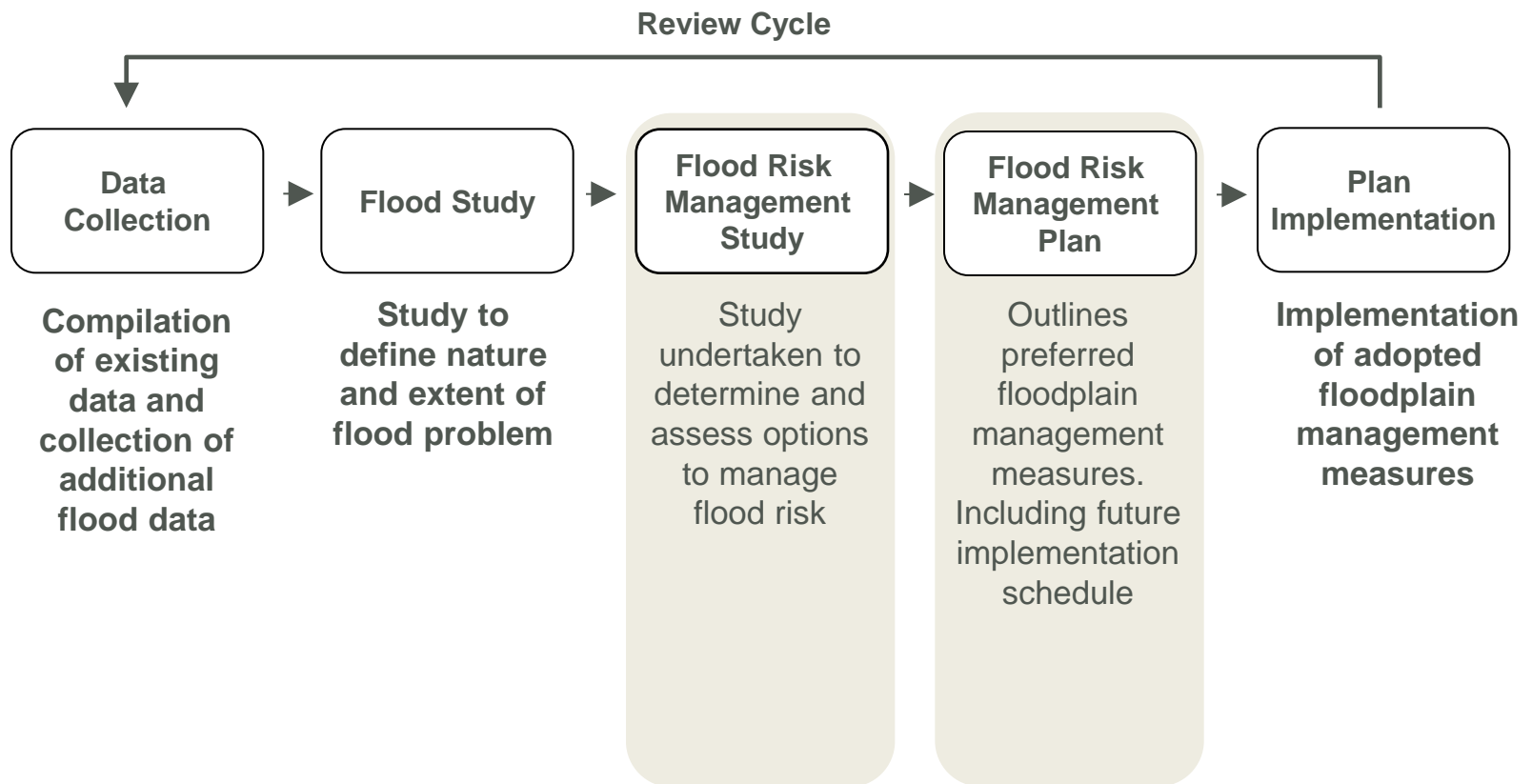
“Where will our knowledge take you?”

# **Tweed Coastal Creeks Floodplain Risk Management Study & Plan – Floodplain Risk Management Committee Meeting**

**28 August 2015**



# Coastal Creeks Floodplain Risk Management Study & Plan



# Assessment of management measures

- Flood Modification Measures
  - Response Modification Measures
  - Property Modification Measures
- +
- Future Development + Climate Change

# Flood Modification Measures

- Two options assessed
  1. Dredging of Mooball Creek
  2. Modification to weirs at Pottswille Waters
- Presented to Committee on 8 March 2013
- Neither option met assessment objectives / found to be viable
- Neither option recommended for inclusion in Study and Plan

# Response Modification Measures

- Majority of measures presented to Technical Committee on 15 May 2015
- Further discussions held with SES
- 18 measures recommended to be carried forward into Study and Plan

# Response Modification Measures

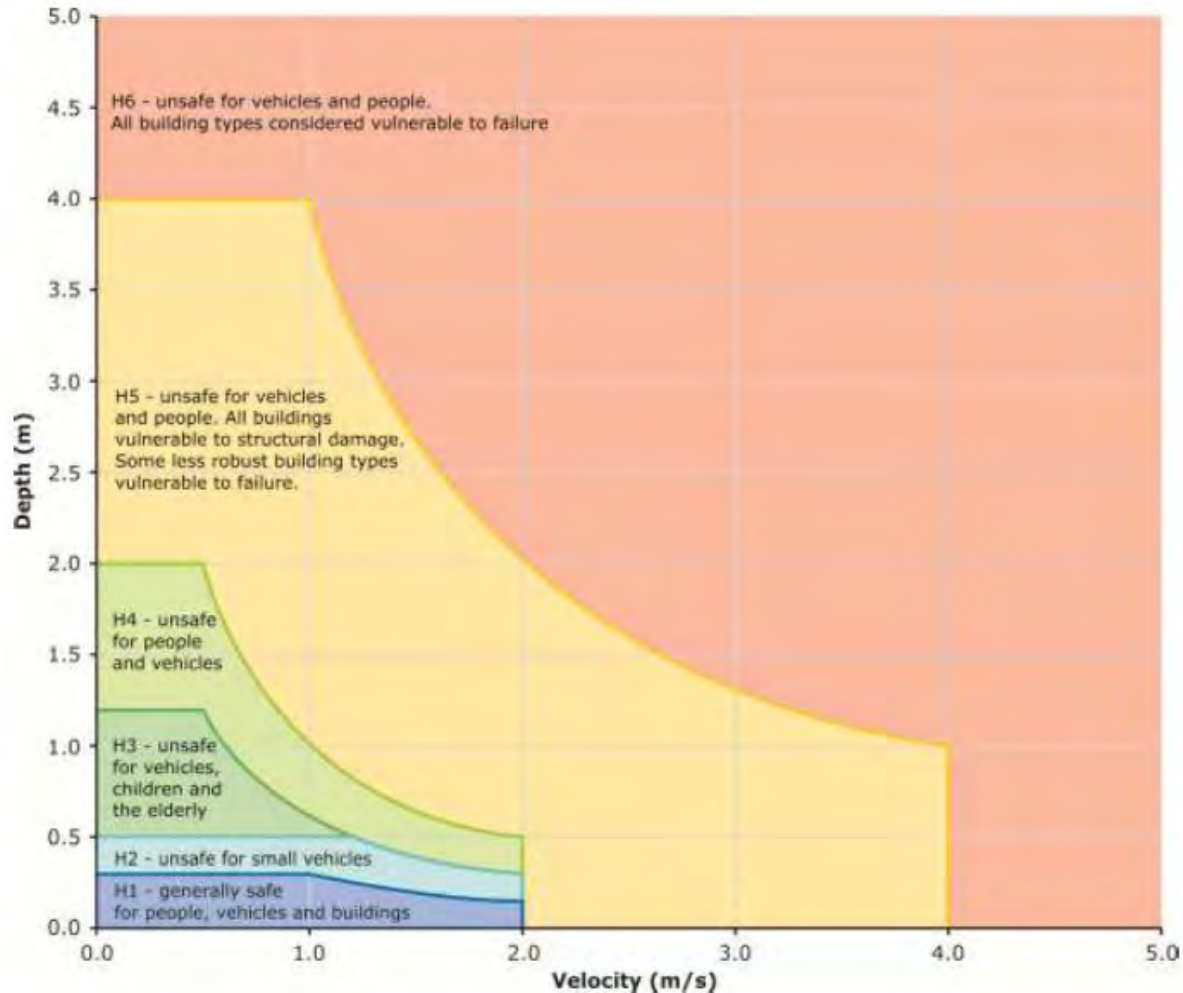
Response Modification Measures	
1. Update the Local Flood Plan	10. Undertake Disaster Resilience Leadership Workshops
2. Plan for Different Types of Flood Risk	11. Enhance Gauge Network
3. Plan for Flash Flooding	12. Install Flash Flood Warning System
4. Plan for Pedestrian and Local Evacuation	13. Establish Flood Watch Network
5. Promote General Flood Awareness	14. Classify Existing and New Stream Level Gauges
6. Provide Flood Information Online to the Community	15. Develop Flood Intelligence Cards
7. Provide Information to Assist with Personal Flood Plans	16. Develop Gauge Triggers
8. Target New Residents and Tourists with Flood Information	17. Trial Flood Decision Support System
9. Use Social Media	18. Predict Storm Surges

# Property Modification Measures

- Range of measures identified
  - Voluntary house purchase
  - Voluntary house raising
  - Land use planning and development control
    - Management of
      1. Strategic Development
      2. Future Development
      3. Climate Change

# Voluntary House Purchase and Raising

- Based on hydraulic hazard criteria





# Voluntary House Purchase and Raising

- Based on hydraulic hazard criteria

Safe → H1: generally safe for people, vehicles and buildings

→ H2: unsafe for small vehicles

VHR → H3: unsafe for vehicles, children and the elderly

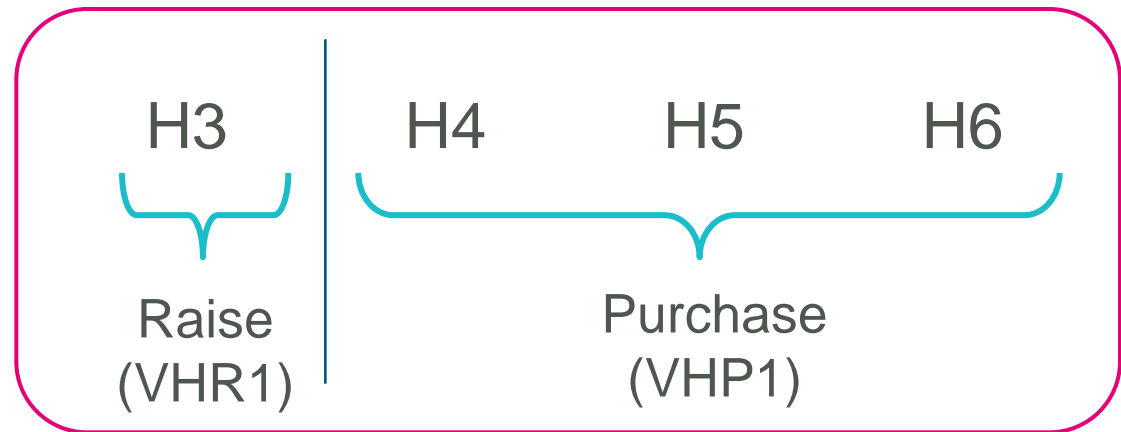
VHR or VHP? → H4: unsafe for people and vehicles

→ H5: unsafe for vehicles and people. All buildings vulnerable to structural damage (some vulnerable to failure)

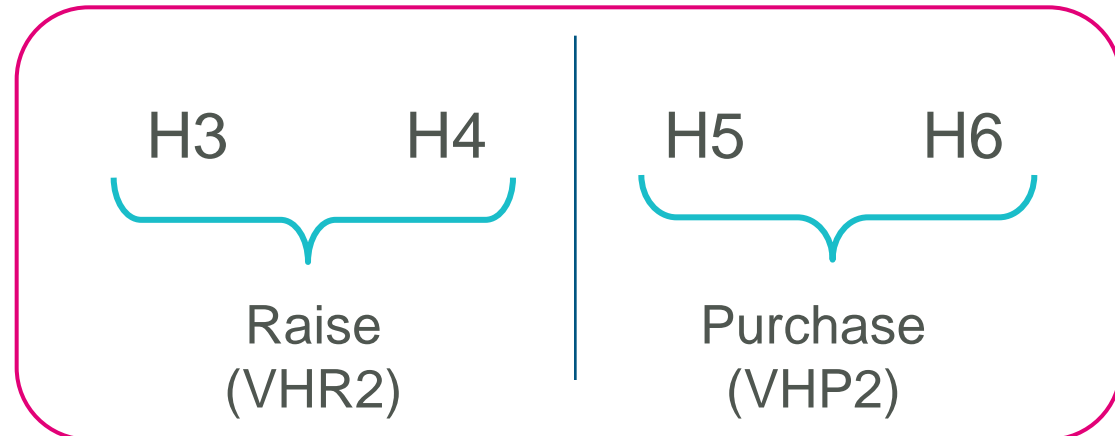
VHP → H6: unsafe for vehicles and people. All building types vulnerable to failure.

# Property Modification Measures

*Either*



*Or*



# VHP and VHR Outcome

	VHP Option 1	VHP Option 2
Properties purchased	45	19
Total cost	\$18m	\$7.6m
Benefit cost ratio	0.34	0.35

	VHR Option 1	VHR Option 2
Properties raised	13	39
Total cost	\$0.9m	\$2.7m
Benefit cost ratio	1.7	1

# VHP and VHR Summary

*Either*

- Purchase 48 houses
- Raise 13 houses
- Total cost \$18.9m

*Or*

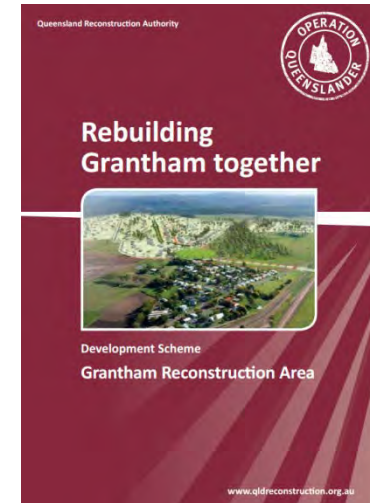
- Purchase 19 houses
- Raise 39 houses
- Total cost \$10.3m

# Supporting Measures / Other Considerations

- Response measures
  1. Flash flood planning
  2. Flood warning system
  3. Flood watch networks
- Resilience measures
  1. Move dwelling within lot
  2. Flood proof materials
  3. Private flood barriers
- Disruption to the community
  1. Ugly streetscape / gap-tooth
  2. Clusters of buildings for VHP

# Consider Land Swap Program

- Can be lower cost to Council
- Voluntary program
- Swap land for similar sized blocks
- Landowners pay building cost
- Collective relocation  
→ minimises social disruption



# Strategic Development Assessment

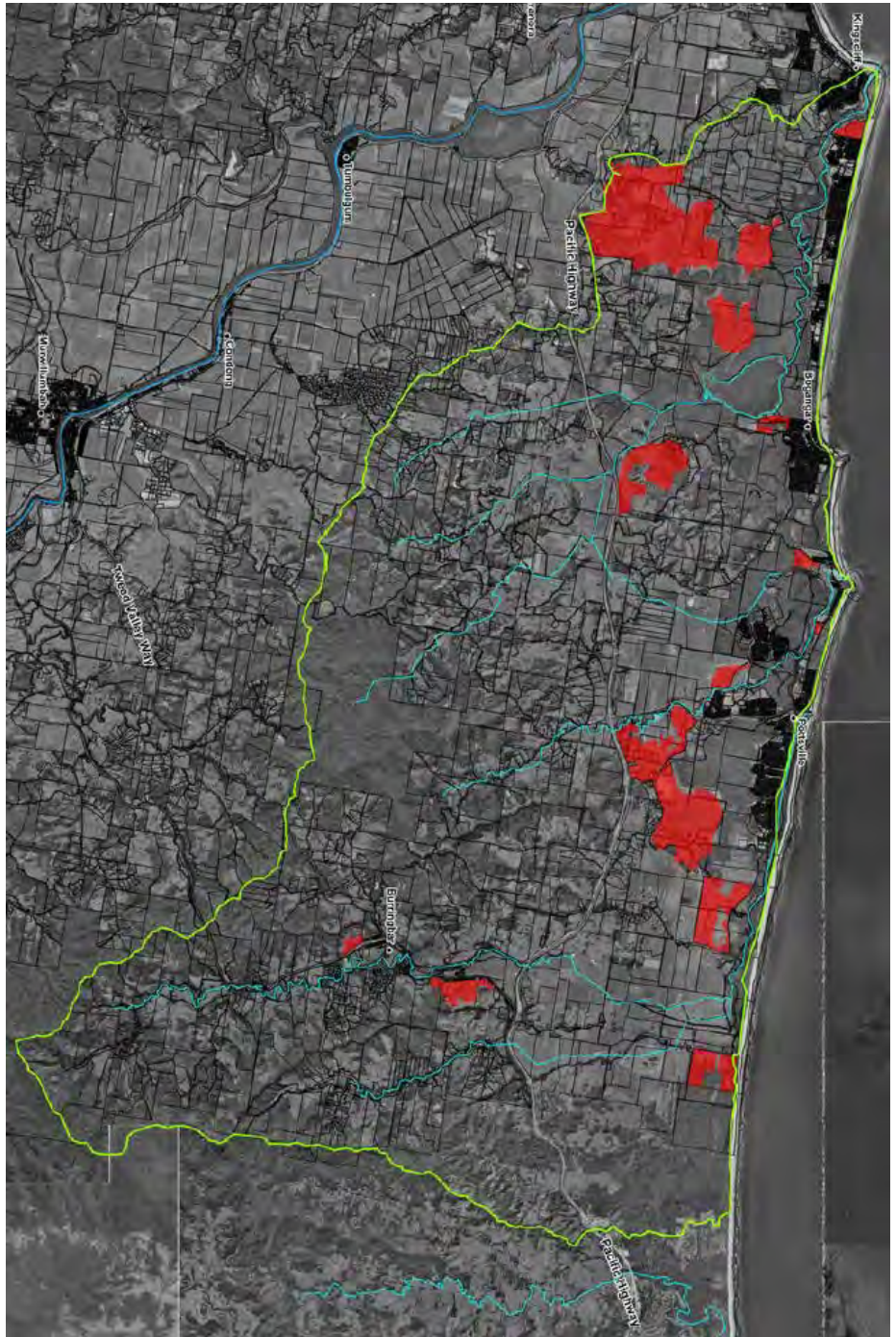
- Hydraulic assessment of strategic future development
  1. Large-scale, urban development (proposed / potential developments)
  2. Potential rural development
  3. Cumulative development combining (1) and (2)
- Assessment criteria
  - Less than 0.03m in residential
  - Less than 0.1m in rural

# Large-Scale Urban Development

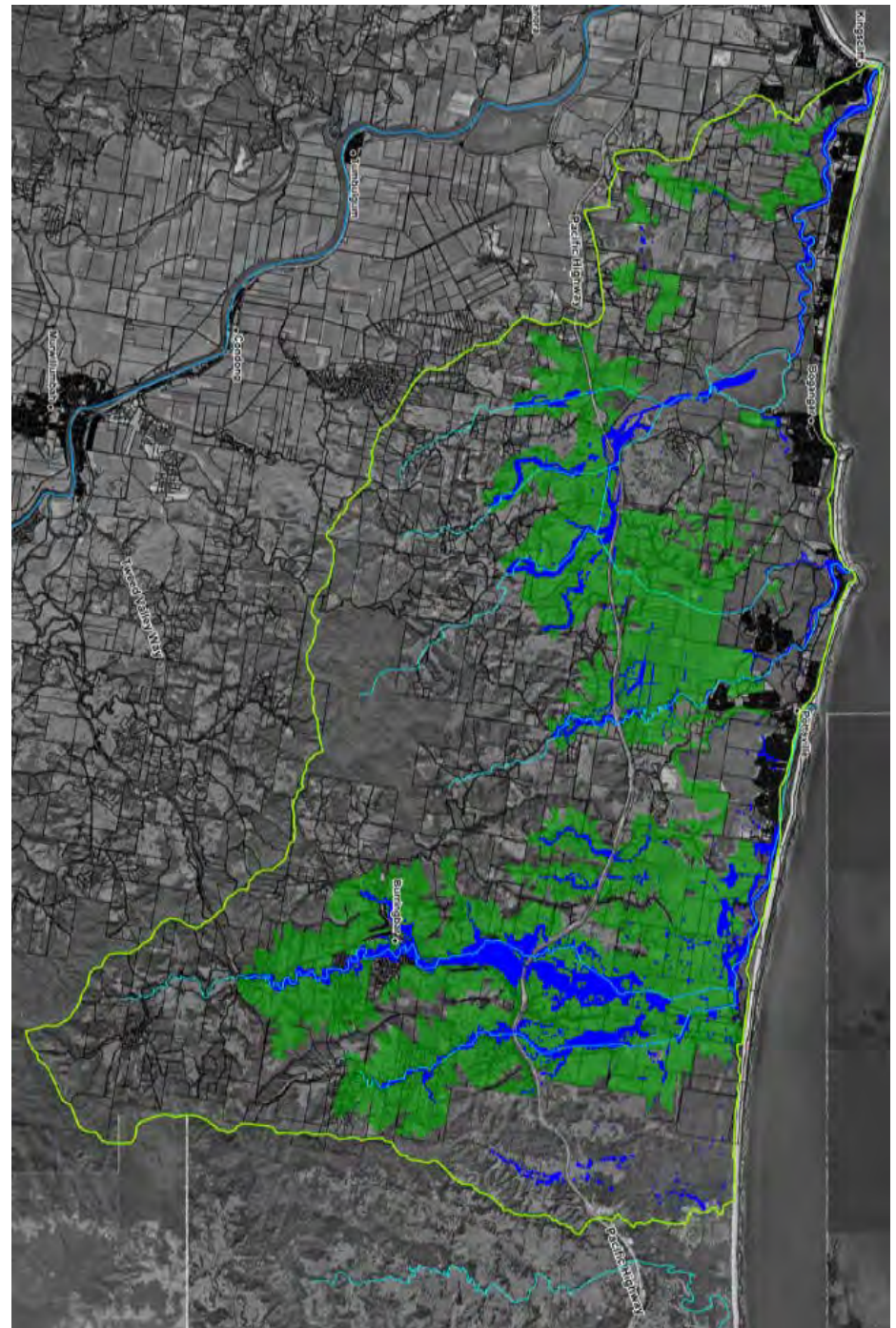
	Development	Modelled Fill Level	Development Fill Area (Ha)
1	Lot 490	Q100 + CC	17.7
2	Kings Forest	Q100 + CC	162.0
3	Depot Road sports fields	Q100 + CC	4.7
4	Unnamed	Q100 + CC	497.2
5	Tanglewood	Q100 + CC	131.0
6	Hansens / Tamarind Avenue / Willow Avenue	Q100 + CC	15.6
7	Lot 156 Creek Street	Q100 + CC	14.0
8	LMPA Aged Care	Q100 + CC	3.7
9	Seabreeze extensions	Q100 + CC	24.0
10	Dunloe Park potential employment land	Q100 + CC	124.1
11	Dunloe Park potential urban release	Q100 + CC	217.1
12	Mooball potential urban release area	Q100 + CC	46.0
13	Burringbar	Q100 + CC	10.6
14	Dunloe Sand Quarry	2.2m AHD	100.1
15	Wooyung Resort	Q100 + CC	63.9



# Large-Scale Urban Development



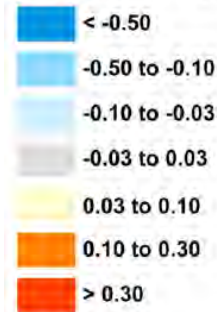
# Permissible Rural Development



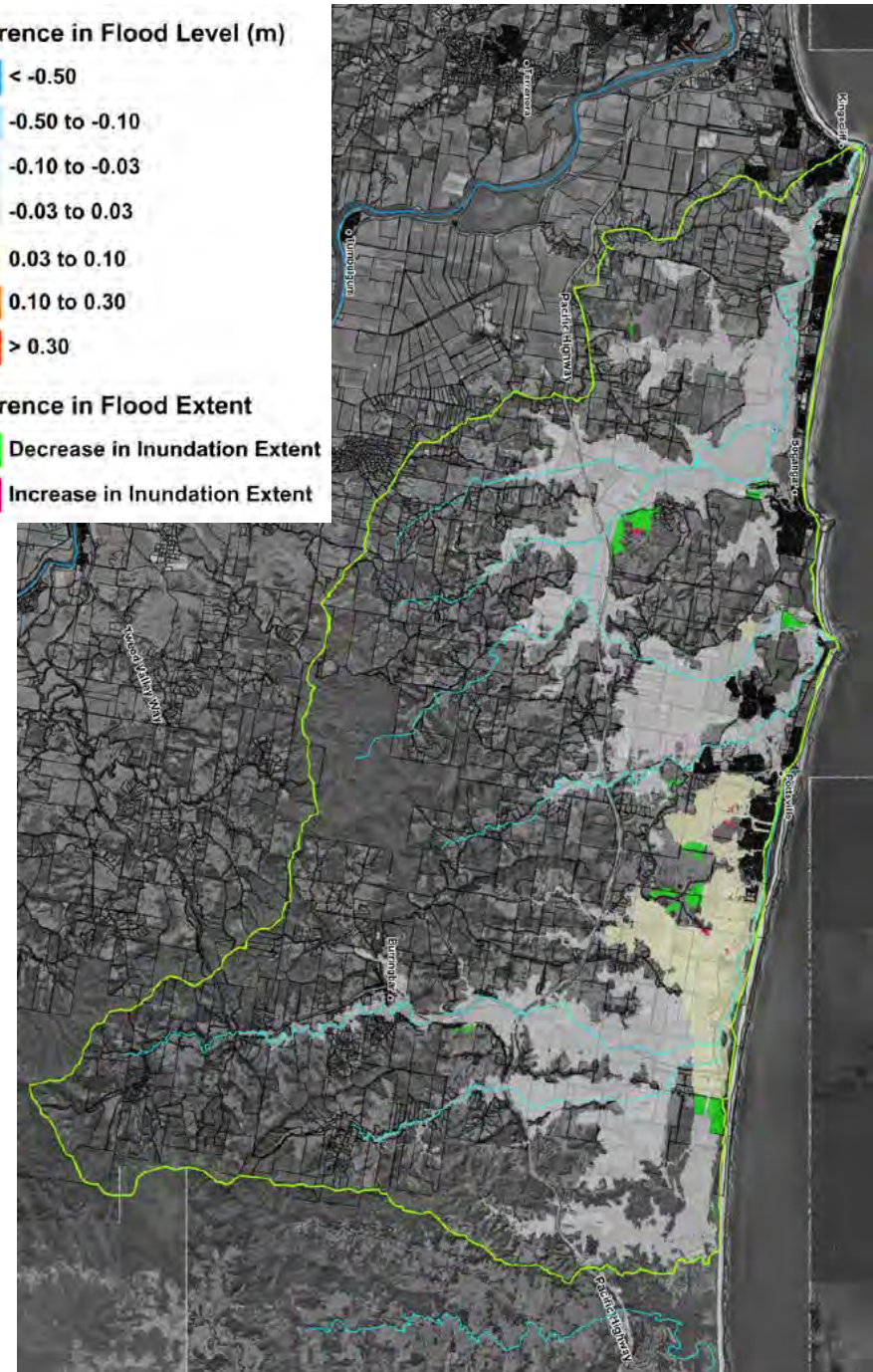
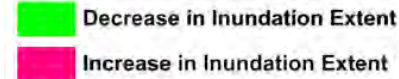
# Cumulative Development Impacts



## Difference in Flood Level (m)



## Difference in Flood Extent



Cudgen Creek

# Assessment Outcomes

- Generally acceptable impacts, catchment wide
- Most impacts in Pottsville to Wooyung area, but within acceptable limits / not residential areas
- 10 properties in Mooball with 0.035m impacts
  1. Eight have floor levels well above flood levels
  2. Two are inundated in existing case by 0.3-0.5m water above floor
- 7 additional properties in 100y flood extent
- 2 properties become flooded above floor

# Land Use Planning and Development Control

- Management of Future Development Flood Risk
  - Nine recommendations to update existing planning and development controls

Shire wide Development Control Measures	
Update Tweed LEP	Building Controls
Update Tweed DCP	Section 149 Notifications
Complying Development	Release of flood information to the public
Section 94 Contributions Plan	Rural Development
Tweed Shire FRM Policy	

- Management of Climate Change Flood Risk
  - Implement Adaptation Plan
  - Planning for Climate Change

# Property Modification Measures

Property Modification Measures	
19. Review Voluntary House Purchase scheme	23. Shire wide development control measures
20. Voluntary House Purchase	24. Location specific development control measures
21. Voluntary House Raising	25. Climate change adaptation
22. Adopt cumulative development scenario	

# Recommended Measures

1	Response	Update the local flood plan
2	Response	Plan for different types of flood risk
3	Response	Plan for flash flooding
4	Response	Plan for pedestrian and local evacuation
5	Response	Promote general flood awareness
6	Response	Provide flood information online to the community
7	Response	Provide information to assist with personal flood plans
8	Response	Target new residents and tourists with flood information
9	Response	Use social media

# Recommended Measures

10	Response	Undertake Disaster Resilience Leadership Workshops
11	Response	Enhance gauge network
12	Response	Install flash flood warning system
13	Response	Establish Flood Watch Network
14	Response	Classify existing and new stream level gauges
15	Response	Develop flood intelligence cards
16	Response	Develop gauge triggers
17	Response	Trial flood decision support system
18	Response	Predict storm surges



# Recommended Measures

19	Property	Voluntary house purchase
20	Property	Voluntary house raising
21	Property	Management of strategic flood risk
22	Property	Management of future development flood risk
23	Property	Management of climate change flood risk Implement Adaptation Plan
24	Property	Management of climate change flood risk Planning for climate change

# Way Forward.....

# Thank you

