Goulburn River Constraints Proposal
Open House Meetings

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

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VICTORIA State Government

Australian Government

MURRAY–DARLING BASIN AUTHORITY

Outline

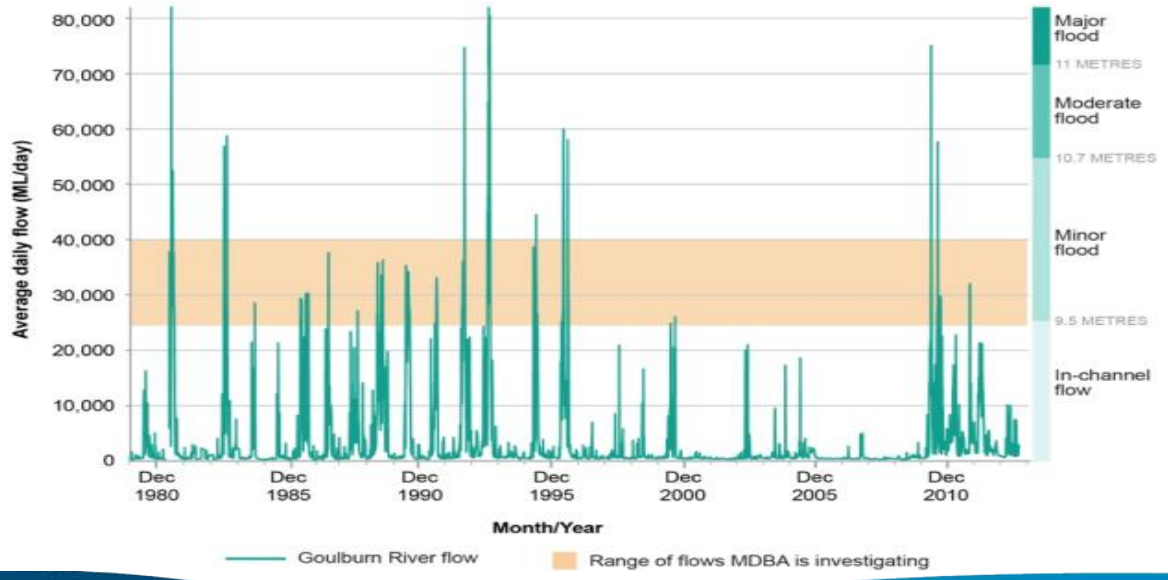
- Introduction – what project is about
- Where we started from 8 months ago
- Proposal
- Cost estimation
- Where to from here


MURRAY RIVER
Barmah Forest
Cobram
Yarrawonga
Nathalia
Numurkah
Broken Creek
Boosey Creek
Deep Creek
Nine Mile Creek
Sandy Creek
Echuca
McCoys Bridge
Loch Garry
Pine Lodge Creek
Kyabram
Reedy Swamp
Gemmills Swamp
Shepparton
Shepparton
Broken River
Tatura
Winton Swamp
Sheep Pen Creek
Seven Creeks
Waranga Basin
Goburn Creek
Honeysuckle Creek
Benalla
Rushworth
Murchison
Castle Creek
Five Mile Creek
Faithfull Creek
Holland Creek
Ryans Creek
Goulburn Weir
Euroa
Nagambie
Major Creek
Lake Nillahcootie
Merton Creek
Hughes Creek
Seymour
Seymour
Mansfield
Sugarloaf Creek
Trawool
Home Creek
Goulburn River
Molesworth
Alexandra
Delatite River
Mt. Buller
Broadford
Yea
Lake Eildon
Dry Creek
Kilmore Creek
Eildon
Jamieson
Acheron River
Rubicon River
Marysville
Woods Point
Big River
Flow Measurement Points
Locality
Lower Goulburn
Mid Goulbrun
Reference.GISADMIN.VMLITE_LOCALITY
Waterway
Waterbody
Goulburn Broken CMA
N
W
E
S
1:925,000

Boosting life on the floodplain and in the river

Environmental needs at Shepparton

- 25,000 ML/day (9.4m)
  (7 to 10 event per 10 years – max gap 3 years)
- 40,000 ML/day (10.3m)
  (4 to 6 event per 10 years – max gap 5 years)



What are constraints?

- Physical structures along or near the river like bridges and roads, and private agricultural land and businesses, which may be affected at higher flows
- River operation rules which have helped us use the river for irrigation

Initial Goulburn River Constraints Management Concepts

- Watering lower Goulburn floodplain
- 25,000ML/d to 40,000 ML/day at Shepparton (9.4m to 10.3m)
  - add 1 to 2 events in 10 years on average
  - winter/spring
  - duration – days/weeks, not months
- Adding environmental water on tributary flows
- River flows are smaller further upstream

MDBA initial costing

- 2014 Constraints Annual Report identified the following costs:
  - $ 6 million easements and private works
  - $ 6-10 million roads
  - $1 million bridges
  - $ 4-8 million lower Goulburn levee regulating structures
  - $14-22 million other lower Goulburn levee works
- **Total $31- 47 million**

What was the focus of work in 2015?

- Focus
  - reduce biggest uncertainties (and document remaining uncertainty)
  - ensure $ in project cost estimates to ensure appropriate decision made and $ available to offset impacts in implementation
  - limited farm scale interactions in development

The proposal – target flow

- **25,000 ML/day** target flow at Shepparton (9.4m)

- 2,075 ha (75% of all wetland area downstream of Goulburn Weir)
  - 1,839 ha (89% of all wetland area downstream of Shepparton)

- 9,279 ha (50% of all tree areas downstream of Goulburn Weir)
  => more flow increases tree area inundated

The proposal – frequency and timing

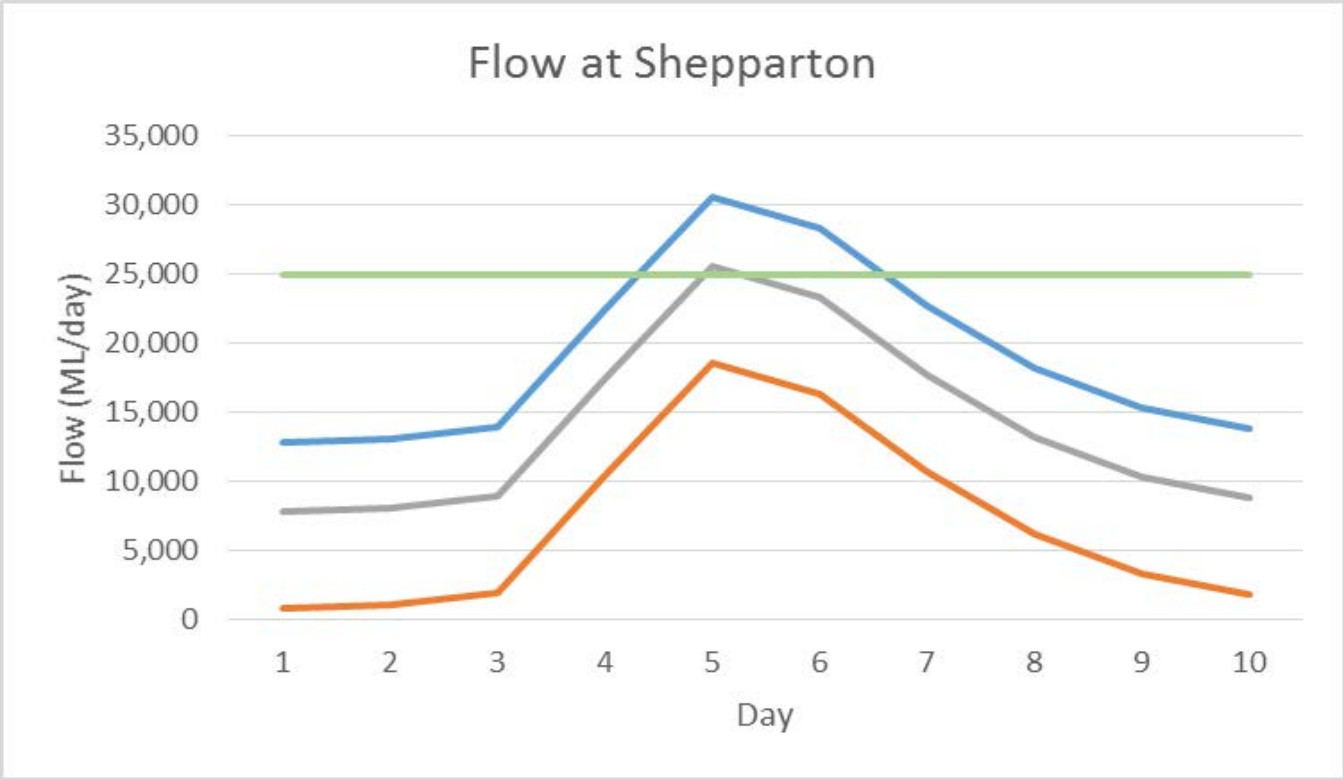
- 25,000 ML/day target flow at Shepparton

  - events 1 to 3 times in 10 years (to add to current ~5 times) on average => 7

  - July to October

The proposal – duration

- Hard to get 5+ days per event
  - with water harvesting, tributary flow events quite quick (weren't naturally)
- **30,000 ML/day** Shepparton peak flow => duration



The proposal – how to add water

How to add water to make higher flow:

- Waranga Basin diversions reduction – based on upstream flows
- Eildon release – limit to **10,000 ML/day at Alexandra** (including tributary flows)
- Eildon release - travel time + rate of rise
  => start based on rainfall forecasts and adjust releases through event

⇒risk from uncertain forecasts

How to manage flows

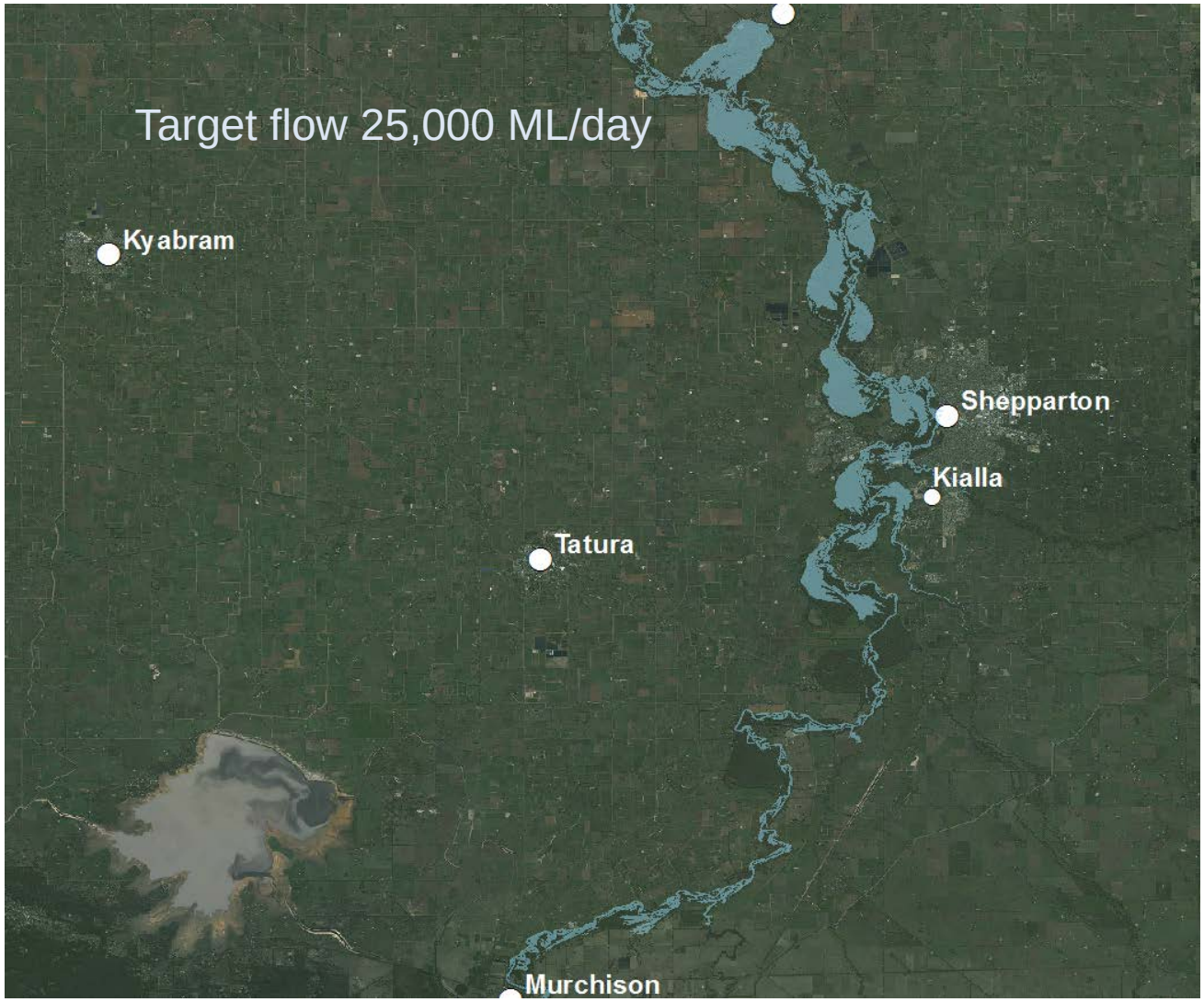
- Managing tributary flow uncertainty:
  - BoM flow forecasting for whole catchment
  - More rainfall and streamflow monitoring
  - GMW develop flow management tools/practices
  - Eildon shutdown, diversion to Waranga Basin
  - **Buffer** in easements/levees
  - when start implementing – target a lower flow and over years increase towards target flow
- No impact on other water users – water released/not diverted can be accounted against environmental entitlements
- Concepts developed - needs more detail/testing

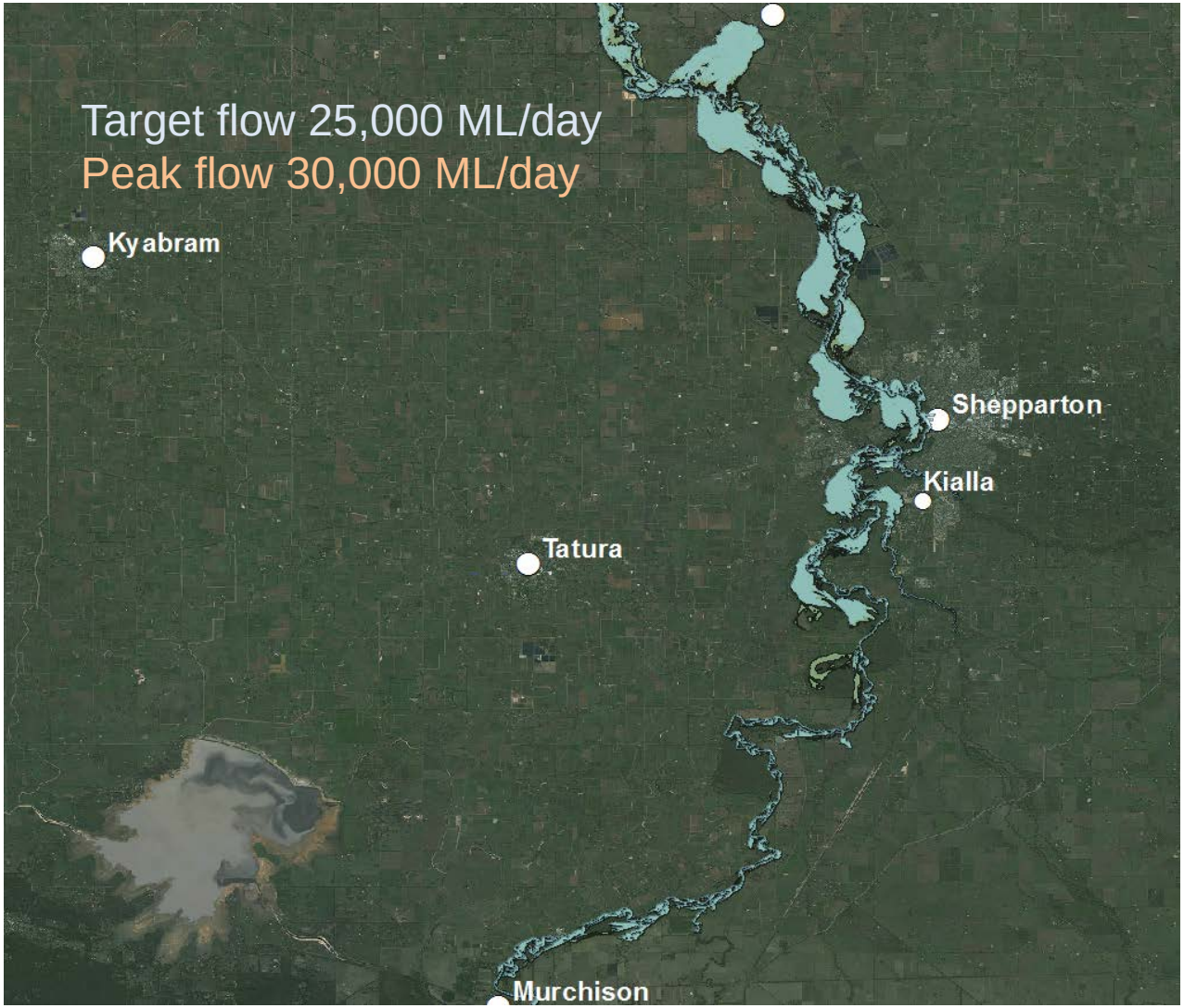
The proposal – buffer levels

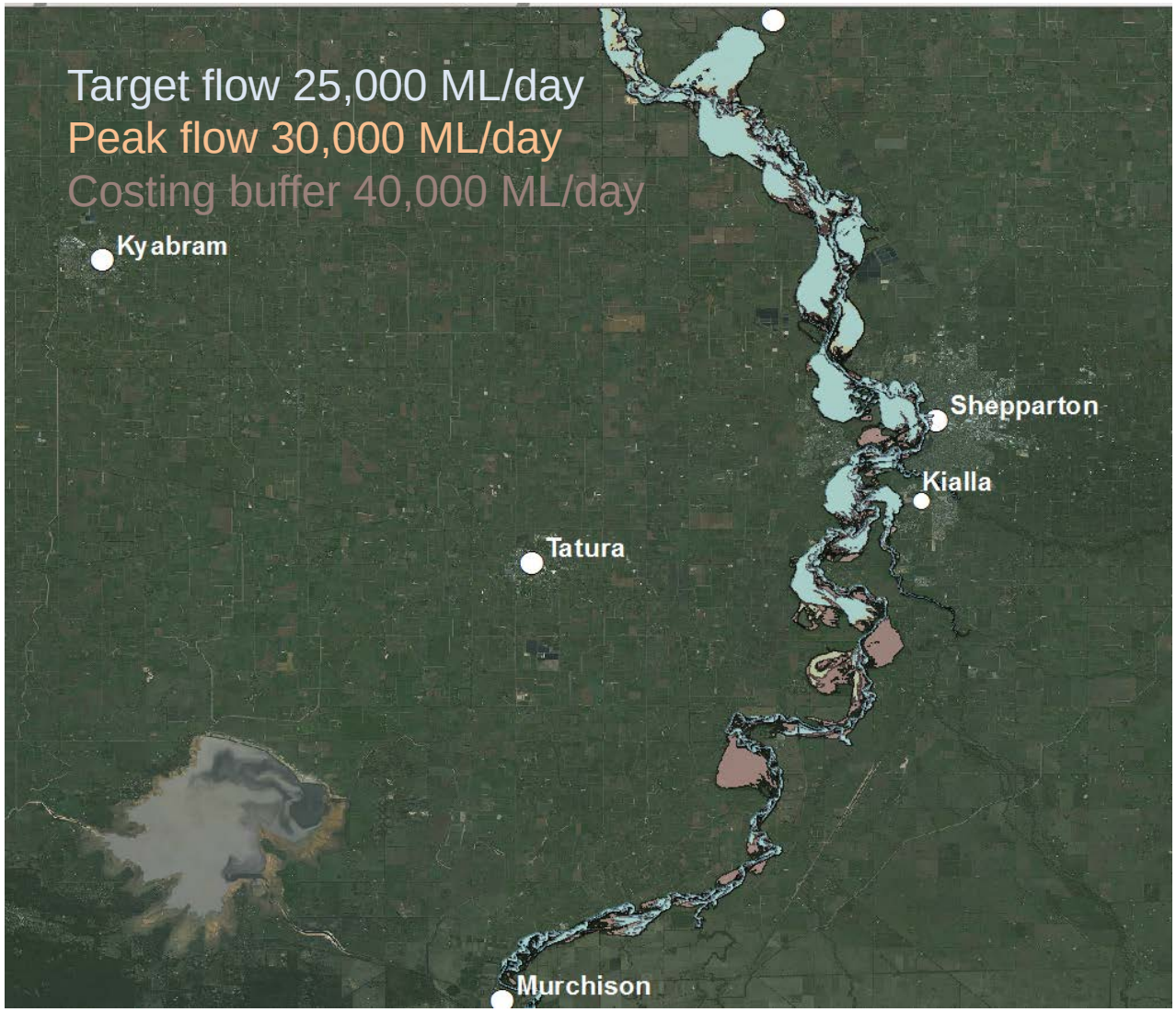
- Remaining uncertainty in controlling unplanned tributary flows
- What if flows go above peak levels?
- Easements and levees and other works allow a margin of safety for flows to be higher than planned - not aiming to deliver at these flow levels

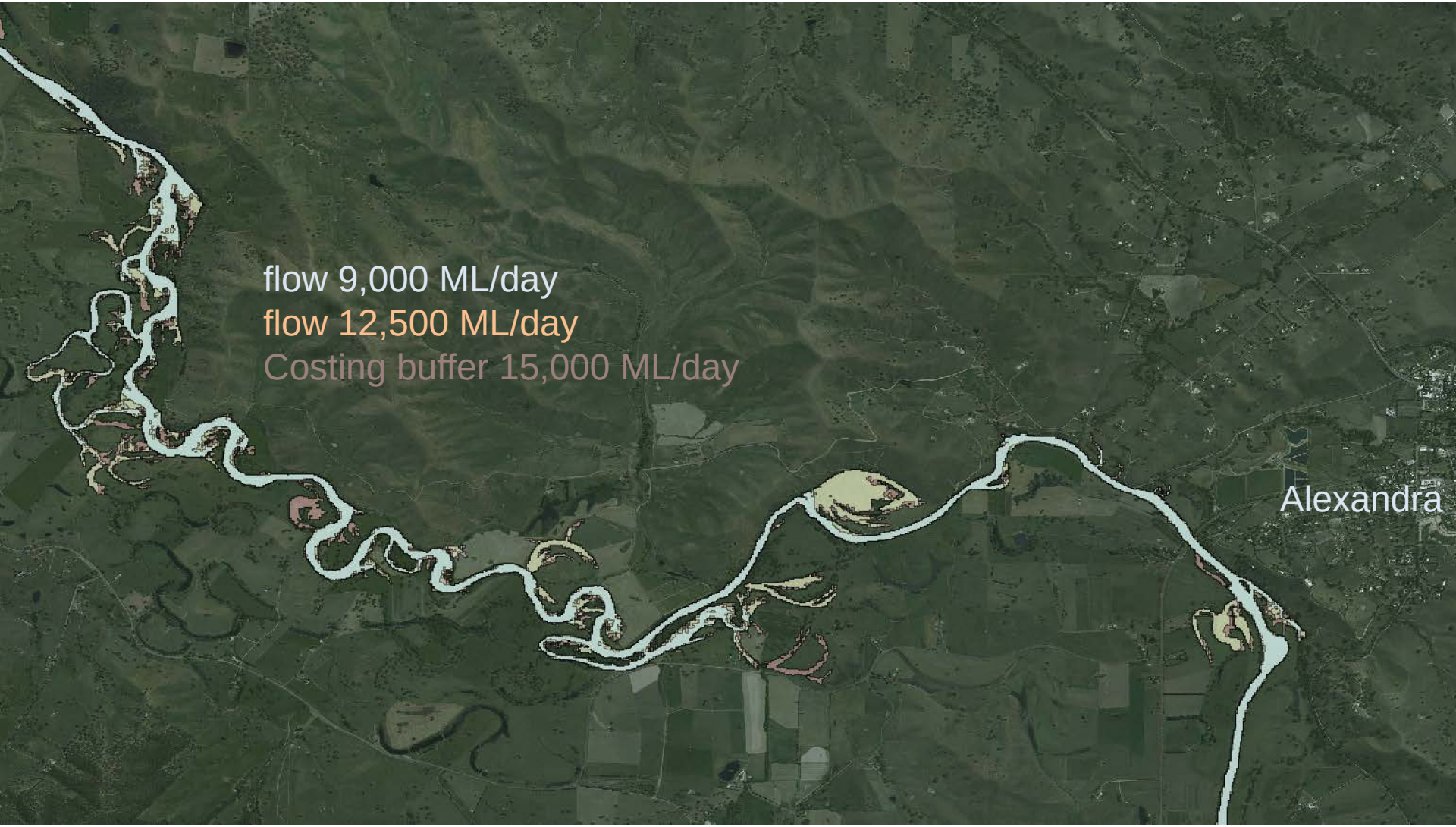
The proposal – buffer levels

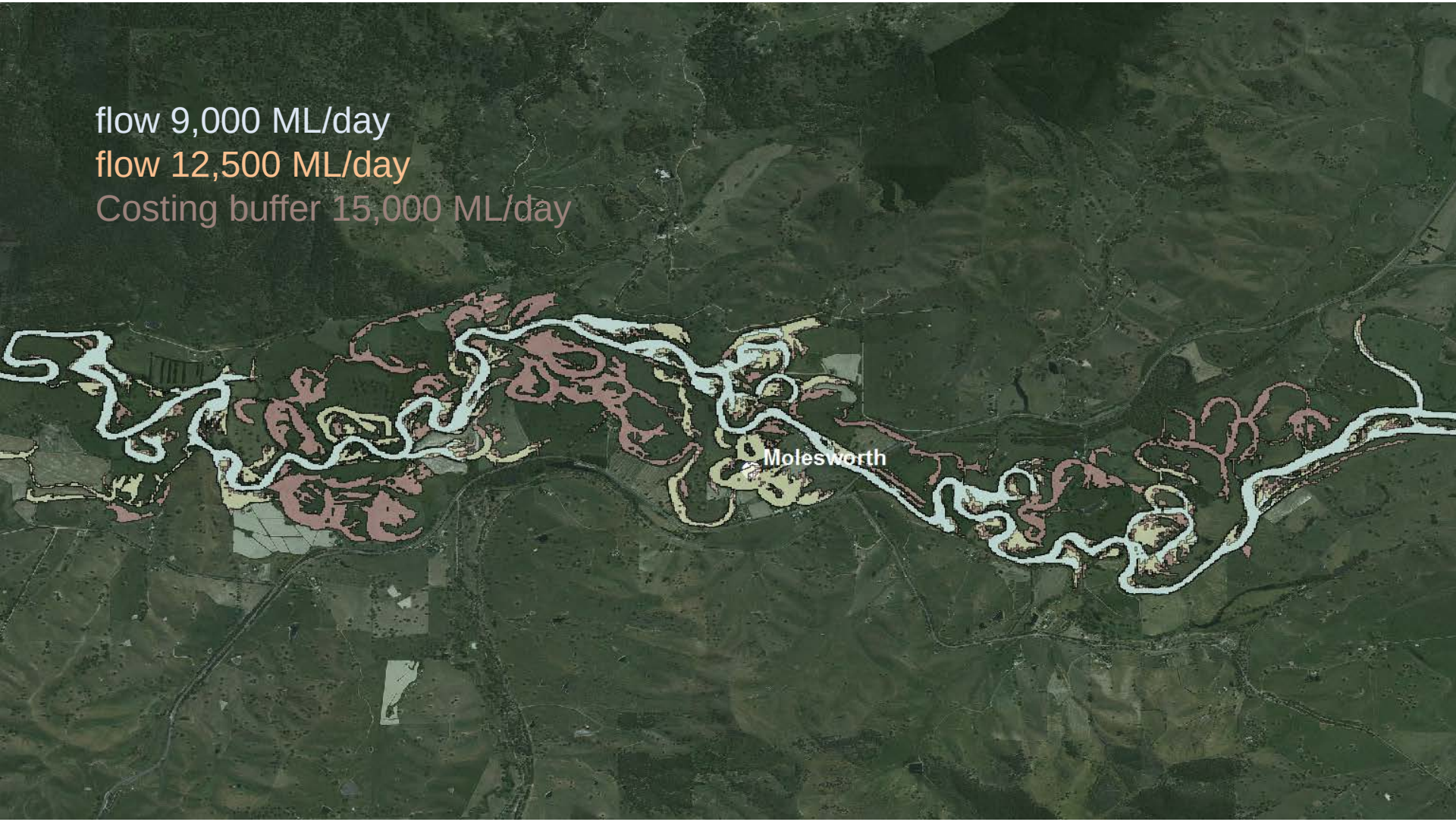
- 15,000 ML/day buffer level at Alexandra
- 35,000 ML/day buffer level at Seymour
- 40,000 ML/day buffer level at Shepparton


Target flow 25,000 ML/day
Kyabram
Shepparton
Kialla
Tatura
Murchison


Target flow 25,000 ML/day
Peak flow 30,000 ML/day
Kyabram
Shepparton
Kialla
Tatura
Murchison


Target flow 25,000 ML/day
Peak flow 30,000 ML/day
Costing buffer 40,000 ML/day
Kyabram
Shepparton
Kialla
Tatura
Murchison


flow 9,000 ML/day
flow 12,500 ML/day
Costing buffer 15,000 ML/day
Alexandra


flow 9,000 ML/day
flow 12,500 ML/day
Costing buffer 15,000 ML/day
Molesworth

Hydraulics – Tributary Interaction

- High tributary flow – impact of higher Goulburn flow
- Limited extent of backup along tributary
  ~1.5 to 3 km at low tributary flows
  ~0.5 to 1 km at high tributary flows
- Change in extent of inundation small
- Issue - slowing tributary drainage further upstream – further work

Hydraulics – Murray interaction

- Murray
  - floods similar areas to Goulburn (in Vic & NSW)
- Would get more inundation from combined flows
- Could reduce Goulburn flow if coinciding with higher Murray flows
- Issue for
  - Goulburn only releases
  - Goulburn and Murray releases
- Needs further work

Estimating the cost

- Private agricultural land
- Specialist businesses
- Public infrastructure
- Lower Goulburn levees
- Lower Goulburn levee outlets
- Other costs

Estimating the cost – private agricultural land

- **Inundation impacts**
  - Pasture and crop yields
  - Fence damage
  - Weeds – gum suckers, lippie
  - Infrastructure – pumps, sheds, tanks..
  - Farm management

- **Interrupted access**

Agriculture – impact costing assumptions

	Duration	Season	Foregone Grazing (days)	Pasture restoration ($/ha)	Crop damages ($/ha)	Clean up and additional management costs ($/ha)
Inundation	< 7 days	Jun-Jul	30	Nil	$45 (c) $2000 (h)	$40
		Aug-Sept	90	Nil	$79 (c) $2500 (h)	$40
		Oct-Nov	120	$60 (t)* $100 (v)	$114 (c) $3000 (h)	$40
	> 7 days	Jun-Jul	30	$51 (t) $51 (v)	$112 (c) $4000 (h)	$40
		Aug-Sept	120	$60 (t) $210 (v)	$226 (c) $4500 (h)	$40
		Oct-Nov	300	$70 (t) $420 (v)	$250 (c) $6000 (h)	$40
Interrupted access	< 7 days	Jun-Jul	7	N/A	$200 (h)	$12
		Aug-Sept	7	N/A	$10 (c) $250 (h)	$12
		Oct-Nov	7	N/A	$19 (c) $300 (h)	$12
	> 7 days	Jun-Jul	14	N/A	$10 (c) $400 (h)	$12
		Aug-Sept	14	N/A	$10 (c) $450 (h)	$12
		Oct-Nov	14	N/A	$38 (c) $600 (h)	$12

Agriculture – mitigation cost calculations

Mitigation activity	Assumptions
Easements over inundated land	Compensate for reduced income from livestock and crops, damage to fences, increase in farm management
Easements over interrupted access land	Compensation as per items above for 50% of the assessed impacts. Remaining 50% mitigated by infrastructure upgrades (see item below)
Upgrades to infrastructure (pumps, bridges, crossings)	For feasibility, infrastructure upgrades assumed to average $50,000 per property with inundation area >10ha. Assume upgrades will mitigate 50% of the assessed impacts.
Negotiation costs with individual landholders	MDBA/CMA cost
Farm management and legal advice for landholder representative groups	Assume 1 group per 200 landholders
Total cost of mitigation	

Estimating the cost – Private agricultural land

- Overall cost = $30.5m (at buffer level)
  - present value of cost of ongoing inundation 3 years in 10 (>7 days) between June & November

- ~560 “properties” involved

- 114 Eildon - Killingworth	997 ha
- 191 Killingworth - Goulburn Weir	2,142 ha
- 257 Goulburn Weir - Murray	8,413 ha

Estimating the cost – Specialist businesses

- Includes quarries, golf courses, caravan parks…
- Assumed inundated 3 years in 10, for 7 days, spread between June and November.
- In Goulburn 12 businesses potentially affected
- Estimated costs of damage
  - loss of business
  - damage
  - cleanup
- Easement versus infrastructure focus
- Total cost estimated = $28m (at buffer level)

Estimating the cost – Public Infrastructure

- Roads, bridges, bike paths, landscaped areas
- Talked to councils about costs and mitigation measures
- Generally reinstate assets rather than upgrade
- Costs
  - operational response (eg close roads, valves)
  - reinstatement (cleanup, repair)
  - capital - isolated property access
  - capital - one bridge
- Estimated cost $21.7m - mainly reinstatement

Estimating the cost – Lower Goulburn levees

- Condition and height assessment in 2012
- Need levees to contain environmental water
- 109 km of levee with water at 40,000 ML/day (plus some others) out of 147 km
- Estimated cost - $24.8m – half replacement, rest repair

- Levee outlets (4) – some repair, fit doors
- Total estimated cost $7.7m

Overall Proposal Cost

- Program Management $ 8.4m
- Consult & Engagement $ 12.0m
- Investigations $ 2.3m
- Flow Management $ 4.6m
- Private land $ 30.5m
- Specialist businesses $ 28.0m
- Roads/bridges $ 21.0m
- Levees $ 24.8m
- Levee outlets $ 7.7m
- Total cost $139.3m (was $31 to 47m)

Comments on proposal

- Feasibility level proposal
  - lots of uncertainty
  - lots of detail to work through
- If government wish to proceed further
  - next 3 years to develop detailed proposal
- Work to do
  - consult directly with all landowners, councils,…
  - what gets inundated
  - how to manage flow
  - detailed design of works required

Developing the concepts

- Flow management
  - install river and rainfall gauges (upstream Trawool)
  - BoM develop flow forecasting across catchment
  - develop river operation tools and skills
- Further analysis/modelling to develop flow management proposal detail
- Improve inundation mapping
  - measure actual events (including landowners)
  - improve inundation models
  - improve asset locations and information
- Designs for structures

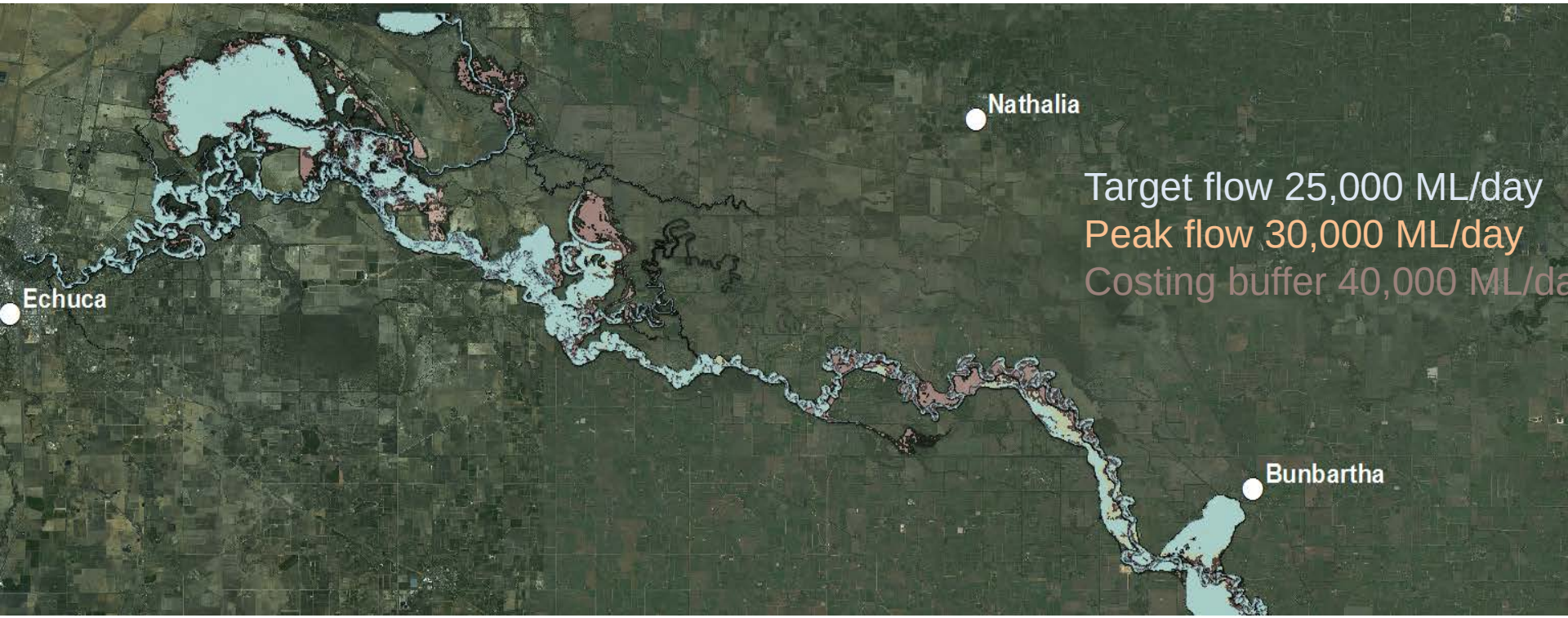
Summary

- Benefits inundation of 2,075 ha of wetlands and 9,279 ha of trees
  - based on 25,000 ML/day at Shepparton
- Cost based on buffers to:
  - 15,000 ML/day at Alexandra
  - 35,000 ML/day at Seymour
  - 40,000 ML/day at Shepparton
- Total proposed cost is significant - $139.3m

Where to next

- No decision has been made
- Community feedback to Minister and into business case
- Complete business case by mid February 2016
- Collective decision of Basin Ministers before 30 June 2016 on whether or how to proceed

- If proceed , 3 years to develop detailed proposal - 5 years to implement


Nathalia
Target flow 25,000 ML/day
Peak flow 30,000 ML/day
Costing buffer 40,000 ML/da
Echuca
Bunbartha

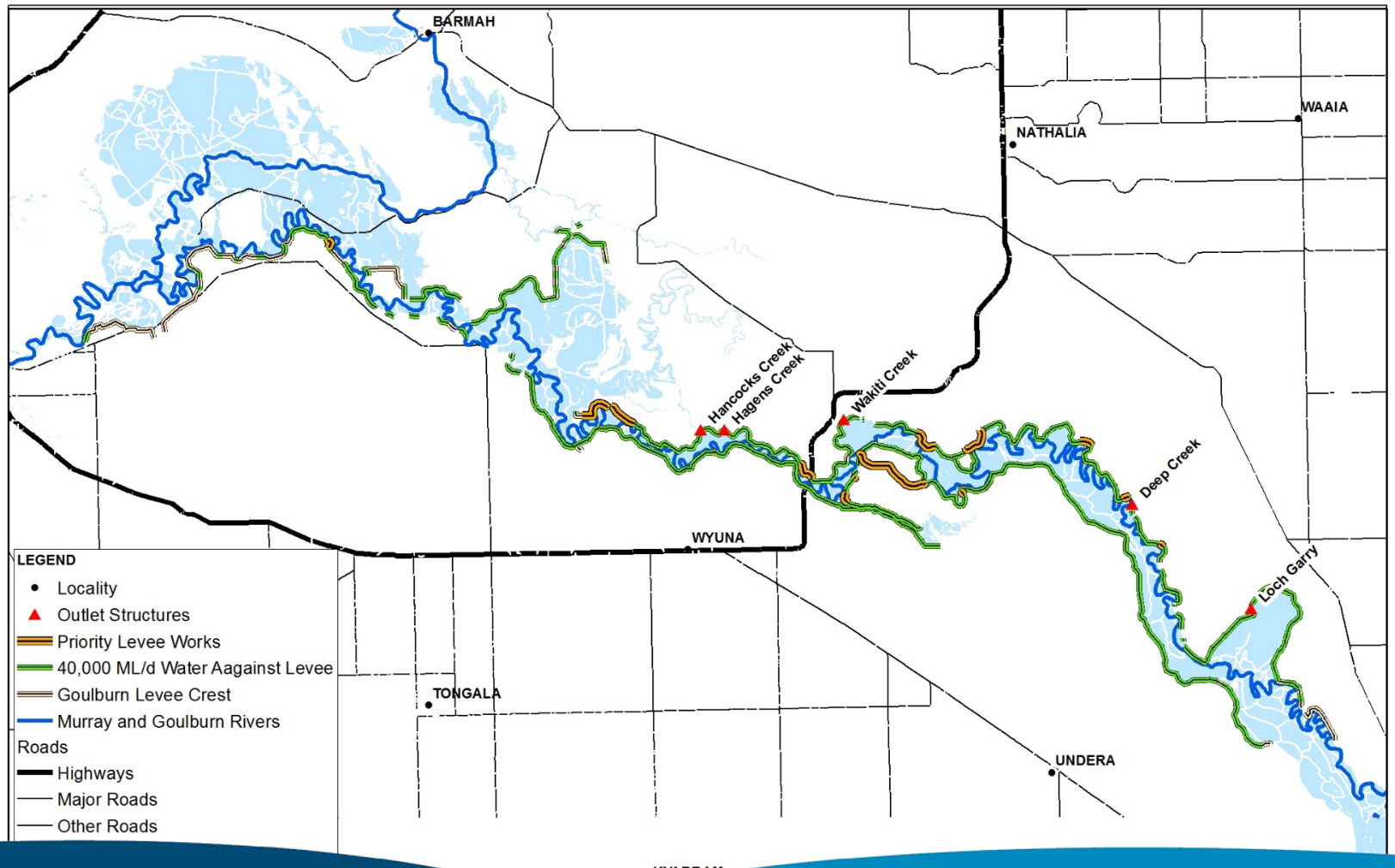
Estimating the cost – Lower Goulburn levees

- Condition and height assessment in 2012
  - crest height
  - points/lines of weakness (holes, erosion, trees..)
- Need levees to contain environmental water
- Assessed at flows of 40,000 ML/day (versus 1 in 5 year flood)
- Risk assessment for upgrade work required
  - consequence and likelihood
  - medium and above risk treated (high consequence)

Estimating the cost – Lower Goulburn levees

- 109 km of levee with water at 40,000 ML/day (plus some others) out of 147 km
- Costs
  - $13m – replacement, realignment, raising
  - $11m – points/lines of weakness repair
  - $0.8m – easement/acquisition of land
  - $24.8m – Total
- Generally leave trees, assess, monitor, remove
- Not included – 38 km levees, natural flood height protection

Estimating the cost – Lower Goulburn levees



Estimating the cost - Lower Goulburn levee outlets

- Want to be closed when environment watering (at buffer level of 40,000 ML/day)
- Structure condition assessed
  - Loch Garry, Deep Creek, Hagans Lane OK
  - Wakati Creek – some repair work
  - Hancocks failing – need to replace
  - most need downstream erosion control works

Estimating the cost - Lower Goulburn levee outlets

- Cost to upgrade and add doors
  - assumes remote control
- Total cost $7.7m
  - Deep Creek $3.4m
  - Wakati $2.0m
  - Hagans $0.2m
  - Hancocks $1.9m
- No change to Loch Garry (not triggered at 40,000 ML/day buffer)