City of Wagga Wagga

Main City & North Wagga Levee Upgrade Project

Overview

- Background
- What's been done so far
- Where we're up to
- Detailed Design
- Flood modelling
- North Wagga Options
- Discussion and feedback

Introduction

Wagga Wagga City Council

Heinz Kausche- Director Infrastructure Services

Alex Fenwick- Manager Engineering

Lauren Fitzgerald- Community Engagement Officer

NSW Public Works

Fred Spain- Manager, Clients & Project Delivery

Background

- Long term project
- Recent experiences
- Complex decisions

What’s been done to date?

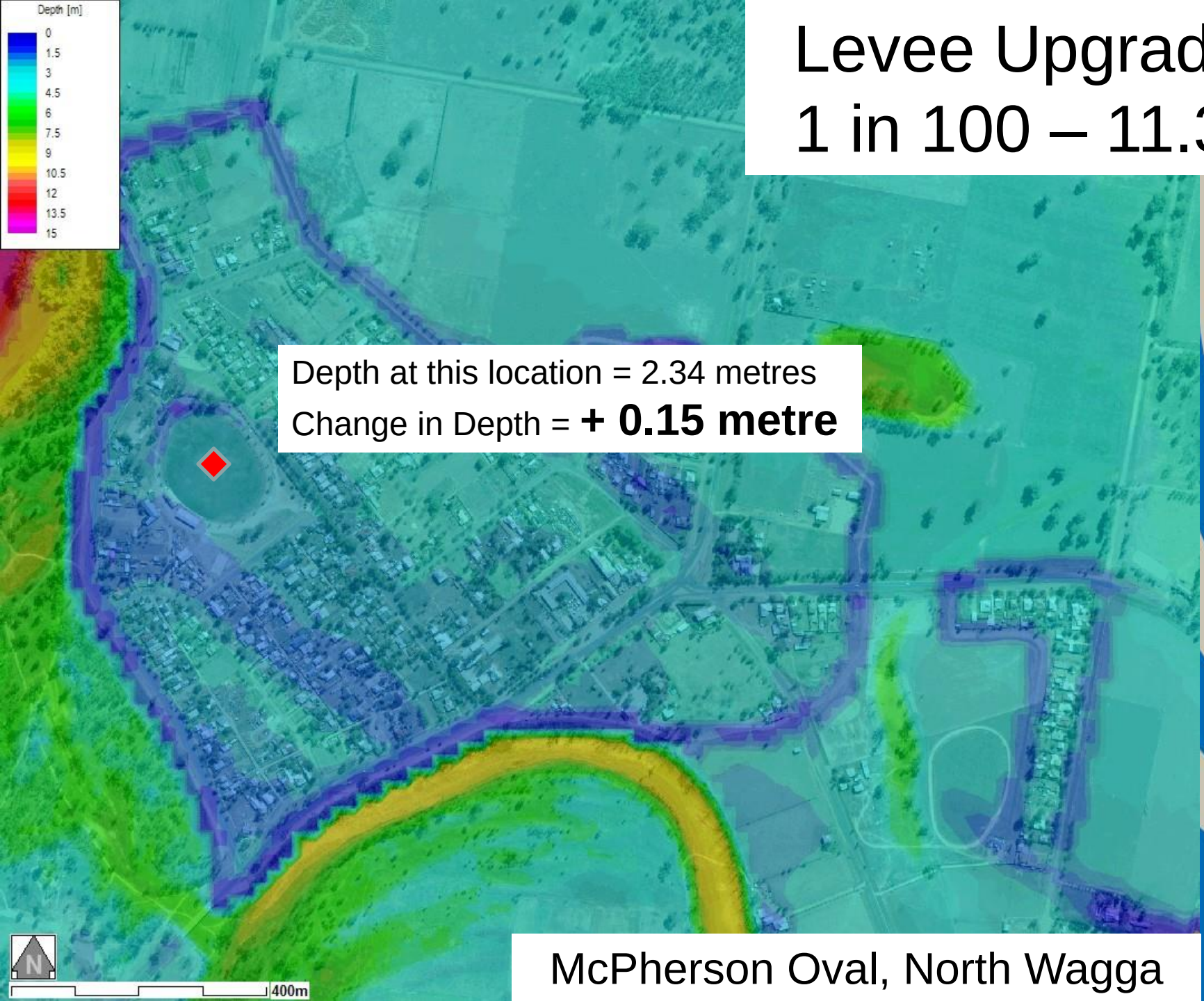
2007	• Geotechnical Survey
2008	• Topographical Survey • Aerial Laser Survey
2009/10	• Detailed Flood Modelling
2010	• Preliminary Environmental Planning Review • Levee Design Level Report • Freeboard Analysis Report
2011/12	• Concept Design Report

2012/13	• Community Engagement
2013	• Review of Environmental Factors
2013/14	• Revised Flood Model

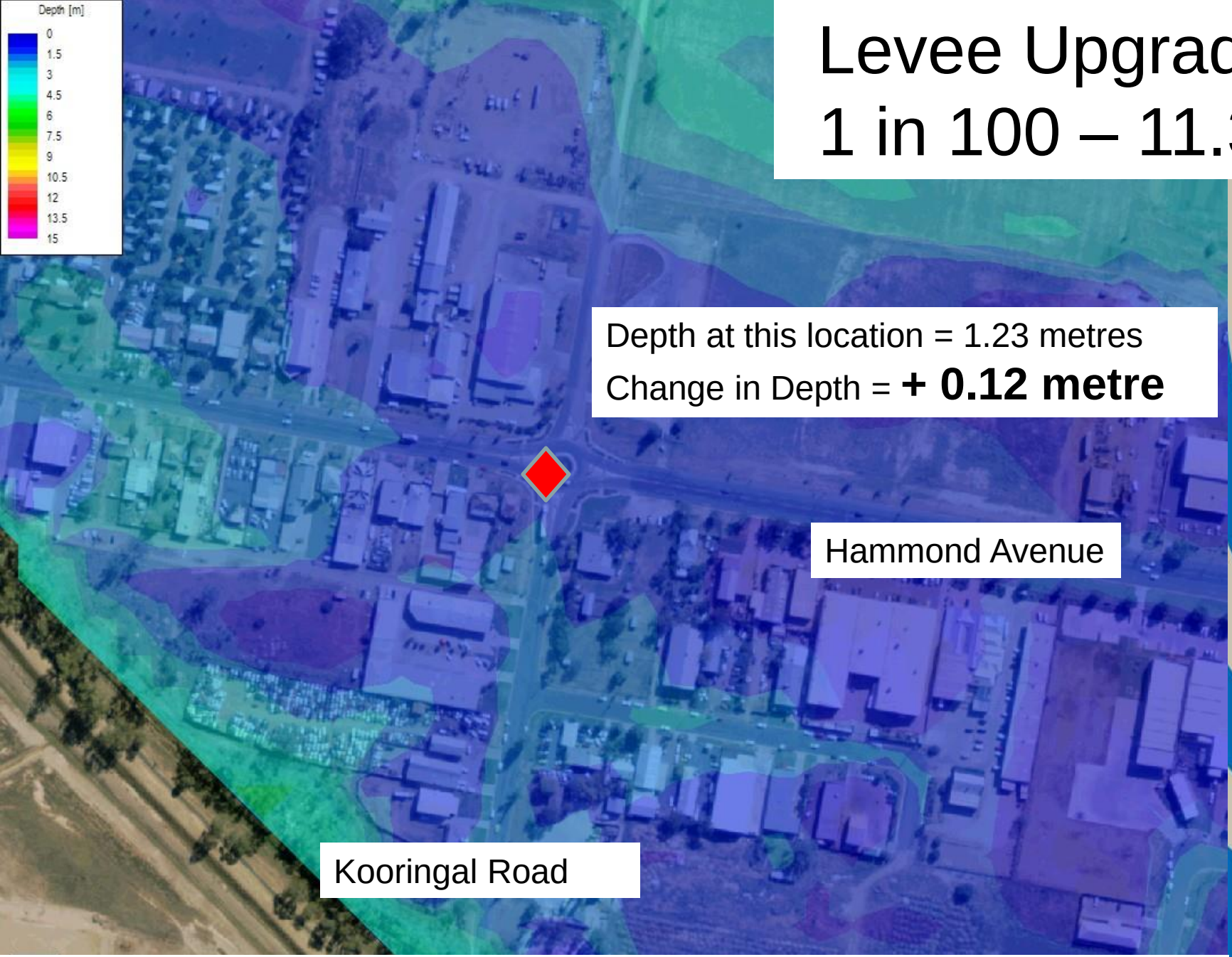
2014/15	• Investigation and detailed design
	  • Detailed Geotechnical Investigation
	  • Detailed Topographical Investigation
	  • Property Investigation and Dilapidation Assessment
	  • Utilities Investigation
	  • Preliminary Design Report

Modelling

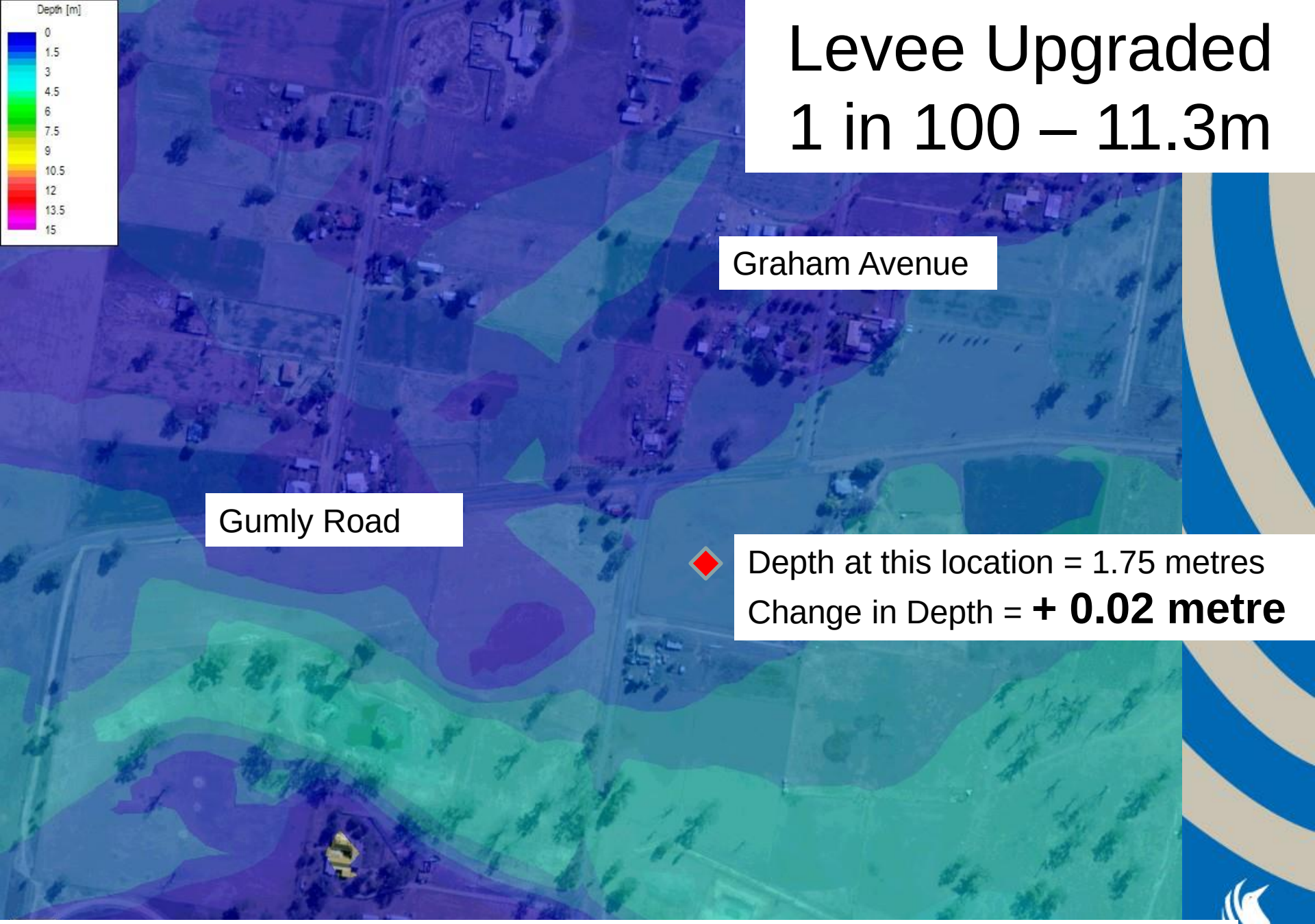
Levee Upgraded 1 in 100 – 11.3m



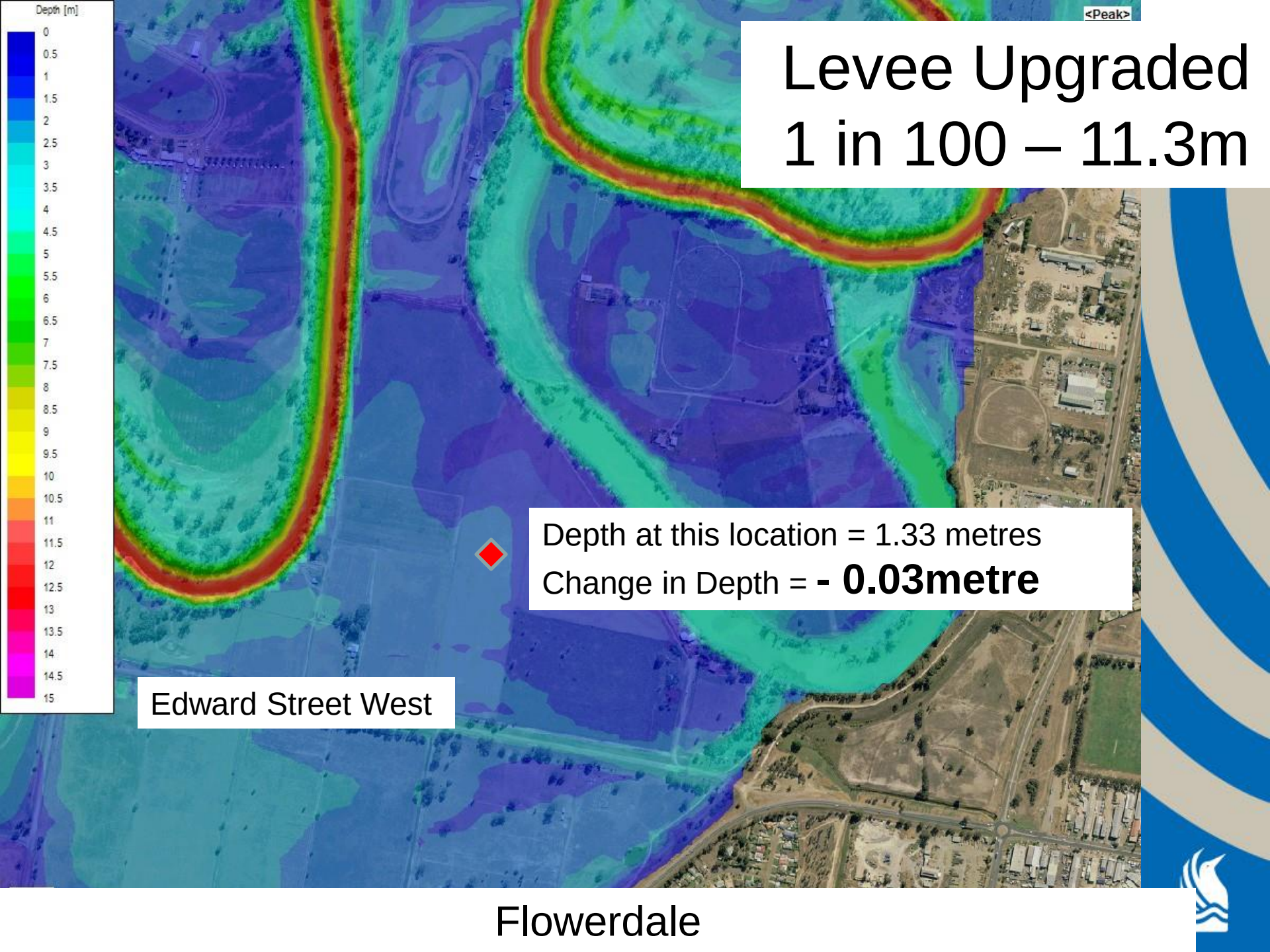
McPherson Oval, North Wagga



Kooringal Rd and Hammond Ave Intersection, East Wagga



Gumly Road and Graham Avenue Intersection, Gumly Gumly


Depth [m]
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
12.5
13
13.5
14
14.5
15
<Peak>
Levee Upgraded
1 in 100 – 11.3m
Depth at this location = 1.33 metres
Change in Depth = - 0.03metre
Edward Street West
Flowerdale

Where are we up to?

NOW

- Community Engagement
- Investigation and Detailed Design
- Investigation on alternatives for North Wagga
- Third Party Impact Assessment

NEXT

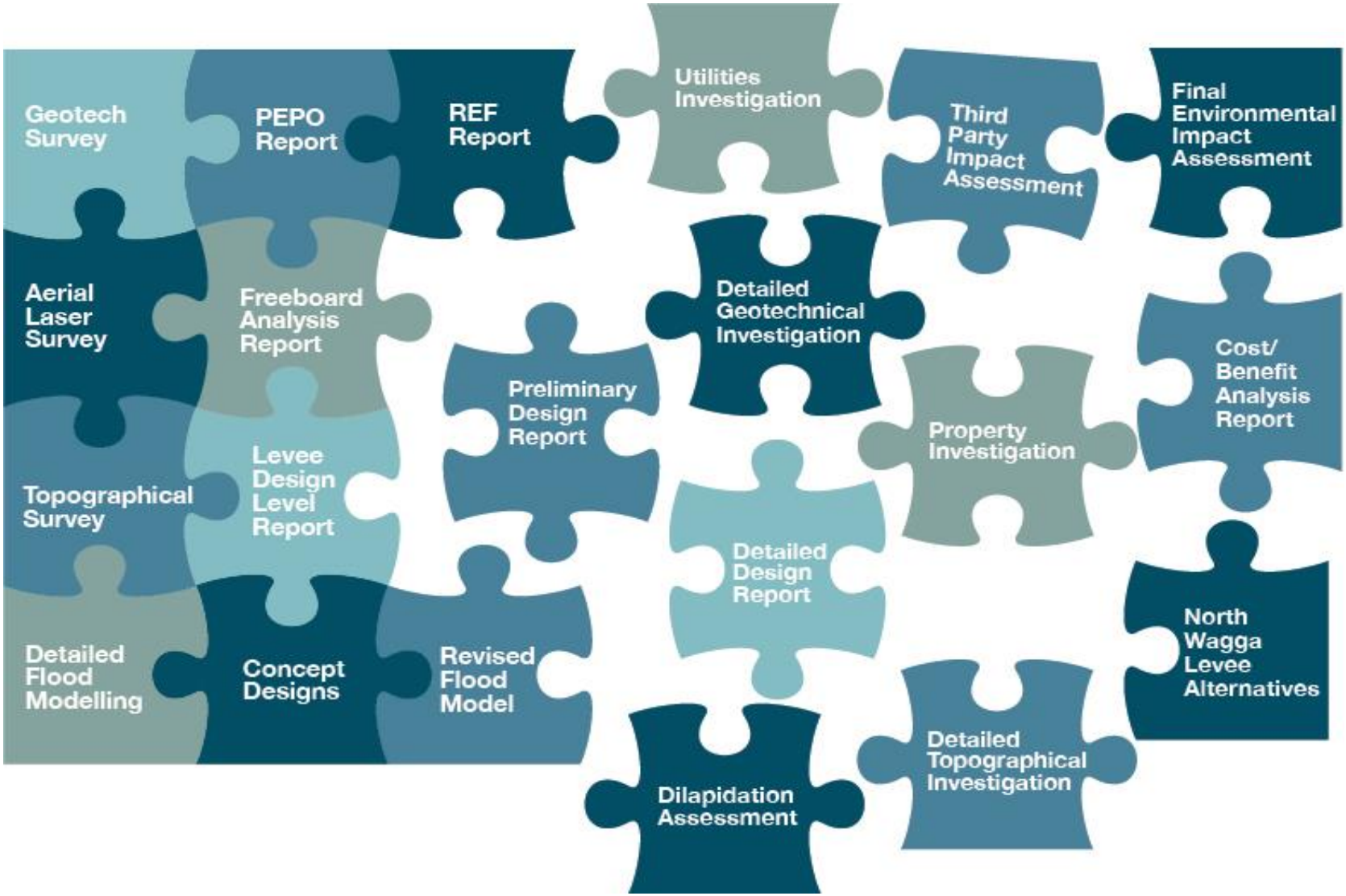
- 9 April 2015: application for Flood Plain Management grants due
- May 2015 Collating community feedback
- July 2015: Report to Council for decision on Main City and North Wagga Levees

BEYOND

- Action on decisions made about flood management

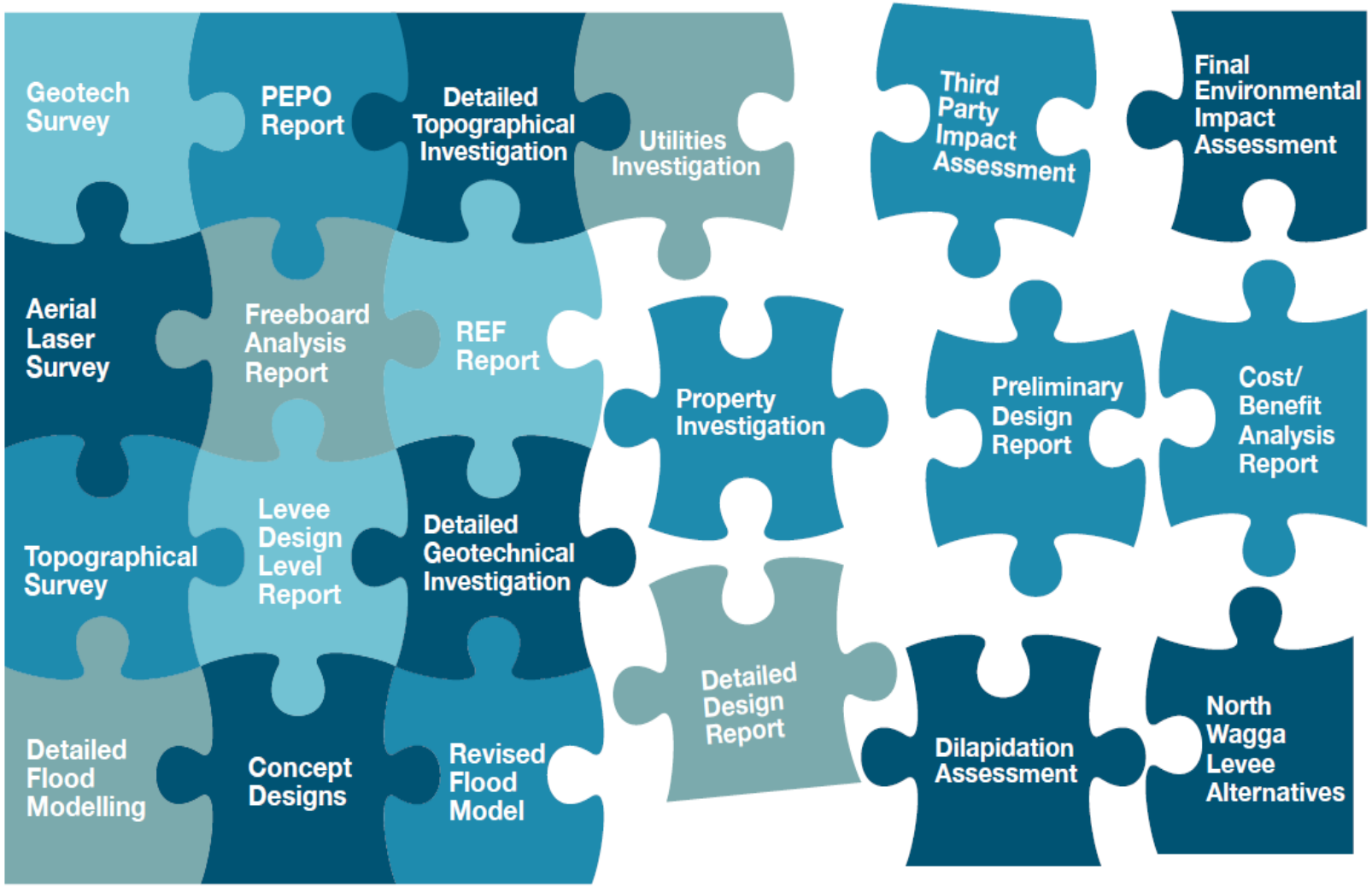
The pieces coming together

2014



The pieces coming together

2015



Detailed Design

Main City Levee

1 in 100 year level of protection

(1% AEP)

- How high – approximately 0.9m higher
- How wide – maximum approx. 1-2m inside
- Materials – Earth and some Sheet Piles

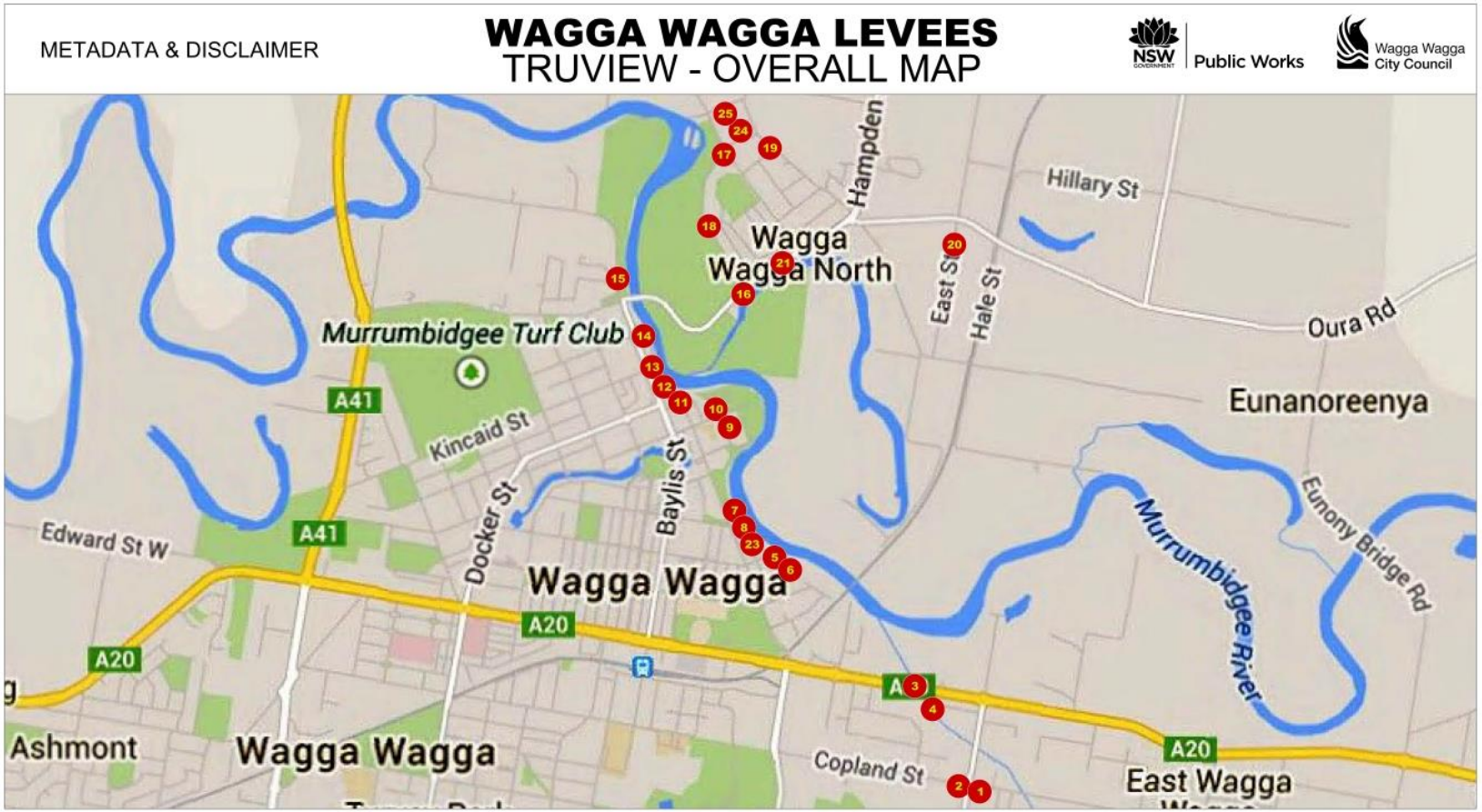
North Wagga Levees

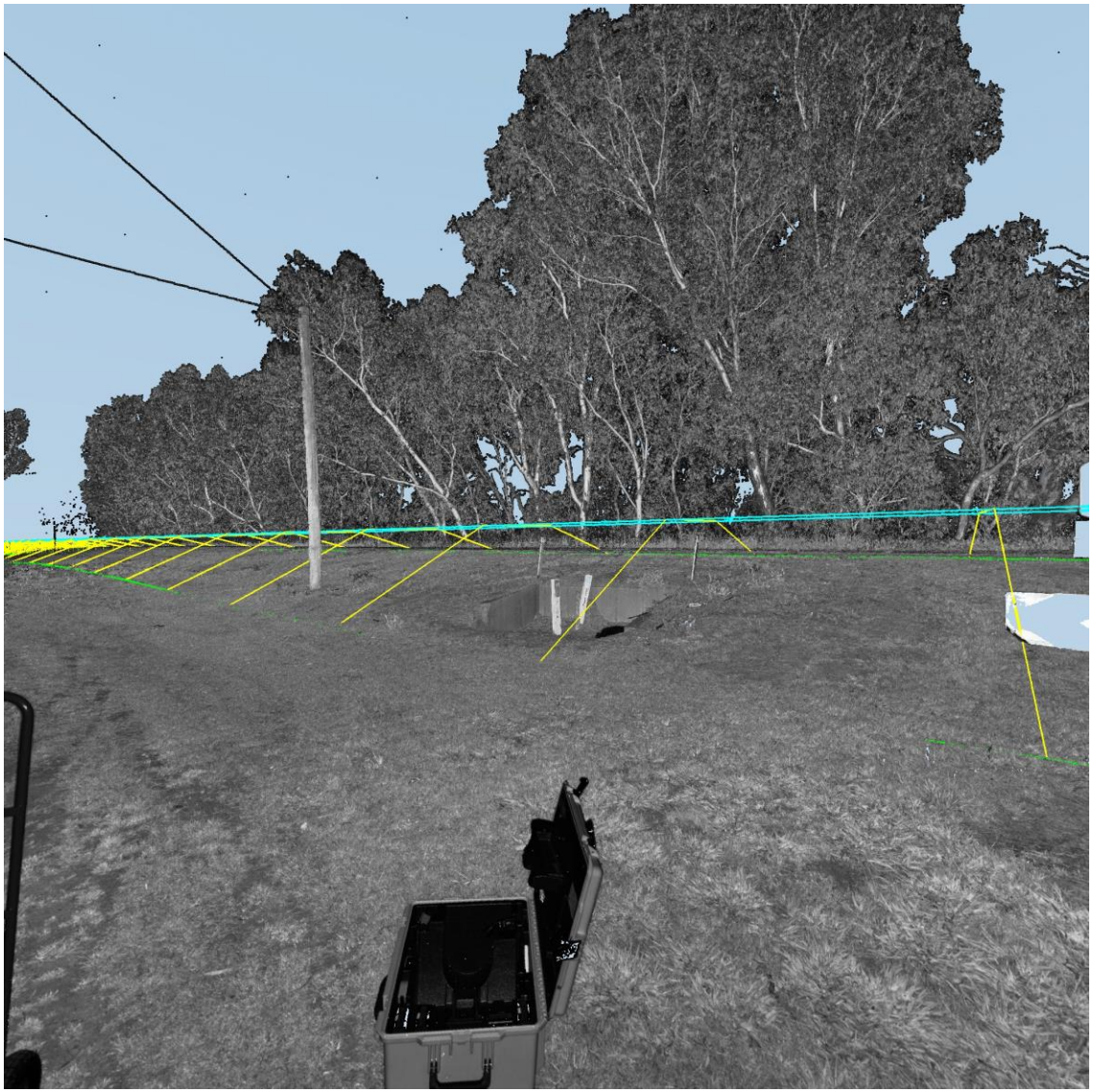
1 in 20 year level of protection

(5% AEP)

- How high – approximately 0.9m higher
- How wide – maximum approx. 1-2m inside
- Materials – Earth (and perhaps sheet pile)

Terrestrial Laser Scanning Survey





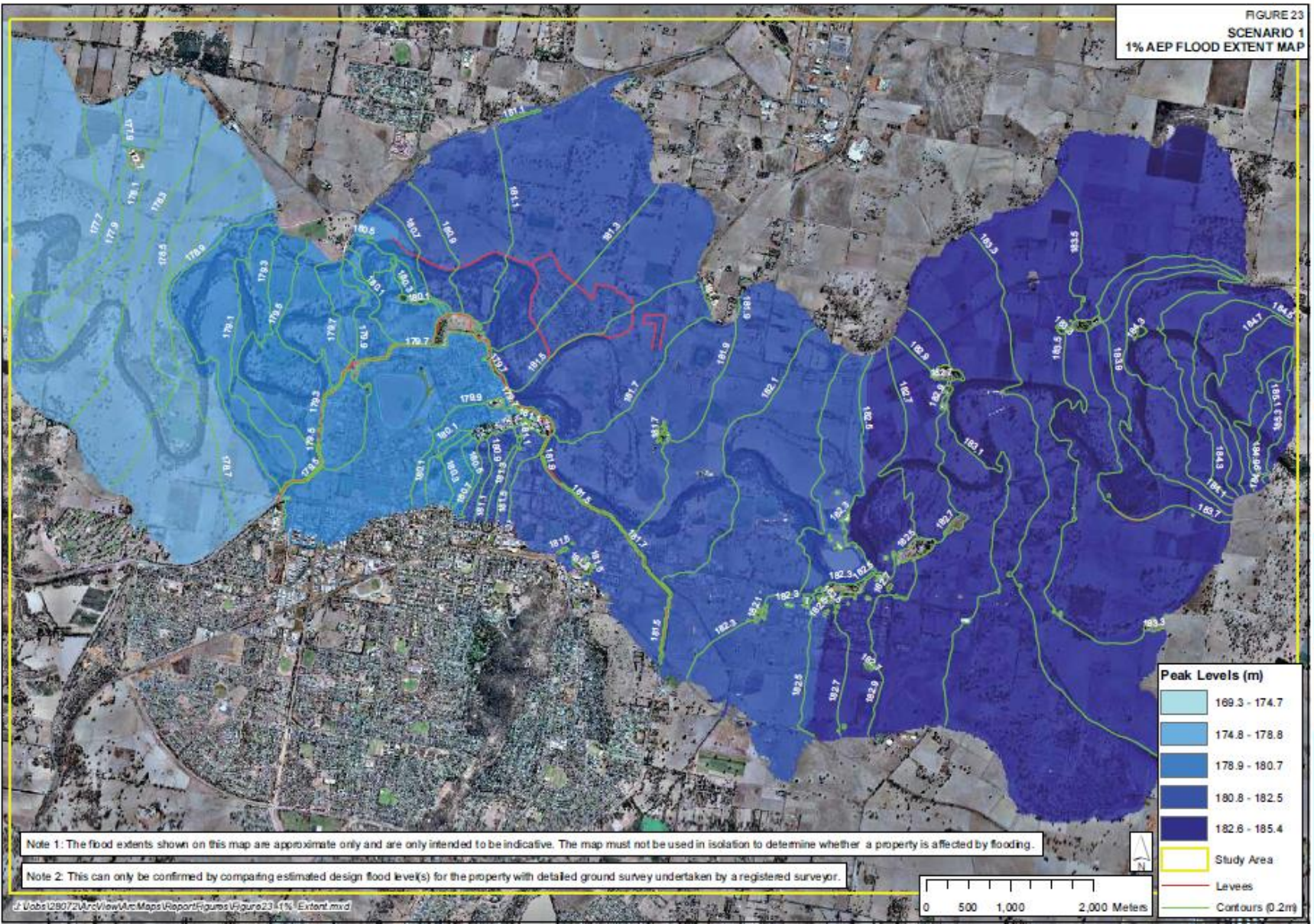
Terrestrial Laser Scanning Survey

Modelling

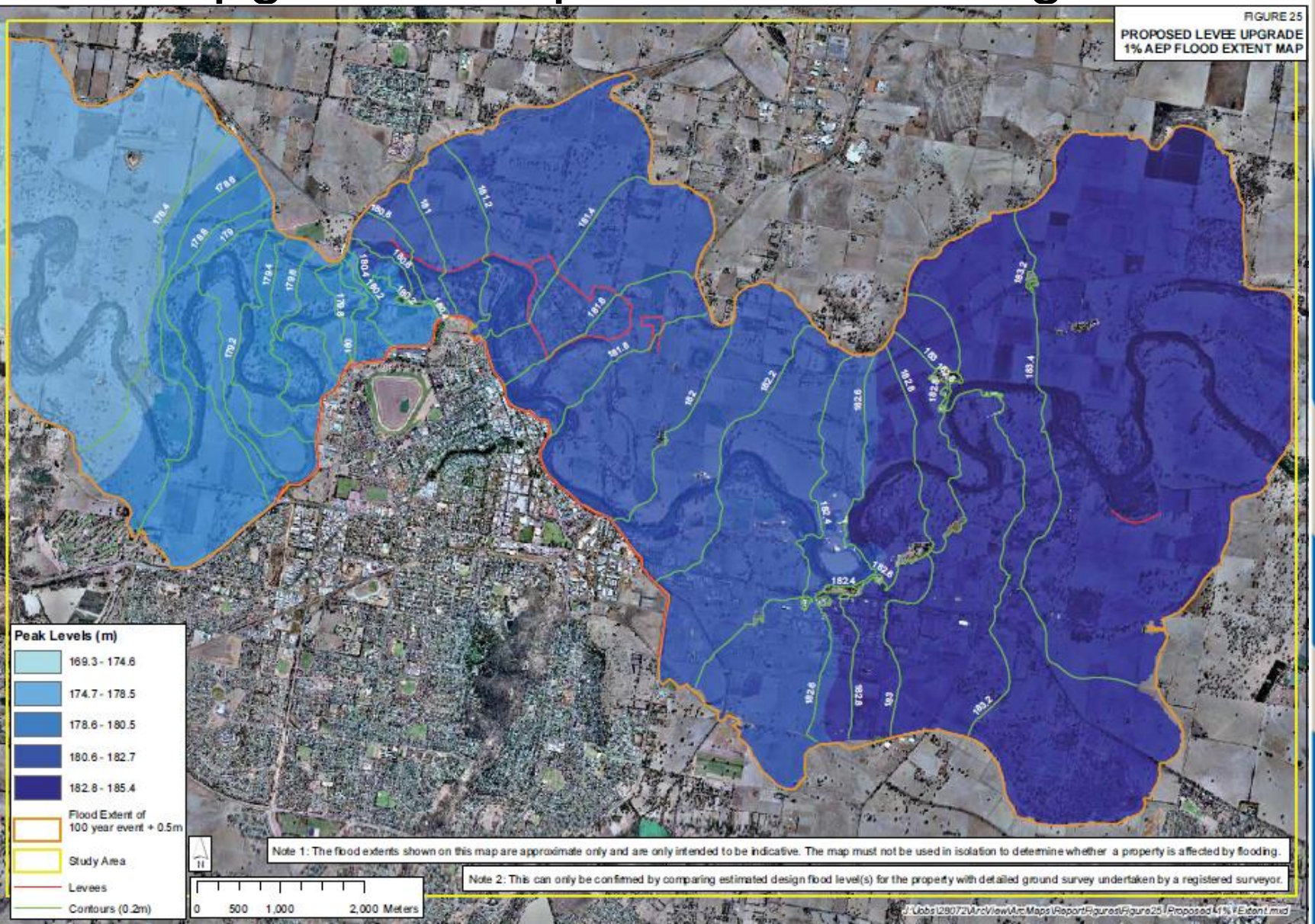
Modelling

- Main City Levee: 1 in 100 year level of protection
- North Wagga Levees: 1 in 20 year level of protection

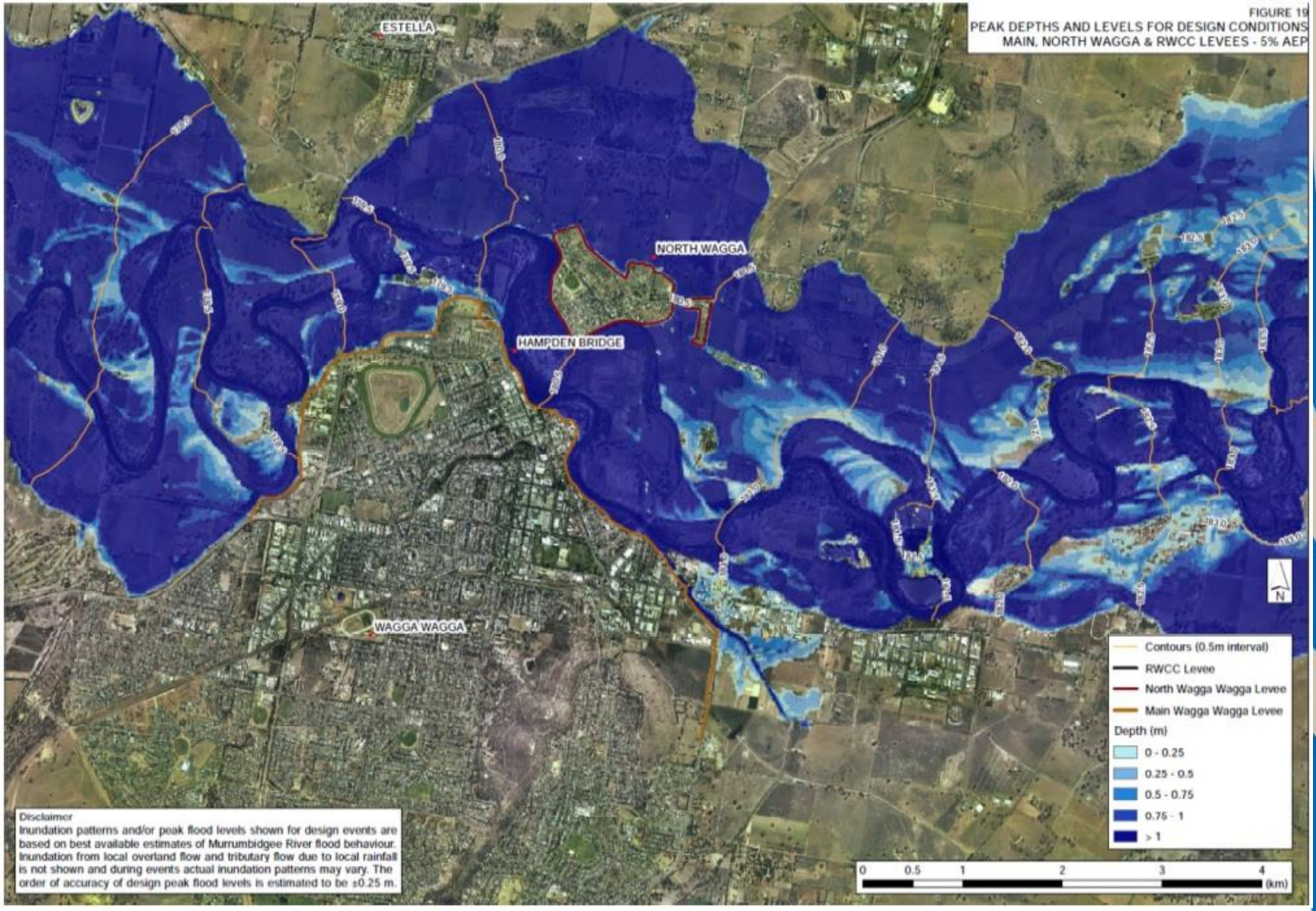
1 in 100 year flood event with levees as they are today



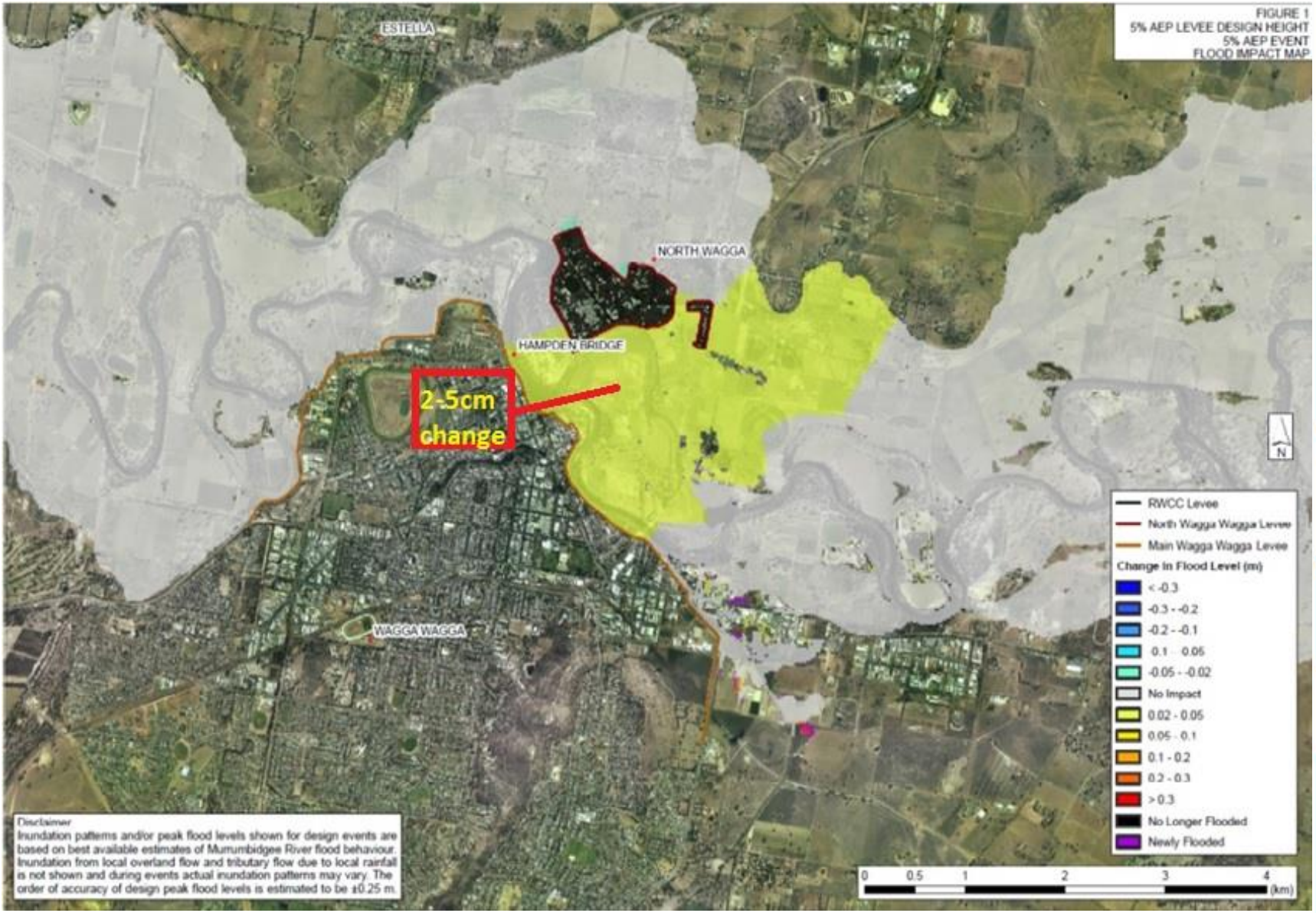
1 in 100 year flood event with levee upgrades as per detailed designs



1 in 20 year flood event with levee upgrades as per detailed designs



Change in a 1 in 20 year flood event



QUESTIONS?

- Detailed design
- Floodplain modelling

North Wagga Options

North Wagga Options

May 2013

Receive a further report on other options for providing flood protection for North Wagga residents and commercial operators in response to feedback from the community including:

- *maintain the levees at their current level of protection and take no further action*
- *raising the North Wagga levee to a 1 in 20 year level of protection*
- *raising the North Wagga levee higher than a 1 in 20 year level of protection*
- *removing the existing North Wagga levees*
- *relocation of the village from the floodplain*
- *raising residences in North Wagga*
- *raising houses in Mill and East Street that are protected by North Wagga levee two*
- *voluntary purchase for properties in North Wagga*

Assessing the options

North Wagga Wagga Levee

Options and Third Party Impacts

-NSW Public Works

Assessing the Options

- Cost of implementing the option
- Impact on floodplain
- Estimated average annual damages for some options
- Pros and cons

Costs

There are two types of costs:

- Capital (upfront) cost;
- Ongoing (recurring) costs.

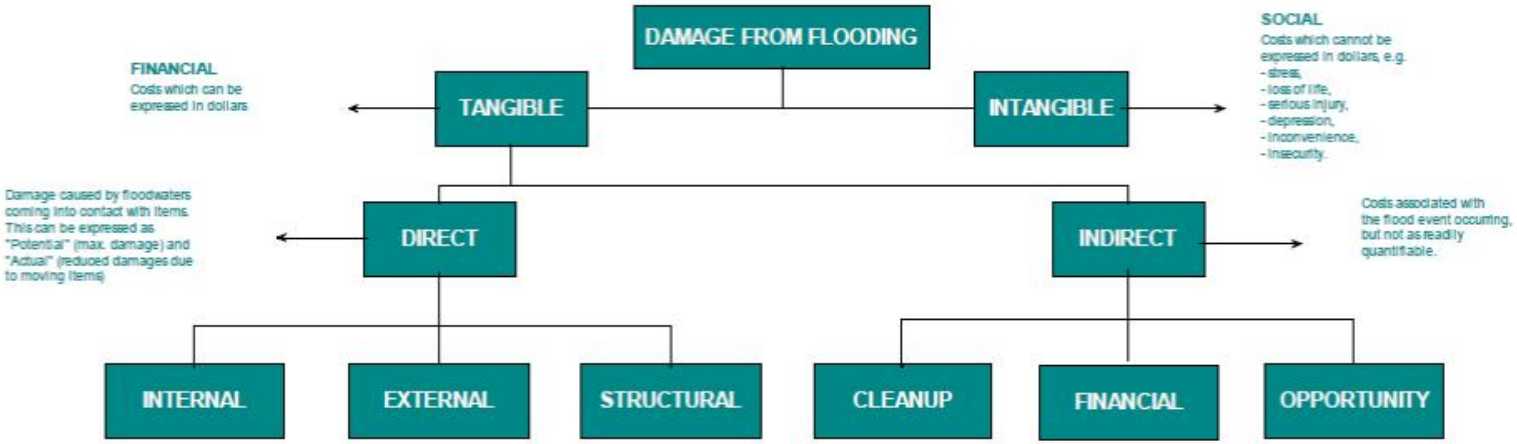
Average Annual Damages (AAD)

Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.

Average Annual Damages can be thought of as a Self-Insurance Policy. That is, it is the amount of money that would have to be set aside each and every year to be drawn upon as needed to pay for flood damages when they occur in the future.

Average Annual Damages

Flood Damages Categories



RESIDENTIAL	Contents of Buildings: Clothes, Carpets, Furniture Valuables, Fittings, Appliances	External Items: Vehicles, Laundries, Caravans, Sheds, Tools, Gardens, Fences	Physical Damage to Buildings: Gyprock, Cupboards, Scour of Footings, Houses becoming buoyant (floating off footings)	Clean Carpets, Walls, Clothes; Reinstate Furniture Remove Mud and Debris	Loss of wages, Living costs (temporary accommodation and food), Time to repair/replace damaged Items	Not Applicable
RURAL	Contents of Buildings: Clothes, Carpets, Furniture Valuables, Fittings, Appliances	External Items: Vehicles, Sheds (stables/barns), Machinery, Tools, Fences, Feed Storage, Saddles, Crops and/or Stock, Irrigation Systems	Physical Damage to Structures: Damage to Homestead, Sheds, Access Tracks, Protection Levees	Clean Homestead and Out-buildings; Remove Debris; Dispose of affected crops and/or stock	Loss of Farm Production and Income, Re-instatement of Pastures, Supplementary feeding of stock (by hand or outside agistment), Stock movement/transport, Living costs (temporary accommodation and food)	Sowing or harvesting of Crops, Sale of Stock (at depreciated value or dependent on market influences)
COMMERCIAL	Contents of Buildings: Products, Stock, Fittings Tools, Machinery, Raw Materials	External Items: Vehicles, Machinery, Display, Raw Materials/Stockpiles, Fences	Physical Damage to Buildings	Dispose of damaged products, stock, materials; Cleaning and Re-instatement	Loss of Productivity and Income, Bank Interest Charges	Loss of existing and/or Potential Trade
PUBLIC AUTHORITIES	Contents of Public Buildings	Public Property and Facilities: Parks, Signs, Machinery, Equipment	Physical Damage to Infrastructure: Electricity, Water, Telephone, Gas, Road & Rail Transport Links	Remove Mud & Debris from Facilities, Public & Private Property Repairs (temporary and permanent)	Disruption of Services, Community Service Relief Grants	Provision of Public Service

Maintain the North Wagga levees at their current level of protection and take no further action

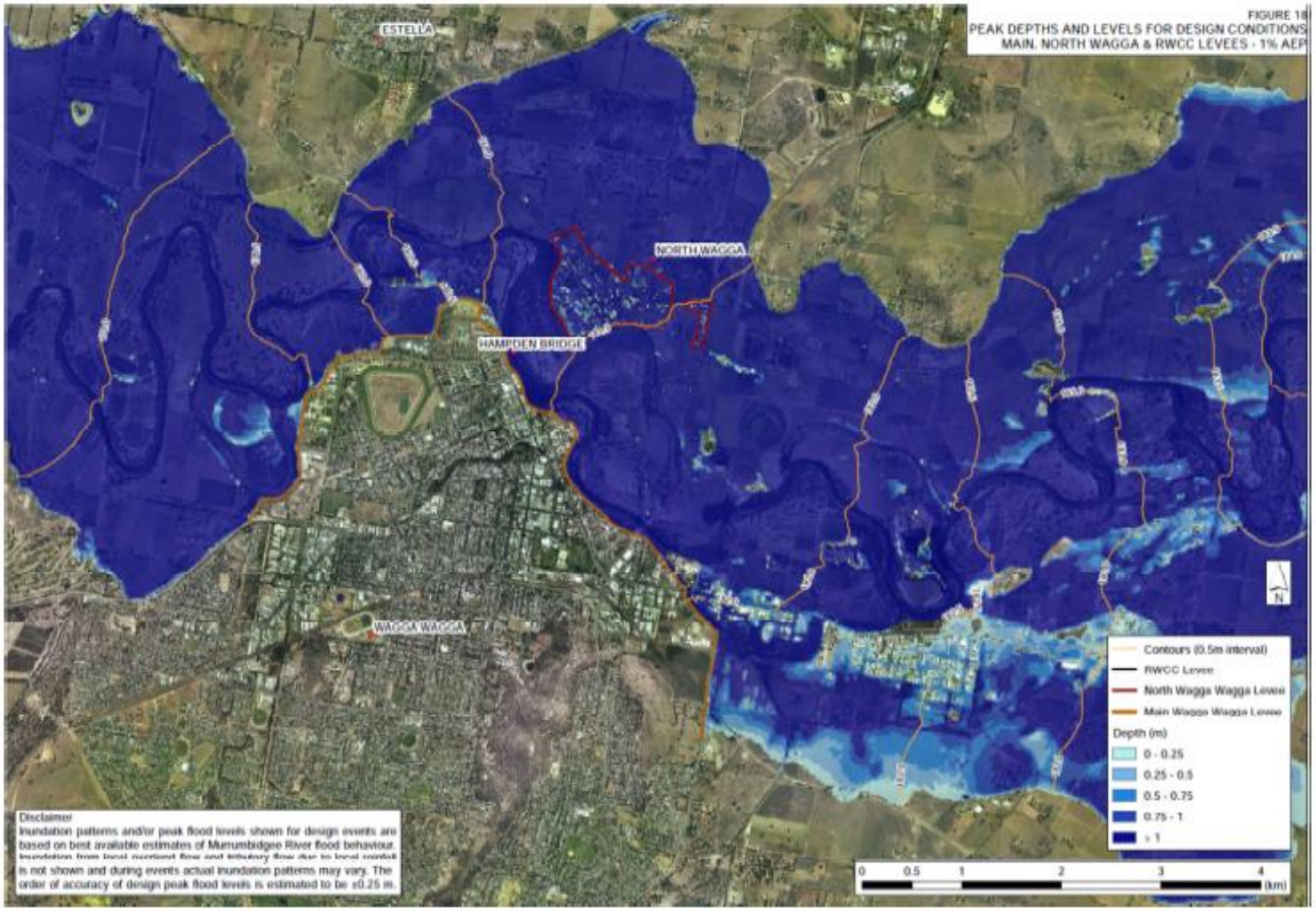
The levee system currently provides protection up to a 9.9m river height at North Wagga.

River heights are measured at the old Hampden Bridge gauge

- 1 in 20 equates to a height of 10.3m
- 1 in 100 equates to a height of 11.3m.

Capital cost estimate: $0

Maintain the North Wagga levees at their current level - 1 in 100 year flood event



Maintain the North Wagga levees at their current level of protection and take no further action

Average annual damages: $1.204M

Pros	Cons
Lowest capital cost	Increased damages compared to other options
.	

Questions?

Relating to the option of maintaining the North Wagga levees at their current level of protection and take no further action

Raising the North Wagga levees to a 1 in 20 year level of protection

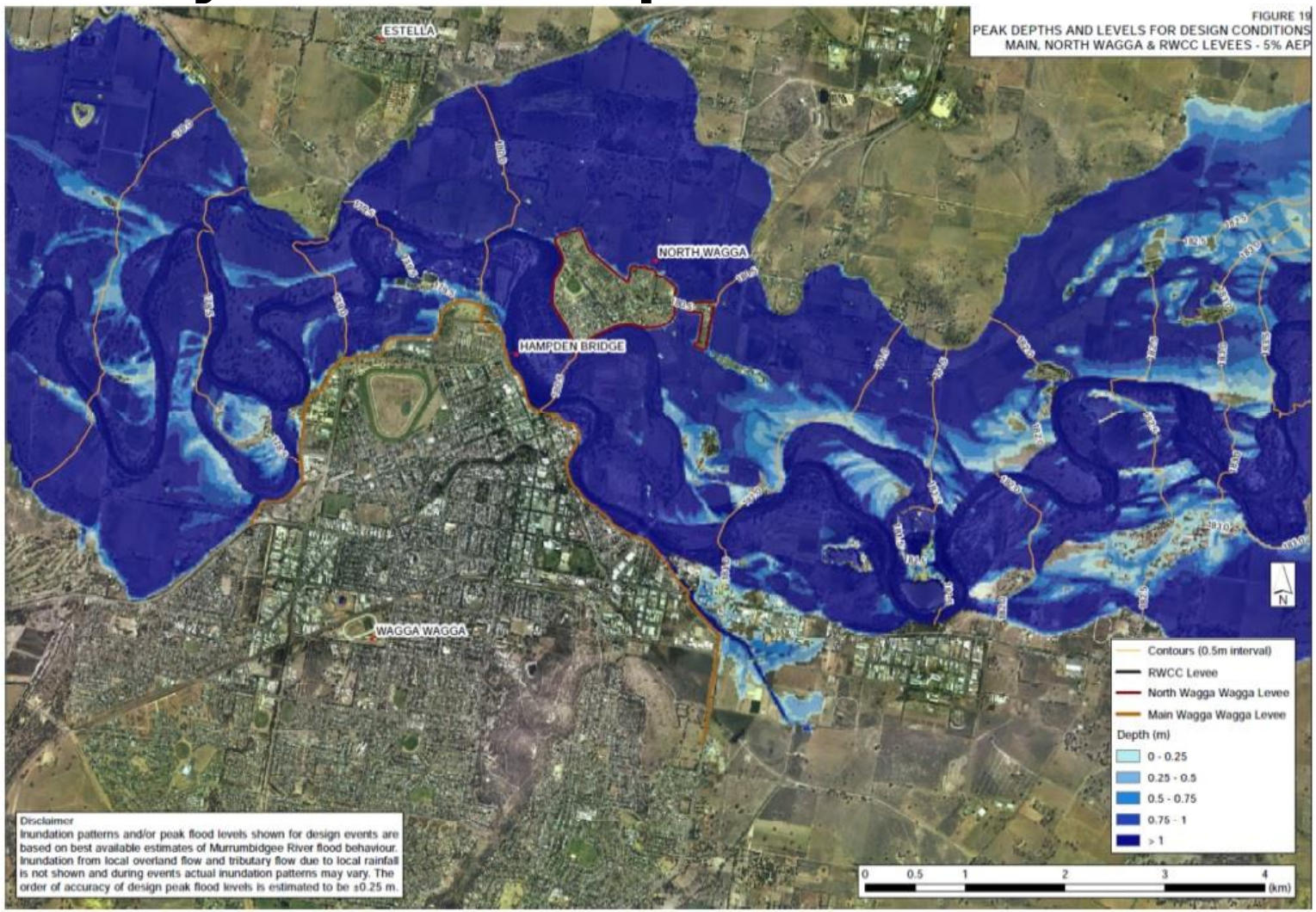
This option is the basis of the detailed design currently being undertaken for the North Wagga Levee system upgrade.

Capital cost estimate: $4.8M

a) North Wagga Wagga levee: approximately $3.35M

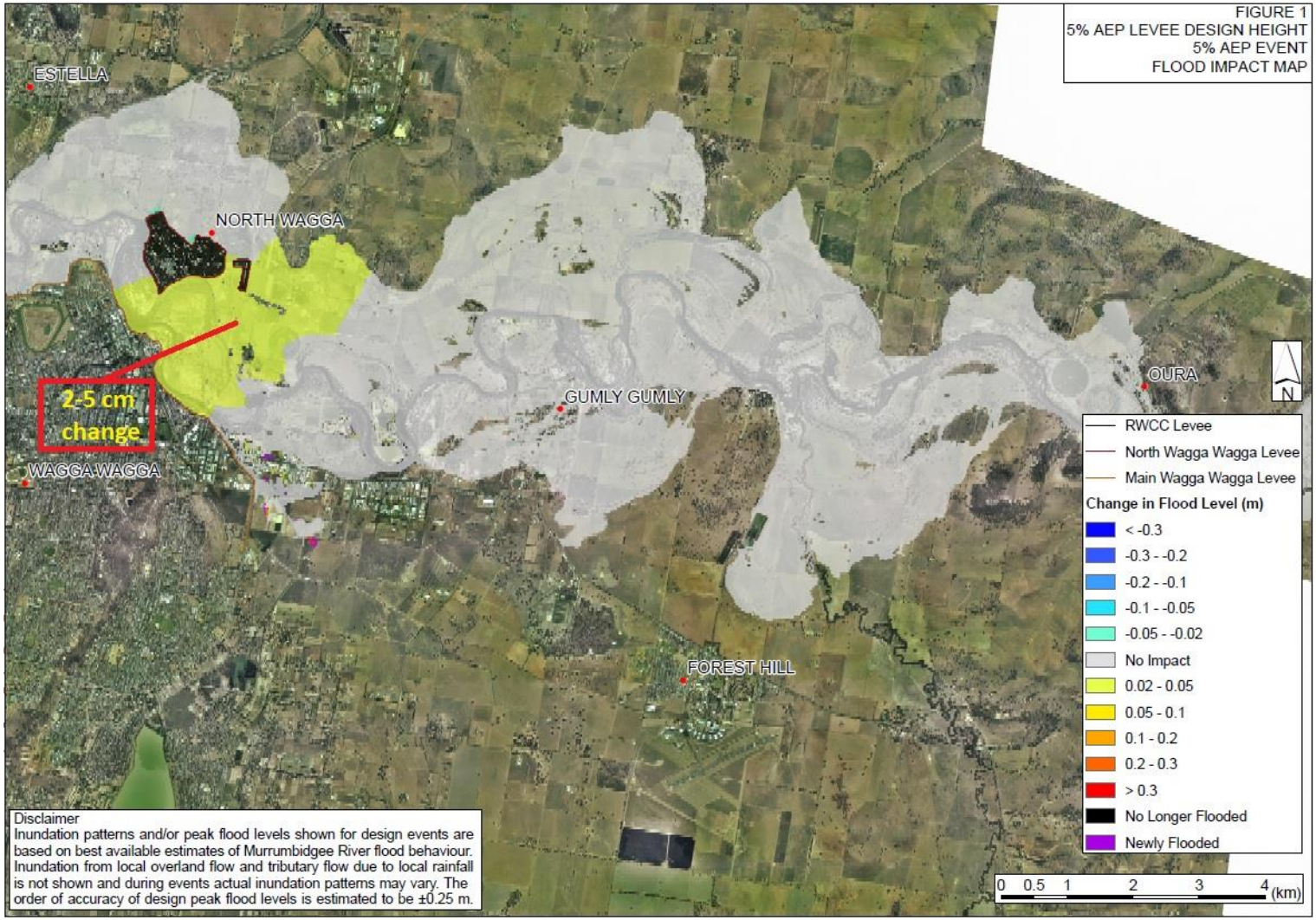
b) Levee Two: approximately $1.45M

Raising the North Wagga levee to a 1 in 20 year level of protection



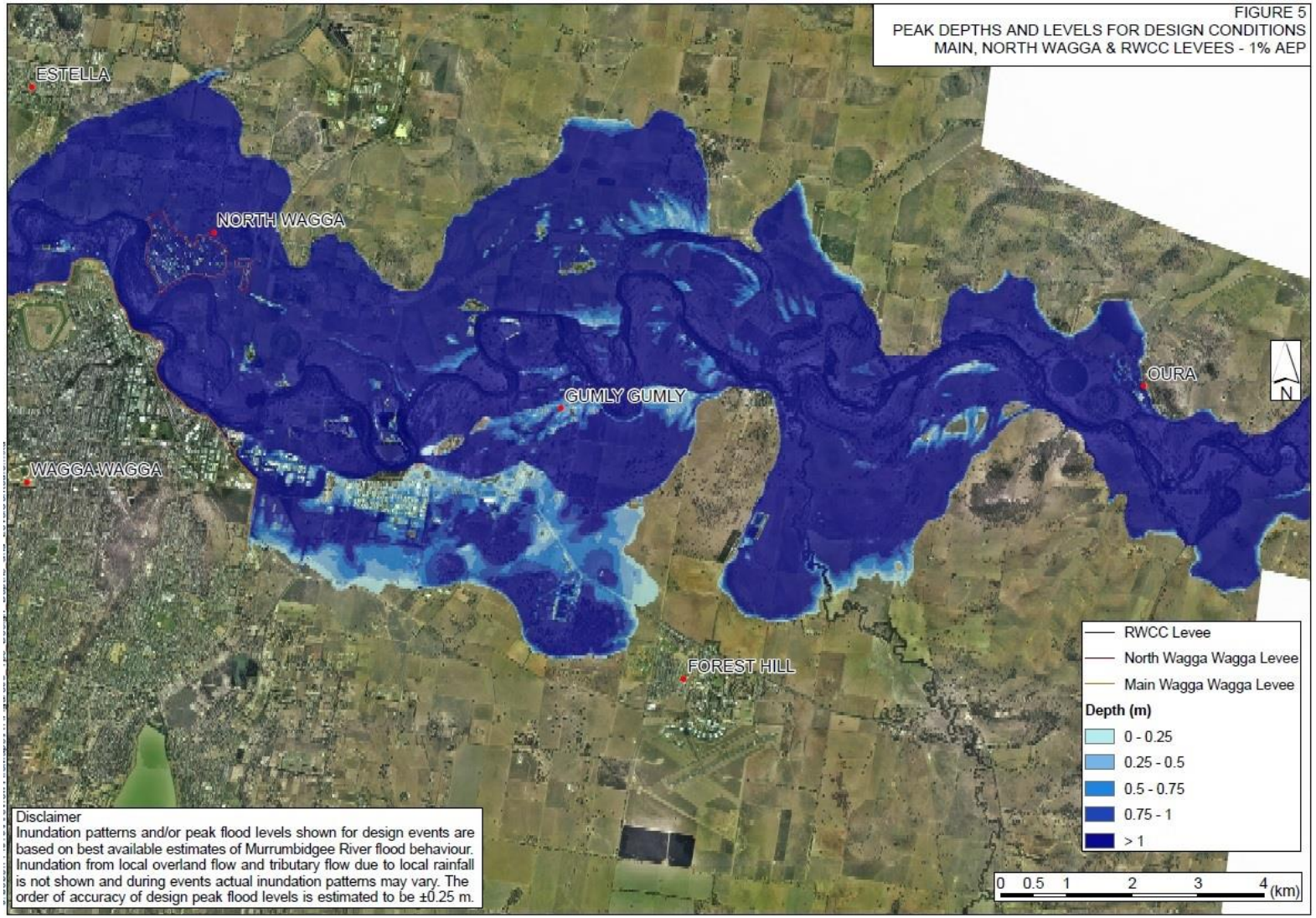
1 in 20 year flood event

Raising the North Wagga levee to a 1 in 20 year level of protection



1 in 20 year flood event

Raising the North Wagga levee to a 1 in 20 year level of protection



1 in 100 year flood event

Raising the North Wagga levee to a 1 in 20 year level of protection

Annual Average Damages: $689K

Pros	Cons
Provides additional level of protection over current level.	Does not provide protection against flooding above a 1 in 20 year flood event
Provides the same level of protection that was designed for previously.	

Questions?

Relating to the option of raising the North Wagga levee to a 1 in 20 year level of protection

Raising the North Wagga levees to higher than a 1 in 20 year level of protection

The scenario used to inform this option is an upgrade of the levee system to a 1 in 100 year level of protection.

This will also a require an increase in height of the Main City Levee.

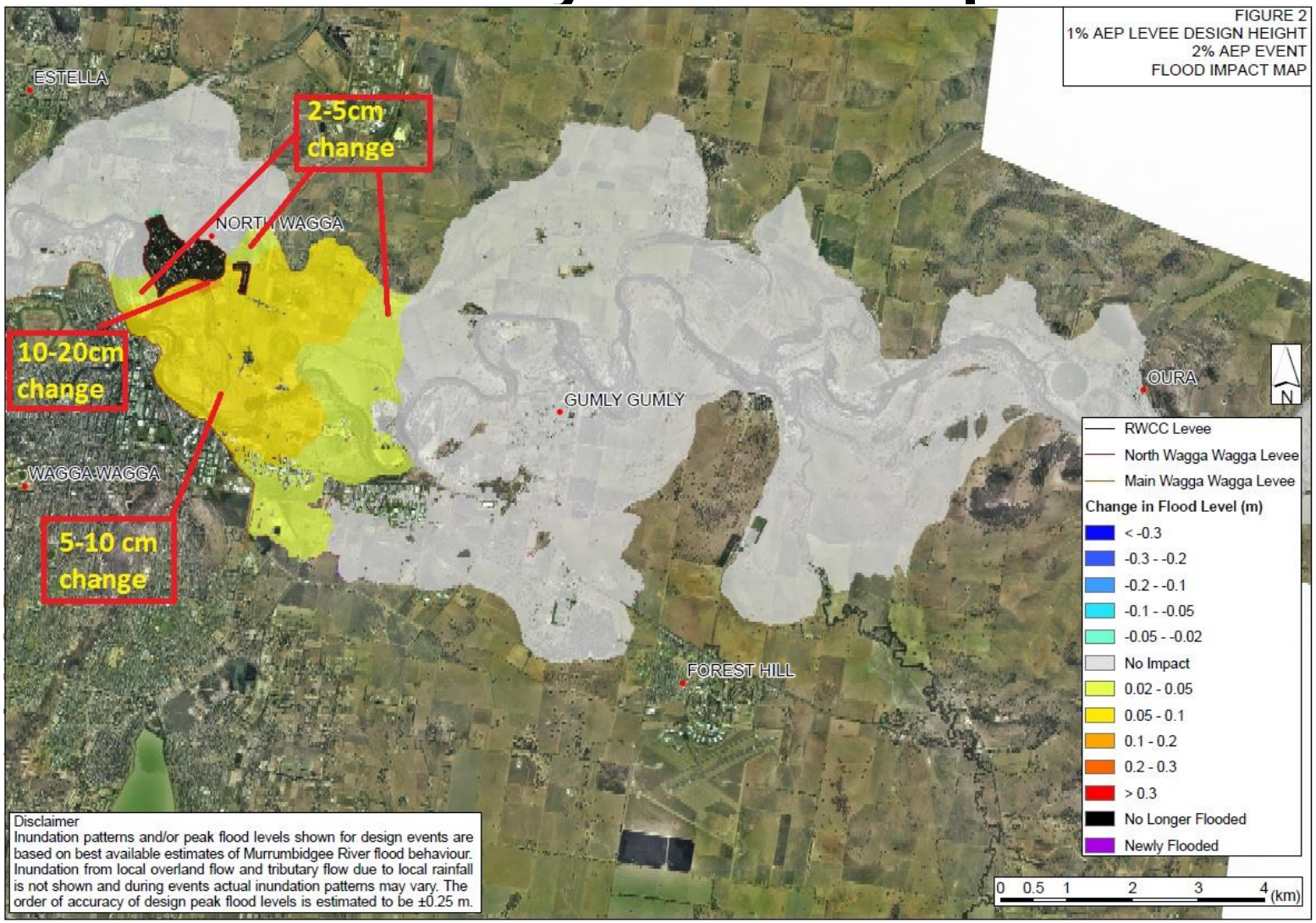
Capital cost estimate: $6.81M

a) North Wagga Wagga levee: approximately $4.13M

b) Levee Two: approximately $1.62M

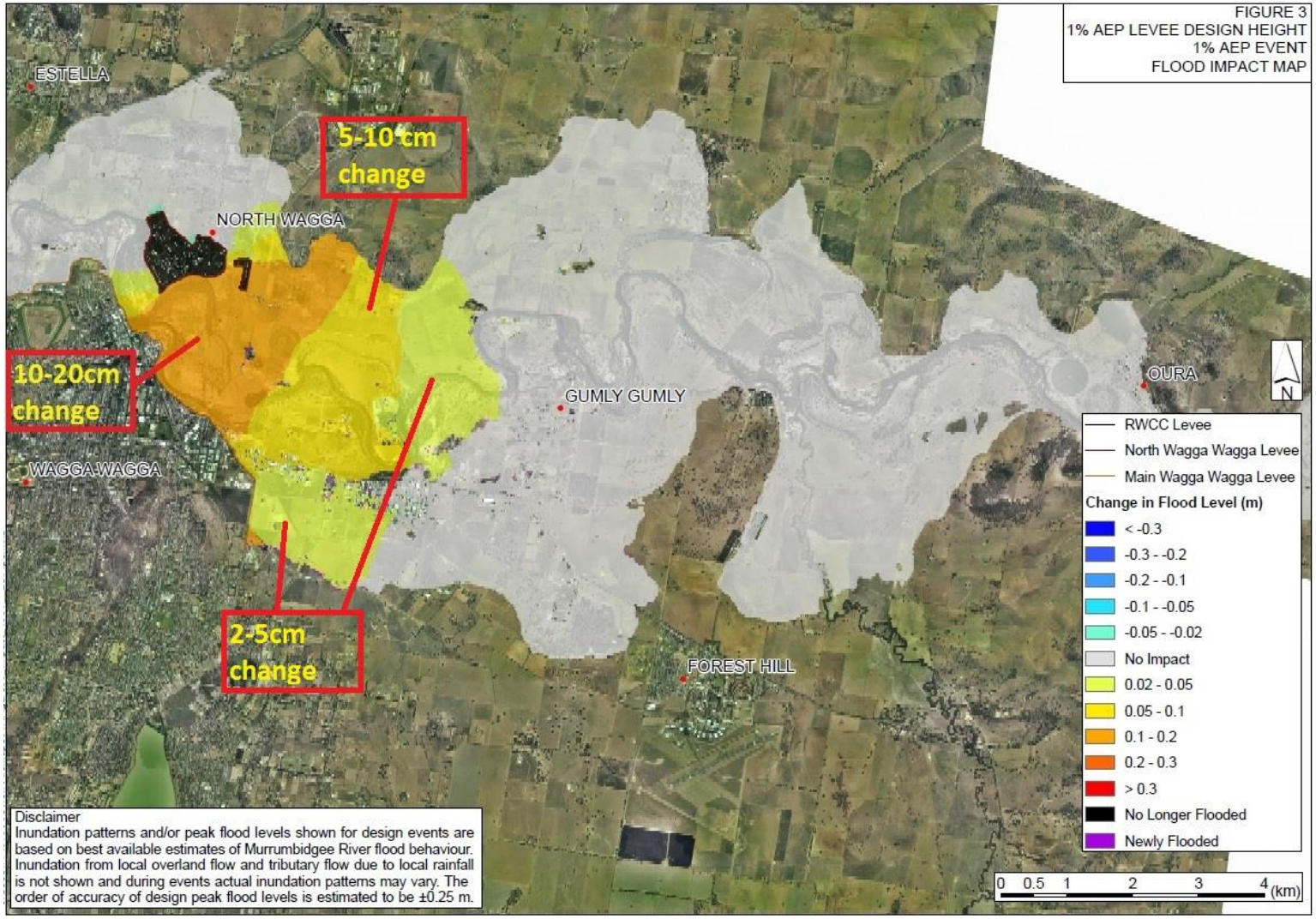
c) Main City Levee: approximately $1.06M

Raising the North Wagga levees to higher than a 1 in 20 year level of protection



1 in 50 year flood event

Raising the North Wagga levees to higher than a 1 in 20 year level of protection



1 in 100 year flood event

Raising the North Wagga levees to higher than a 1 in 20 year level of protection

- Annual Average Damages: $149K*

Pros	Cons
Provides similar level of protection as the Main Levee.	Loss of amenity with the levee being 0.9m – 1.0m higher than the 1 in 20 design height.
Has one of the lowest Average Annual Damages.	Increased pressure to allow the construction of new houses on vacant blocks. Issues associated with evacuating North Wagga in the event of a flood that is larger than a 1 in 100 year flood event. Results in an increased height and cost of upgrading the Main City Levee.

*A 1 in 100 level of protection has been used to inform this scenario

Questions?

Relating to the option of raising the North Wagga levee to a higher than 1 in 20 year level of protection

Remove the North Wagga levees

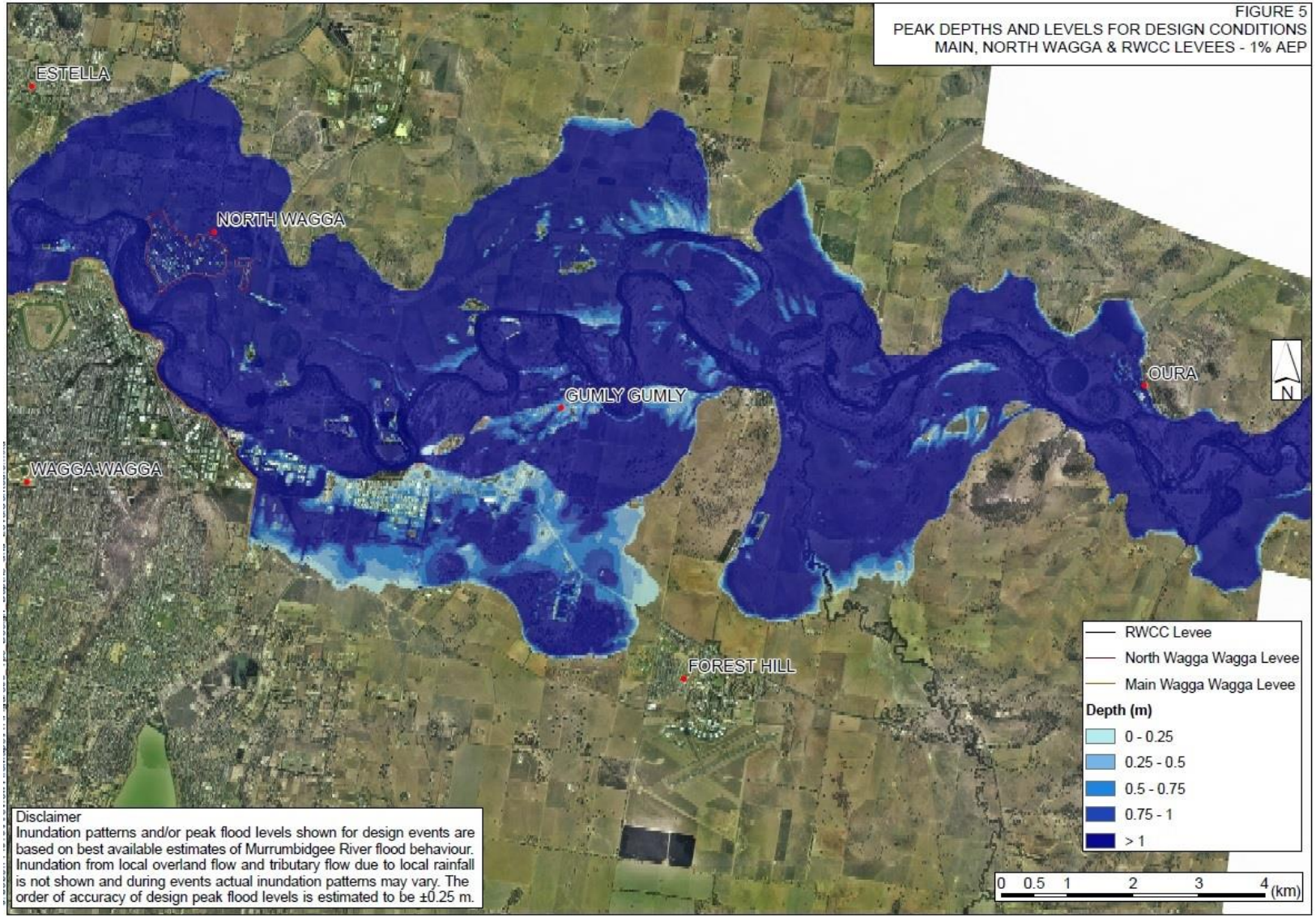
Involves the removal of the North Wagga levee system.

Other controls would have to be considered if this option were to be pursued (eg house raising, relocation, voluntary acquisition).

Cost estimate: $395K

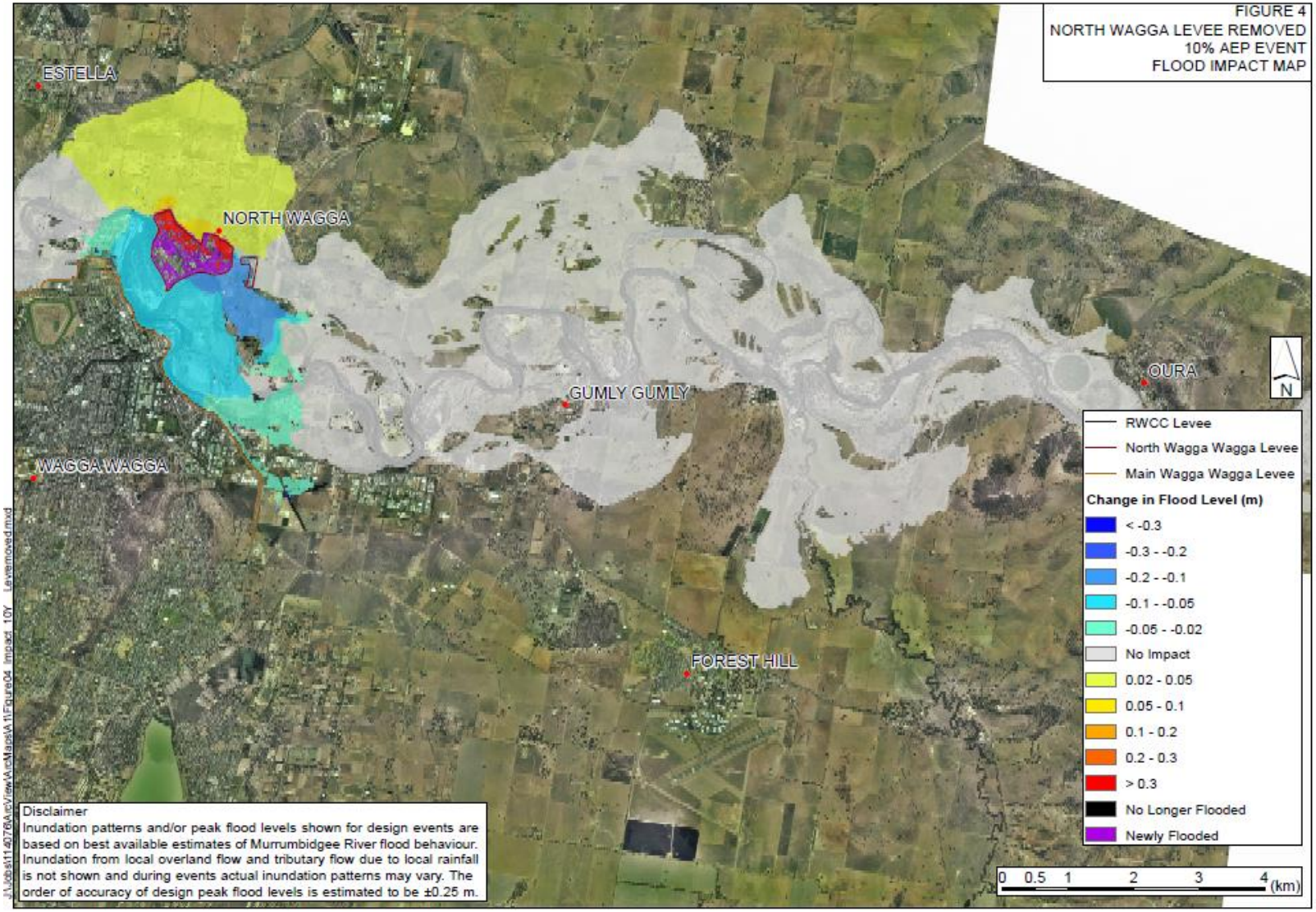
Remove the North Wagga levees

1 in 100 year flood event



Remove the North Wagga levees

Change in depth for 1 in 10 year flood event



1 in 10 year flood event

Remove the North Wagga levees

- **Annual Average Damages:** $1.5M

Pros	Cons
Has one of the lowest capital cost	Provides no flood protection Has the highest Average Annual Damages

Questions?

Relating to the option of removing the North Wagga levees

Relocation of the village from the flood plain

This option is based on the complete relocation of North Wagga village to a flood free location.

The costs for this option are based on the construction of a new suburb of equal size and does not include the cost of land, relocation of existing buildings, construction of new buildings and demolition of existing buildings in North Wagga.

Capital cost estimate: $93.5M

Relocation of the village from the flood plain

Annual Average Damages: $0

Pros	Cons
Has the lowest annual average damages	Has the highest capital cost Would be a major disruption

Questions?

Relating to the option of relocating North Wagga from the flood plain

Raising houses in North Wagga

This option involves raising all buildings that may be raised to above the 1 in 100 year flood level.

In the analysis an allowance has been made for demolition and reconstruction to above the 1 in 100 year flood level for buildings that cannot be raised.

Capital cost estimate: $16.85M

Raising houses in North Wagga

Pros	Cons
Dwellings are out of flood waters	Some dwellings cannot be raised Those dwellings that cannot be raised would require the construction of new raised dwellings Damage to other property and facilities would still occur More difficult for elderly or disabled people to access dwellings Cost greater than the cost of levee raising

Raising houses in East and Mill Street only

Similar analysis method and pros and cons to the previous option, but on a smaller scale.

Capital cost estimate: $1.65M

Questions?

Relating to the option of raising houses in North Wagga

Voluntary purchase for properties in North Wagga

There are a number of ways this option could be implemented, and time limits could be imposed for this scheme.

Implementation cost estimate: $37.2M

The average annual damages cannot be calculated as it is unknown how many dwellings will be purchased, how many homes owners will take up the offer for this to be done etc.

Pros	Cons
	Very expensive Damages can occur while waiting for properties to be voluntarily sold.

Questions?

Relating to the option of voluntary purchase of property

Summary of North Wagga Options

Option	Capital Cost	Average Annual Damages
Maintain North Wagga Levees and take no further action	$0	$1.2M
Raise to a 1 in 20 yr level of protection	**$4.8M**	**$689K**
Raise to a 1 in 100 yr level of protection	$6.81M	$149K
Remove the existing North Wagga levees	**$395K**	**$1.5M**
Relocation of the village from the floodplain	$93.5M	$0
Raising residences in North Wagga	**$16.85 M**	**N/A**
Raising residences in East and Mill Streets	$1.65M	N/A
Voluntary purchase	**$37.2M**	**N/A**

Discussion

Have your say

- Feedback form
- Online survey
- Let us come to you
  - Details in your information pack

wagga.nsw.gov.au/floodfutures

Close