



# Flood Futures

## Options for North Wagga

As a direct result of community feedback received during the exhibition of the levee upgrade concept designs, a number of alternatives for protecting North Wagga during a flood event have been investigated.

The following options have been explored as part of this process.

- Maintain the North Wagga levees at the current level of protection
- Raise the North Wagga levees to a 1 in 20 year level of protection
- Raise the North Wagga levees above a 1 in 20 year level of protection
- Remove the existing North Wagga levees
- Relocation of the North Wagga village from the floodplain
- Raising residences in North Wagga
- Raising houses in Mill Street & East Street that are protected by the smaller of the North Wagga levees
- Voluntary purchase of properties in North Wagga

In assessing these options, both the capital cost associated with the option and the cost of damage to property due to flooding have been considered.

Council is seeking feedback from the community about which options they believe should be prioritised.

### Average Annual Damages (AAD)

Depending on its size (or severity), each flood will cause a different amount of damage to a flood prone area. AAD is the average damage per year that would occur due to flooding over a very long period of time. AAD may be thought of as a self

insurance policy. It is the amount of money that would have to be set aside each and every year to draw upon as required to pay for flood damages as they occur into the future.

In this analysis the flood damage to properties (both residential and non-residential) inside the North Wagga levees for flooding up to the probable maximum flood (PMF) has been considered.

The analysis considers both direct (loss of property, structural damage etc) and indirect (temporary accommodation etc) costs. The figures do not include the cost of damage to public land and infrastructure.

### Maintain the North Wagga levees at the current level of protection

This option is to maintain the status quo and take no further action. There will be no change to flood behaviour or impact inside or outside of the North Wagga levee system as a result of this option.

The current levee system provides protection to the North Wagga village up to a river height of 9.9m

**Estimated capital cost:** \$0  
**Average Annual Damages:** \$1,204,000

Pros	Cons
Lowest capital cost	Increased damages compared to other options



# Flood Futures

## Raise 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. It involves increasing the height of the levee to provide protection up to the 1 in 20 year flood level.

Raising the levees to this height will have minimal impact on the levels of flood water outside of the levees. For a 1 in 20 year flood event properties in the vicinity of Bomen Lagoon and the North Wagga Floodplain will experience an increase in flood height in the order of 2-5cm. There are small sections of East Wagga that will also experience a small increase in water level, but for the most of the floodplain there will be no change in flood level compared to existing conditions.

**Estimated capital cost:** \$4,800,000  
**Average Annual Damages:** \$689,000

The cost estimate may be broken down as follows:

- a) North Wagga levee approximately \$3,350,000
- b) Levee Two (East Street and Mill Street) approximately \$1,450,000

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	

## Raise the North Wagga levees above a 1 in 20 year level of protection

The scenario that has been used to inform this option is to upgrade the North Wagga levee system to a 1 in 100 year level of protection. This will also require an increase in height of the Main City levee system.

Raising the levees to this height will have minimal impact on the levels of flood water on the floodplain upstream of the levees. For a 1 in 100 year flood event the maximum increase in flood level is 20cm with increases in depth from 10cm-20cm occurring 0km-2km upstream of the levee. From 2km-3km upstream the change in depth is 5cm-10cm. Where there is development in East Wagga (3km-5km upstream) the change is 2cm-5cm. Very little additional land is inundated.

**Estimated capital cost:** \$6,810,000  
**Average Annual Damages:** \$149,000

The cost estimate may be broken down as follows:

- a) North Wagga levee approximately \$4,130,000
- b) Levee Two (East Street and Mill Street) approximately \$1,620,000
- c) Increase in height of Main City levee approximately \$1,060,000

Pros	Cons
Provides similar level of protection as the Main Levee (1%AEP)	Loss of amenity with the levee being 0.9m-1m higher than a 1 in 20 design height.

# Flood Futures

Has one of the least Annual Average 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.

## Remove the existing North Wagga levees

This option 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 etc). The impact on the floodplain and flood behaviour is quite similar to existing conditions.

**Estimated capital cost:** \$395,000  
**Average Annual Damages:** \$1,515,000

Pros	Cons
Has the cheapest capital cost	Provides no flood protection
	Will result in property damage

## Relocation of the North Wagga village from the floodplain

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 do not include the cost of land, relocation of existing buildings, construction of new buildings and demolition of existing buildings in North Wagga.

**Estimated capital cost:** \$93,500,000

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

## Raising residences 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.

These estimates include houses within both the main North Wagga levee and houses in East and Mill Street.

**Estimated capital cost:** 16,850,000

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



# Flood Futures

	More difficult for elderly or disabled people to access dwellings
	Cost greater than cost of levee raising

An alternative measure may be to cease occupation of properties in that area, with voluntary purchases of properties to remove residents from the risk of flooding and the cost of clean-up post flood. There are a number of ways this option could be implemented, and time limits could be imposed for this scheme.

## Raising houses in Mill Street and East Street that are protected by the smaller of the North Wagga levees

This is similar to the previous option but only applies to residences in Mill Street and East Street.

**Estimated capital cost:** \$1,650,000

## Voluntary purchase of properties in North Wagga

Flood mitigation in high hazard areas of a floodplain may be impractical or uneconomic for existing properties.

**Estimated capital cost:** \$37,200,000

## More information

**Online:** [wagga.nsw.gov.au/floodfutures](http://wagga.nsw.gov.au/floodfutures)

**Email:** [floodfutures@wagga.nsw.gov.au](mailto:floodfutures@wagga.nsw.gov.au)

**Phone:** Lauren Fitzgerald, Community Engagement Officer 1300 292 442

## Summary of North Wagga Options

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

# Summary table: Average annual damages

## Maintain the North Wagga levees at the current level of protection

Flood event	Number of properties affected	Number flooded above floor level	Total damages for event
1 in 5 (20% AEP)	0	0	\$0
1 in 10 (10% AEP)	42	23	\$1,302,000
1 in 20 (5% AEP)	163	148	\$10,455,000
1 in 50 (2% AEP)	174	173	\$16,958,000
1 in 100 (1% AEP)	174	173	\$20,024,000
PMF	174	174	\$29,885,000

Average Annual Damages: \$1,204,000

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

Flood event	Number of properties affected	Number flooded above floor level	Total damages for event
1 in 5 (20% AEP)	0	0	\$0
1 in 10 (10% AEP)	0	0	\$0
1 in 20 (5% AEP)	0	0	\$0
1 in 50 (2% AEP)	174	173	\$16,958,000
1 in 100 (1% AEP)	174	173	\$20,024,000
PMF	174	174	\$29,885,000

Average Annual Damages: \$689,000

## Raising the North Wagga Levee to a 1 in 100 year level of protection

Flood event	Number of properties affected	Number flooded above floor level	Total damages for event
1 in 5 (20% AEP)	0	0	\$0
1 in 10 (10% AEP)	0	0	\$0
1 in 20 (5% AEP)	0	0	\$0
1 in 50 (2% AEP)	0	0	\$0
1 in 100 (1% AEP)	0	0	\$0
PMF	174	174	\$29,885,000

Average Annual Damages: 149,000

## Removing the existing North Wagga levees

Flood event	Number of properties affected	Number flooded above floor level	Total damages for event
1 in 5 (20% AEP)	19	3	\$167,000
1 in 10 (10% AEP)	143	87	\$4,996,000
1 in 20 (5% AEP)	163	148	\$10,455,000
1 in 50 (2% AEP)	174	173	\$16,958,000
1 in 100 (1% AEP)	174	173	\$20,024,000
PMF	174	174	\$29,885,000

Average Annual Damages: \$1,515,000

Source: "North Wagga Damage Assessment" by WMA Water

[www.wagga.nsw.gov.au/floodfutures](http://www.wagga.nsw.gov.au/floodfutures)  
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