Department of **Lands, Planning and Environment**

Alice Springs
Flood Mitigation Project

Flooding in Alice Springs

The Northern Territory Government is working to alleviate the impact of flooding in Alice Springs by implementing the recommendation outlined in the Alice Springs Regional Flood Mitigation Advisory Committee report to investigate structure mitigation measures.

Much of Alice Springs is located on the floodplains of the Todd and Charles rivers.

Residents and businesses experience riverine flooding when heavy rainfall causes the Todd River to flow and overtop its banks. Localised flooding also occurs as a result of overflow from stormwater drainage systems.

There has been three major flooding events in Alice Springs since 1983, including in 1984, 1988 and 2000.

WRM Water and Environment consultants were engaged to undertake flood modelling for Alice Springs and investigate the potential flood mitigation options to reduce the peak flow of a flood.

The flood modelling uses detailed topographical data, including from the upper catchment of the Todd River, identified major trunk drainage and underground piped drains, and the floor level surveys of flood prone properties, to assess which structural mitigation measures will reduce the impacts of flooding.

Above: The Todd River flows over the footbridge on Undoolya Road during the 1988 flood.

What does the flood modelling tell us?

The results of the flood modelling shows that there is no simple solution to mitigating flooding in Alice Springs and is further characterised by unique features that creates limitations on what can be done.

The flood modelling work undertaken to date has identified that Alice Springs:

- has a large 526 square kilometre catchment with high variability of rainfall
- 10 crossings or causeways over the Charles and Todd rivers that impact the flow of floodwater
- large urbanised, flat areas east and west of the Todd River, north of Heavitree Gap
- high environmental and cultural significance within the Todd River corridor
- flash flooding with limited warning time of three to four hours
- control point through Heavitree Gap that creates high velocities and depths immediately north.

In addition, trunk drains identified through flood modelling contribute to localised flood impacts in Alice Springs including overflows from:

- East Side Drain
- North Stuart Highway Drain
- Smith Street network of open drains
- Lovegrove Drain.

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What are the structural mitigation options to minimise flooding?

The flood modelling was used to inform the potential location and effectiveness of structural flood mitigation options such as detention basins, levees and improved capacity and conveyance of stormwater drainage.

More than 40 structural options were considered and 28 modelled to look at potential impacts for up to the 1 in 100 year flood on the Todd River and major tributaries. These broadly included:

- detention basins in the upper catchment (Bond Springs) to temporarily hold back floodwaters and detain the peak flows that reach Alice Springs in a large flood event
- removing or upgrading causeway crossings across the Todd River to improve flows
- levee options along the Todd River, including levees to protect critical infrastructure (public roads and/or Alice Springs Hospital) to prevent floodwaters breaking out from the Todd River
- local detention basins to temporarily hold back floodwaters and detain the peak flows that reach Heavitree Gap
- upgrading trunk drainage to improve capacity and flow of floodwaters through trunk drains to reduce localised flooding.

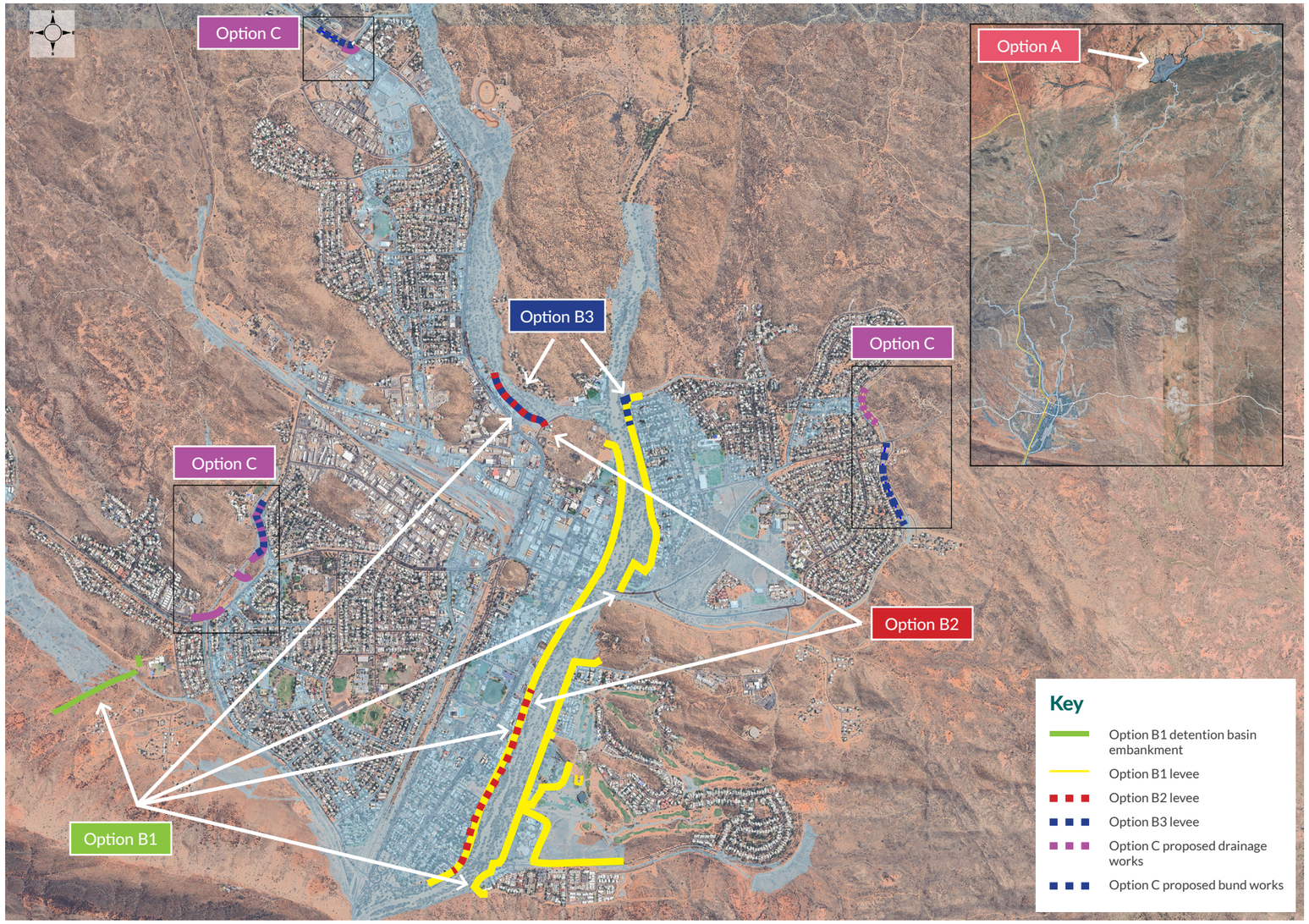
What can be built to minimise flooding impacts?

The flood modelling and cost benefit assessment has informed the options considered further in an options assessment, to determine a preferred measure to mitigate the impacts of flooding in Alice Springs for up to the 1 in 100 year flood event.

The options were investigated for:

- visual impact on the Todd River corridor
- cultural, environmental and social impacts
- cost benefit ratio of each option based on a reduction in the estimated annual flood damages
- whether they caused any adverse flood impacts to any properties
- ease of construction (constructability) and ongoing management costs
- additional flood immunity provided to key infrastructure such as public roads and/or hospital.

This map shows the location of each option and the results of the assessment:



Option A

Detention basin in the upper catchment (high level estimate of $8.1 million*)

PLUS: reduces impact on 1535 houses from a large rainfall event when it is in the upper catchment, no impact on river corridor

MINUS: no impact if rainfall in lower catchments, hard to construct, high ongoing management costs, low cost benefit ratio (0.75**).

Option B1

Levees along eastern and western banks of Todd River and southern bank Charles River (high level estimate of $164.8 million*)

PLUS: reduces impacts on 1824 properties, including hospital

MINUS: $164.8 million to construct, high visual/environment/cultural impact to river corridor, high ongoing management costs, hard to construct, low cost benefit ratio (0.31).

Option B2

Levees along western bank of Todd River and southern bank of Charles River (high level estimate of $42 million*)

PLUS: reduces impacts on 224 properties

MINUS: $42 million to build, increases flooding by 30mm to other properties, high impact on river corridor, low cost benefit ratio (0.26).

Option B3

Levees along eastern bank of the Todd River and southern bank of Charles River (high level estimate of $8.3 million*)

PLUS: reduces impact on 305 properties, has a higher cost benefit ratio than other levee options considered (1.11).

MINUS: increases flooding by 15 mm to other properties, will have potential impact on river corridor, temporary barrier will need to be deployed.

Option C

Upgrade trunk drainage in East Side, Braitling and Gillen (high level estimate of $4.7 million*)

PLUS: reduces impacts on 386 properties, high cost benefit ratio, easier to construct, no impact to river corridor (1.78).

** Costs are indicative only for the purpose of an options analysis.*

*** A cost-benefit ratio summarised the overall value for money for a project, with a ratio above 1 considered feasible.*

Above: *Water overflowing from trunk drainage contributes to Todd Street Mall flooding during the 1988 flood event.*

Preferred option to reduce flood impacts

Option C was identified as the preferred option based on the flood modelling and options assessment, because it:

- has the highest cost benefit ratio
- does not cause negative flood impacts to other properties
- can be constructed relatively quickly and is within the existing road and drainage alignments
- will reduce flooding impacts associated with more frequent floods caused by stormwater drainage
- has no visual, environmental or cultural impact to the Todd River corridor
- provides additional flood immunity to public roads and the national highway
- reduces flooding for up to 386 residential and commercial properties in the East Side, Braitling and Gillen.

Improving existing trunk drainage issues would include:

- reprofiling and increasing capacity of the East Side Drain and North Stuart Highway Drain
- new bund works for the East Side Drain
- installing new culverts under the Stuart Highway to receive greater flows from the North Stuart Highway Drain
- constructing a cut off drain and bund for problem areas along Lovegrove Drain.

Where to from here

Further information will be available on the Department's website at https://environment.nt.gov.au/lands-planning/projects/alice-springs-flood-mitigation

To talk to one of our project team:

Email flood.mitigation@nt.gov.au