Brown Hill Keswick Creek Project
Part B Report - Sept 2014

Brown Hill Keswick Creek
STORMWATER PROJECT

Background

- Mid 2012: Stormwater Management Plan (SMP) for the Brown Hill Keswick Creek Stormwater Project jointly developed and endorsed by catchment councils (Cities of Adelaide, Burnside, Mitcham, Unley and West Torrens)
- 5 March 2013: SMP gazetted - committed catchment councils to
  - flood mitigation works for Part A Works
  - further investigate alternative mitigation works in the Upper Brown Hill Creek catchment (Part B Works), with a ‘no dam’ preference
- Notwithstanding this preference, investigations for Part B works have considered the respective merits of ‘no dam’ and ‘with dam’ based options
- SMA gave catchment councils 12 months to finalise the Part B Works (to March 2014). The further investigative work for Part B is now complete and is being made publicly available.

Changes to technical data since 2012 SMP

'Part B' investigation process has benefited from:

- Revised hydrology (rainfall) data released in mid-2013 by BoM and updated runoff forecasts (hydrologic modelling)
- Upgraded hydraulic modelling and floodplain mapping showing the extent of stormwater inundation beyond the watercourse
- Updated project cost estimates based on the revised technical information.

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Implications for Part B investigations

Applying revised data has significantly altered the flood risk profile:

- Reduced peak 100 year peak flows by up to 25% in parts of the upper Brown Hill Creek catchment
- Decreased the estimated number of properties impacted by a 1 in 100 year flood over the entire Brown Hill Keswick Creek catchment from approx 7,000 (2012 SMP) to just over 2,000 properties.

Due to the reduced level and extent of forecast flooding, a greater length of the creek has the capacity to carry the predicted flood flows.

Options considered

- Eight (8) options have been investigated for the upper Brown Hill Creek catchment.
- The options differ in how they combine the following three components:
  - A detention dam at one of two sites:
    Brownhill Creek Recreation Park or Ellisons Gully
  - High flow bypass culverts
  - Creek capacity upgrade works (incl bridge upgrade works)
- All of the options include undertaking creek rehabilitation works to rehabilitate the creek towards achieving ‘good condition’ in order to assist flow capacity along the full length of upper Brown Hill Creek.

Options

SUMMARY OF FLOOD MITIGATION OPTIONS FOR UPPER BROWN HILL CREEK

OPTION		DETENTION DAM	HIGH FLOW BYPASS CULVERT	CREEK CAPACITY UPGRADE
A1	Creek rehabilitation along the full length of upper Brown Hill Creek from Anzac Highway to Brown Hill Creek Caravan and Holiday Park	Site 1: Brown Hill Creek Recreation Park	Malcolm Street to Victoria Street*	Anzac Highway to Leah Street; Cross Road to Hampton Street
A2		Site 2: Ellisons Gully	Malcolm Street to Victoria Street*	Anzac Highway to Leah Street; Cross Road to Hampton Street
B1		Site 1: Brown Hill Creek Recreation Park		Anzac Highway to Leah Street; sections between Mitchell and Malcolm Streets; Cross Road to Hampton Street; Fife Avenue
B2		Site 2: Ellisons Gully		Anzac Highway to Leah Street; sections between Mitchell and Malcolm Streets; Cross Road to Hampton Street; Fife Avenue
C1			Hampton Street to Victoria Street via the railway corridor with Malcolm Street leg (Route 3A)*	Anzac Highway to Forestville Reserve; sections upstream of Hampton Street
C2			Hampton Street to Victoria Street via suburban streets (Route 3)*	Anzac Highway to Forestville Reserve; sections upstream of Hampton Street
C3			Hampton Street to Victoria Street via the railway corridor without Malcolm Street leg*	Anzac Highway to Forestville Reserve; sections between Douglas and Malcolm Streets; sections upstream of Hampton Street
D				Anzac Highway to Forestville Reserve; sections between Victoria and Mitchell Streets; Orphanage Park; Douglas to Malcolm Streets; Cross Road to Hampton Street; sections upstream of Hampton Street to Muggs Hill Road

*As detailed in the Part B Process Report.

Under all options, some public road bridges need to be upgraded to meet required flow capacity.

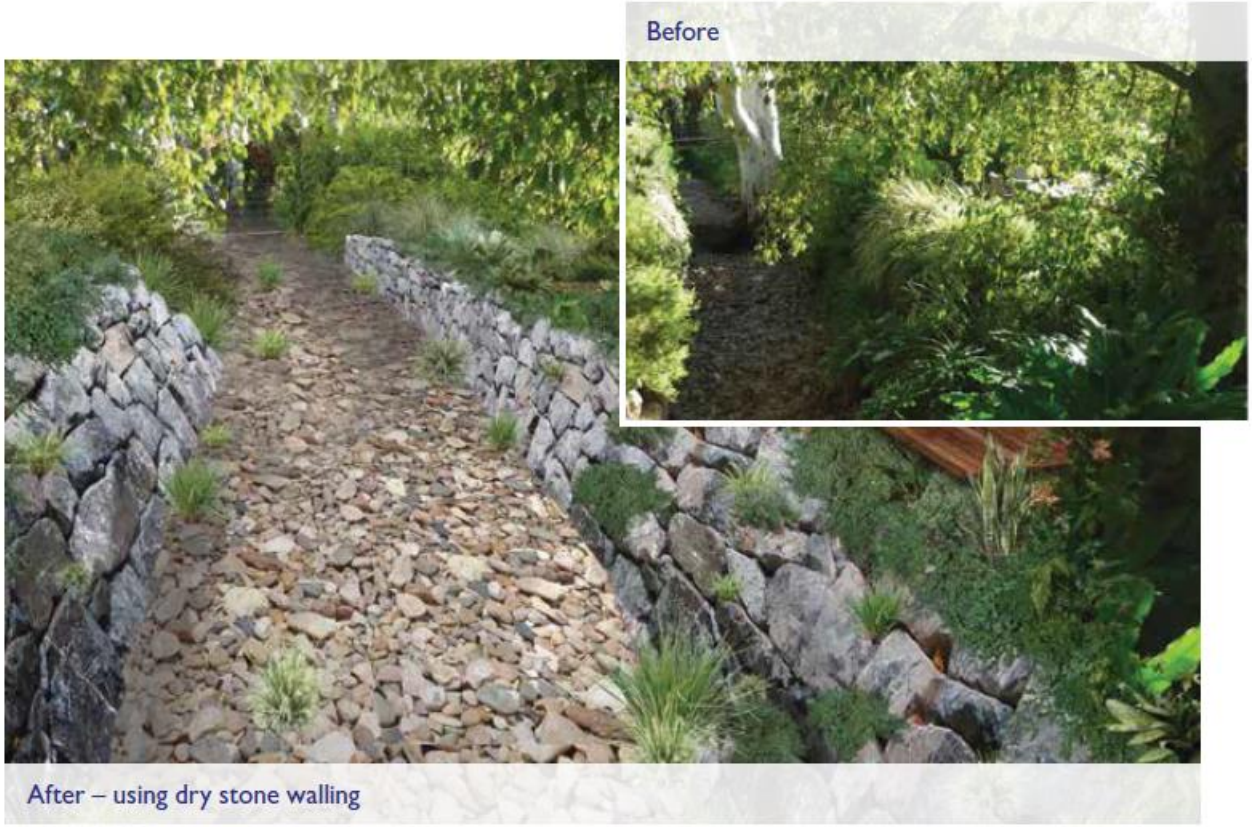
Components of eight options

Detention dams : temporarily stores floodwater generated off the rural area of the catchment during a major storm, reducing the rate of water flowing downstream.

High flow bypass culverts: conveys part of the stormwater flow from a creek where flooding occurs and then returns the flow back into the creek further downstream at a location where the flow can be accommodated – bypassing existing bottlenecks and avoiding creek overflows at particular flood prone locations.

Creek capacity upgrade works: involve widening the creek bed and/or modifying the creek banks at critical sections to ensure there is sufficient capacity to convey 100 year ARI peak flows.

Creek capacity upgrade works



It is NOT proposed to create a concrete channel
and to retain as far as possible a natural creek environment.

Where this is not possible, or the sides of the creek banks need further stabilisation, the type of materials that could be used include dry stone walling or gabions.

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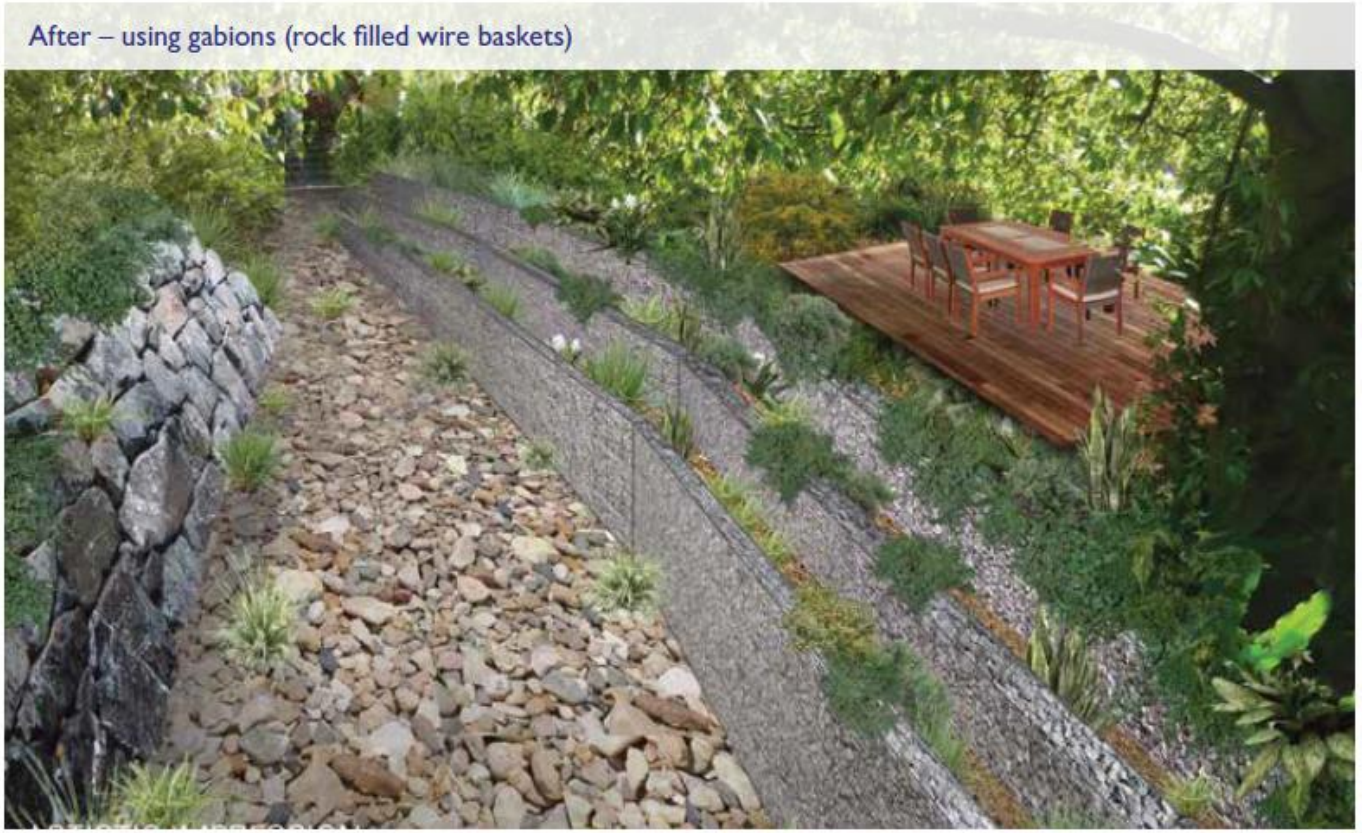
Creek capacity upgrade works



To comply with legislation, before any works were carried out the BHKC Stormwater Project would reach agreement with each property owner to agree on detailed designs to increase creek capacity to ensure any works integrate with existing landscape treatments.

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Easement or Agreement

Arrangements for ongoing maintenance would also be negotiated with each property owner.

Under both the Natural Resources Management (NRM) Act and the Local Government Act, if permanent infrastructure works are proposed (such as creek capacity upgrade works or bank stabilisation work):

- Works can be carried out under an **agreement** with the property owner under which the property owner agrees to undertake ongoing care, control and management of the works.
- Where the property owner wants the NRM Board or council to retain ongoing responsibility for care, control and management of the permanent works, then the NRM Board or council must acquire an **easement**.

The choice of whether there is an agreement or an easement is largely a decision for the property owner.

Creek rehabilitation works

All eight options include creek rehabilitation aimed at rehabilitating the creek towards achieving 'good condition' in order to assist flow capacity along the full length of upper Brown Hill Creek

Creek owners are responsible (under the Natural Resources Management Act) for maintaining the creek in 'good condition' by removing invasive vegetation and other obstructions that might impede large water flows.

Proposed that the project undertakes initial works (at its cost):

- Selectively removing and cutting back trees and vegetation in the creek bed and side banks that are obstructing flow and therefore increasing the potential for flooding
- Re-planting on top of the banks with suitable native vegetation to ensure the creek is returned as far as possible to an improved and sustainable environment

Assessment of options

- Options have been assessed based on:
  - Level of flood protection
  - Estimated costs
  - Environmental impacts
  - Community feedback to date
- All eight options provide approximately the same level of flood protection for the 100 year ARI event.
- However, initial work indicated that options involving high flow bypass culverts (Options A1, A2, C1, C2 and C3) would be too costly to implement.
- **For this reason, investigations have focused on Options B1, B2 and D**.

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Overview of Options B1, B2 and D

Component	Options	B1	B2	D
Dam		Site 1	Site 2	Not required
High flow bypass culvert		Not required	Not required	Not required
Estimated number of properties requiring creek capacity upgrade works; requiring an agreement or easement		29	22	66
Number of properties where land acquisition is required		0	2	0
Number of properties requiring an easement for Dam Site 2		0	3	0
Number of public bridge upgrades		4	4	10
Creek rehabilitation works		Full length of creek	Full length of creek	Full length of creek

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Level of flood protection

- **For 100 year average recurrent interval (ARI) event**
  (1% chance of occurring in any given year)

  All of eight options provide approximately the same level of flood protection

  The number of potential flood impacted properties along upper Brown Hill Creek (Mitcham and Unley Council areas) is reduced from over 400 to about 25 properties
  (none of 25 are likely to suffer above floor flooding).

- **For shorter duration storms**
  Option D (creek capacity upgrade) provides a higher than 100 year ARI level of flood protection, thereby providing additional reserve capacity if urban peak flows increase in the future due to redevelopment, climate change or increases in land use density

Comparison of costs

ESTIMATED CAPITAL COSTS ($M)

	OPTIONS							
COMPONENT	A1	A2	B1	B2	C1	C2	C3	D
Dam	24.1	28.8	24.1	28.8	–	–	–	–
High flow bypass culvert	19.2	19.2	–	–	43.4	46.4	28.6	–
Creek capacity upgrade works	4.4	4.4	6.3	5.4	10.0	10.0	11.0	17.0
Public bridge upgrades	0.9	0.9	1.6	1.6	2.8	2.8	4.0	8.5
Creek rehabilitation	2.9	2.9	2.7	2.7	2.5	2.5	2.3	1.8
Easements	0.4	0.4	1.2	0.6	1.2	1.2	1.4	3.2
BHC diversion by DPTI	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
ESTIMATED TOTAL COST	56.9	61.6	40.9	44.1	64.9	67.9	52.3	35.5

- **Option D** has the lowest capital cost ($35.5m) and the lowest annual maintenance cost of $162,000
- **Option B1** has the 2nd lowest capital cost ($40.9m) and the 2nd lowest annual maintenance cost of $176,000
- **Option B2** has the 3rd lowest capital cost ($44.1m) and the 3rd lowest annual maintenance cost of $186,000

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Environmental impacts

- Assessment mainly focused on impact on trees; no requirements to date to undertake detailed environmental studies
- Project aims to preserve as many trees as possible - however under all eight mitigation options some trees would need to be removed
- Estimated number of trees that may need to be removed

  Option B1: 30 (dam) + 179 (creek upgrade / rehab)

  Option B2: 30 (dam / compound) + 179 (creek upgrade / rehab)

  Option D: 229 (creek upgrade / rehab)

- **Where trees need to be removed, the project would replant new trees and vegetation where appropriate.**

Community feedback to date

- Strong opposition to a dam: environmental, recreational, Aboriginal and European heritage impacts
- Strong opposition to culverts: loss of trees / suburban amenity
- Opportunities and concerns re creek capacity upgrade works:
  - Impact on private properties / public places
  - Requirements for easement / agreement
- Likely to be mixed community views regarding creek rehabilitation works
- **No decision will be made by Councils until the community has been consulted – consultation anticipated to commence in March 2015**

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Option D

Option D has been identified as the preferred option by the BHKC Stormwater Project as:

- It has the lowest capital cost ($35.5m) by a margin of about $5 million and has the lowest annual maintenance cost ($162,000)
- It provides the required (100 year ARI) level of flood protection
- For shorter duration storms it provides a higher than 100 year ARI level of flood protection
- It satisfies the project councils' endorsed position to give preference to a feasible 'no dam' solution
- It does not require bypass culverts in suburban streets
- It is within the budgeted cost for Part B as estimated in the SMP
- It preserves existing sites of heritage significance

Next steps

Sept 2014:	Councils to receive and note Part B Report Release report for public to read / consider
March 2015:	Commence consultation
April/May 2015:	Each Council to consider community feedback and determine its position
May 2015:	Project to make a final recommendation on Part B Works to State Government

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Questions?

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