











	Option 1 Do nothing	Option 2 1-in-3-month protection	Option 3 1-in-6-month protection	Option 4 1-in-1-year protection	Option 5 1-in-2-year protection (Identified as the most effective flood protection outcome)
Measures adopted	No options adopted - maintain the current operational practices with monitoring and closure improvements.	B1	B2 only	B3 + O1	B4 + O2 + S1
	No constructed measures, improvements to flood monitoring.	Removal of overbank sediment immediately upstream of the Bends.	Upgrade existing culverts (m) New Levee and removal of 1m depth of sediment immediately upstream of the Bends.	Upgrade existing culverts (m). New levee, removal of 1m depth of overbank sediment and two sets of new under-road culverts.	Significantly increase existing culverts at Oxford Falls. New levee and removal of 1m depth of overbank sediment and two sets of new under-road culverts, and existing levee top up.
Average closures per year	Six to seven closures on average per year	At least four closures on average per year	At least two closures on average per year	At least one closure on average per year	At least one closure on average every two years Eight (8) times as effective as 1-in-3-month protection Twice as effective as 1-in-1-year protection
Cost (indicative only), \$M	\$0.05M	\$4.5M 	\$7.0M  	\$13.3M   	\$17.5M    

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Likely environmental impacts	No environmental impact as no works would occur.	Vegetation cleared (local + native): ~ 27,360 m ² . Local vegetation cleared: 24,100 m ² .	Vegetation cleared (local + native): ~ 29,700 m ² . Local vegetation cleared: 27,000 m ² at minimum.	Vegetation cleared (local + native): ~ 32,250 m ² . Local vegetation cleared: 27,000 m ² at minimum.	Vegetation cleared (local + native): 34,700 m ² . Local vegetation cleared: 27,000 m ² at minimum. Potential for less vegetation clearance (about 7,400 m ²), if it is found that further drainage works at the Academy is not needed.
Sediment removal (25,600 m ³) of excavation. Could impact aquatic habitats.					
Native vegetation impacts			Two plant community types impacted are classified threatened ecological communities - Swamp Sclerophyll Forest, and Freshwater Wetlands.	Three plant community types impacted at the Bends are classified threatened ecological communities - Swamp Sclerophyll Forest, Freshwater Wetlands, and Swamp Oak Floodplain forests.	Four plant community types impacted at the Bends and Academy are classified threatened ecological communities - Swamp Sclerophyll Forest, Freshwater Wetlands, Swamp Oak Floodplain forests, and Coastal Saltmarsh.
Delivery / Construction		25+ weeks to complete. Significant truck movements for overbank sediment removal.	30+ weeks to complete. Temporary road closures needed for culvert works. Could be partial in nature. Significant truck movements for overbank sediment removal.	40+ weeks to complete. Temporary road closures needed for culvert works. Could be partial in nature. Significant truck movements for overbank sediment	40+ weeks to complete. Temporary road closures needed for culvert works. Could be partial in nature. Significant truck movements for overbank sediment
Delivery / Construction		Significant truck movements for overbank sediment	Temporary road closures needed for culvert works. Could be partial in nature. Significant truck movements for overbank sediment removal.		
Recommendation within Study	Feasible	Feasible	Feasible	Recommended and feasible	Recommended and feasible

Common features	Description
Sediment removal – significant excavation work along Middle Creek, requiring access routes and ramps for trucks.	<p>With approximately 28,000 m³ to be removed along Middle Creek between Narrabeen Lagoon and Oxford Creek, this equates to approximately 2,800 truck movements to excavate and transport overbank sediment.</p> <p>The only scenario where this was not needed was a 1-in-3-month protection scenario with a levee option. However, this option was dismissed for other reasons.</p> <p>This also results in significant vegetation clearance – see below.</p>
Land ownership	<p>The majority of the potential works area, including the creek and immediate creek banks and floodplain are under either Crown or Council ownership. The road corridor is understood to be under RMS ownership.</p> <p>Parts of the potential works area at The Bends, including portions of the floodplain to the south of Wakehurst Parkway and the left-hand bank (looking downstream) of the main channel, are under the ownership of the Metropolitan Local Aboriginal Land Council.</p>
Traffic management	As a largely one-lane carriageway, particularly at and connecting all three sites, traffic management will need to be in place. This will require partial road closures.
Vegetation clearance	<p>At minimum, 2 4,100m² of native vegetation will be directly impacted, regardless of option. Clearance of vegetation would be required for the removal of sediment.</p> <p>In addition, the vegetation in the area is dense, and clearing activities, either along the road corridor or Middle Creek are a necessity as part of any activities to build flood-resistant features into the Parkway, or treat Middle Creek.</p> <p>The habitats that would primarily be affected are Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions and Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions. The impact is expected to be 2.41 hectares at minimum.</p>
Native Fauna impacts	<p>Vegetation clearing impacts habitat for threatened species.</p> <p>15 threatened native fauna have a moderate or greater potential to be negatively impacted by disturbance and clearance of vegetation.</p>
Aquatic impacts	Impacts of sediment removal on Middle Creek ecology including Key Fish Habitat unknown at this point - to be investigated.
Potential environmental impacts (further investigations needed)	Assessments of Significance may find that more impacts are found to threatened ecological communities.
Potential heritage impacts	<p>Although there are 58 recorded sites and an Aboriginal place listed as being in the broader area – Oxford Falls, Cromer, Ingleside and Belrose -, there are no known culturally significant Aboriginal sites listed specifically within the study area.</p> <p>However, this will be further investigated in the next stage, with close engagement with local stakeholders and the traditional owners of the land.</p> <p>A European Heritage Assessment has not been undertaken.</p>
Utilities – gas	Utilities are present along the Parkway and run close to Middle Creek. This includes a gas main within the road reserve, which crosses the creek at the Academy. The depth of the gas main is unknown at this point.
Utilities – sewer main at the Bends and the Academy.	The presence of the sewer line will need to be considered during construction and may impact the final design.