



## VULNERABILITY ASSESSMENT TABLE

# External structures, objects, murals and signage

This table highlights some of the ways external structures, objects, murals and signage may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place, object or collection.



### EXPOSURE — GENERAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>Change in seasonal rainfall (chronic)</p>	<p>Increase in rainfall events and their intensity leading to increased frequency and intensity of flooding, erosion and soil degradation</p>	<p>Depends on fabric, construction and local conditions</p>	<ul style="list-style-type: none"> <li>Types of material (e.g. wood, metal, stone, paint, glass) will be affected differently</li> <li>Increased number and intensity of rainfall events causing damage to murals and signage</li> <li>Increased frequency and intensity of flooding directly impacting structures, objects, signage and murals at ground level; and, for structures, towers and objects, indirectly impacting on fabric and stability through frequent and prolonged saturation of soil</li> <li>Increased water erosion and movement of soils may destabilise structures causing cracking and collapse; murals and signage may be indirectly impacted as a consequence of impacts to the buildings or structures on which they are located</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> </ul>
 <p>Increase in mean temperature</p>				




## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
<i>continued from previous page</i>	Increased frequency, duration and intensity of drought events	Loss of ground cover, drying and cracking of soils, and wind erosion  Cracking, instability of buildings or structures on which murals and signage are located	<ul style="list-style-type: none"> <li>○ Drying, cracking or movement of soils may affect the stability of structures</li> <li>○ Increased dryness will affect materials (e.g. wood, metal, stone, paint, glass) in different ways</li> <li>○ Drying and cracking of murals and signage, including as a consequence of impacts to the buildings or structures on which they are located</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Indoor relocation if appropriate and possible (moving monuments to internal situations can cause accelerated decay)</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>
 More hotter days (>35°C and >40°C)	Increased frequency and intensity of bushfires	Directly related to proximity and/or connectively to bush	<ul style="list-style-type: none"> <li>○ Damage to, or destruction of, external structures and objects, murals and signage; types of material will be affected differently</li> <li>○ Loss of vegetation cover, heating and cracking of soils, and increased erosion following a bushfire event may affect the stability of structures</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase maintenance regime (e.g. vegetation management)</li> <li>○ Consider planting to offer shade but it should be away from the object or external structure</li> <li>○ Relocation if risk is unacceptable and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or site transfer, in consultation with local community</li> </ul>
	Heatwaves and extreme temperatures	Soils susceptible to drying and cracking	<ul style="list-style-type: none"> <li>○ Impacts will vary for different types of materials (e.g. wood, metal, stone, paint, glass)</li> <li>○ Drying, cracking and movement of soils may affect the stability of structures</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Indoor relocation if appropriate and possible</li> </ul>



## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>More extreme rainfall events (acute)</p>	Flooding, erosion and landslips	Depends on terrain (local conditions)	<ul style="list-style-type: none"> <li>○ Structural damage or collapse and damage to access routes</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Relocation if risk is unacceptable and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas	Depends on terrain and potential defences (e.g. sea wall) – refer to local information	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding, with damage and destruction of structures and objects; depending on the elevation of the structural elements or objects, mural or signage, this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>○ Consider nature-based solutions</li> <li>○ Relocation if risk is unacceptable and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>
 <p>More intense or more frequent storms</p>	Coastal erosion impacts	Depends on terrain and potential defences (e.g. sea wall) – refer to local information	<ul style="list-style-type: none"> <li>○ Potential for storm damage or destruction of structures (or parts) and objects during storms and through coastal erosion caused by individual and recurring storm events</li> </ul>	<ul style="list-style-type: none"> <li>○ Relocation if risk is unacceptable and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Heat stress: types of material will be affected differently, including impacts to buildings on which murals and signage are located</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> <li>Increase shade, plant trees and green infrastructure</li> <li>Indoor relocation if appropriate and possible</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>Higher daily minimum temperatures and changes in precipitation</p>	Changed freeze-thaw cycles, reduced snow cover and fewer cold days	Water run-off from new thaw and changing drainage systems	<ul style="list-style-type: none"> <li>Impacts will vary for different types of materials (e.g. wood, metal, stone, paint, glass)</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> </ul>

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**VULNERABILITY ASSESSMENT TABLE**

# Historical infrastructure

This table highlights some of the ways historical infrastructure may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place.





**EXPOSURE — GENERAL**

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 Change in seasonal rainfall (chronic)	Increase in rainfall events and their intensity leading to increased frequency and intensity of flooding, erosion and soil degradation	Depends on fabric, construction and local conditions	<ul style="list-style-type: none"> <li>Types of material (e.g. wood, metal, stone) will be affected differently</li> <li>Increased frequency and intensity of flooding will directly impact infrastructure; there will also be indirect impacts through frequent and prolonged saturation of soils</li> <li>Increased water erosion and movement of soils may destabilise structures causing cracking and collapse of structures and associated loss of use</li> </ul>	<ul style="list-style-type: none"> <li>Floods: build defences against flash flooding (divert water), reinforce foundations to avoid collapse in a flood</li> <li>Re-engineer drainage</li> <li>Monitor erosion and increase maintenance and repair regime</li> <li>Consider creation of new flood plains to manage rising water levels</li> </ul>
 Increase in mean temperature				
	Increased frequency, duration and intensity of drought events	Loss of ground cover, drying and cracking of soils, and wind erosion	<ul style="list-style-type: none"> <li>Drying, cracking or movement of soils may affect the stability of structures; increasing dryness will affect materials (e.g. wood, metal, stone) in different ways</li> </ul>	<ul style="list-style-type: none"> <li>Monitor cracking and increase maintenance and repair regime to ensure structural integrity</li> </ul>





## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days (&gt;35°C and &gt;40°C)</p>	<p>Increased frequency and intensity of bushfires</p>	<p>Directly related to proximity and/or connectively to bush</p>	<ul style="list-style-type: none"> <li>○ Damage to or destruction of infrastructure</li> <li>○ Types of material will be affected differently; loss of vegetation cover, heating and cracking of soils, and increased erosion following a bushfire event may affect the stability of structures and damage access routes</li> <li>○ Smoke creates carbon build up which can damage most porous building materials</li> </ul>	<ul style="list-style-type: none"> <li>○ Bushfire planning</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>○ Vegetation maintenance regime</li> <li>○ Prepare defences where possible, such as sprinklers, gutter clearance, wrapping against ember attack etc.</li> <li>○ Undertake post-bushfire risk assessment for cumulative impacts (e.g. water run-off and erosion)</li> <li>○ Undertake post-bushfire remediation actions including tree felling, vegetation clearance, firebreaks, grading, etc.</li> </ul>
	<p>Heatwaves and extreme temperatures</p>	<p>Soils susceptible to drying and cracking</p>	<ul style="list-style-type: none"> <li>○ Impacts will vary for different types of materials (e.g. wood, metal, stone)</li> <li>○ Drying, cracking and movement of soils may affect the stability of structures</li> </ul>	<ul style="list-style-type: none"> <li>○ Monitor cracking and increase maintenance and repair regime to ensure structural integrity</li> </ul>
 <p>More extreme rainfall events (acute)</p>	<p>Flooding, erosion and landslips</p>	<p>Depends on terrain (local conditions)</p>	<ul style="list-style-type: none"> <li>○ Structural damage or collapse and damage to access routes</li> </ul>	<ul style="list-style-type: none"> <li>○ Floods: build defences against flash flooding (divert water) and reinforce foundations to avoid collapse in a flood</li> <li>○ Consider new flood plains</li> <li>○ Consider nature-based solutions such as plantings to capture and/or divert flood waters</li> </ul>





## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding with damage and destruction of infrastructure; depending on the elevation of the structural elements, this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>○ Protect: add barriers/diversions where possible</li> <li>○ Consider nature-based solutions such as revegetation of mobile coastal dunes</li> </ul>
 <p>More intense or more frequent storms</p>	<p>Coastal erosion impacts</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for storm damage or destruction of infrastructure during storms and through coastal erosion caused by individual and recurring storm events</li> </ul>	<ul style="list-style-type: none"> <li>○ Increased maintenance and structural integrity regime</li> <li>○ Consider water attenuation away from buildings/infrastructure</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Heat stress: types of material will be affected differently</li> <li>Impacts to associated structures or infrastructure may also impact the heritage values</li> </ul>	<ul style="list-style-type: none"> <li>Increased shading by planting or other means (integrated planning)</li> <li>Increased monitoring and repairs regime</li> </ul>
 <p>More extreme rainfall events (acute)</p>	Flash flooding	Depends on the nature and condition of stormwater infrastructure	<ul style="list-style-type: none"> <li>Pressure on historic drains and flooding around historic assets, such as bridges</li> </ul>	<ul style="list-style-type: none"> <li>Increased monitoring and repair/upgrading of stormwater infrastructure</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Higher daily minimum temperatures and changes in precipitation</p>	Changed freeze-thaw cycles, reduced snow cover and fewer cold days	Water run-off from new thaw and changing drainage systems	<ul style="list-style-type: none"> <li>Impacts will vary for different types of materials (e.g. wood, metal, stone)</li> </ul>	<ul style="list-style-type: none"> <li>Monitor erosion and increase maintenance and repair regime</li> </ul>

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**VULNERABILITY ASSESSMENT TABLE**

# Historical parks and gardens

This table highlights some of the ways historical parks and gardens may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place.



**EXPOSURE — GENERAL**

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 Change in seasonal rainfall (chronic)	Water availability, soil degradation, and change to ecosystems and species distributions over the short-term and long-term	Potentially non-native plants and some natives may disappear regionally	<ul style="list-style-type: none"> <li>Gardens and botanic gardens may lose species and new pests and diseases may become prevalent</li> </ul>	<ul style="list-style-type: none"> <li>Plan for transition to drought resistant plants that preserve character/heritage value</li> <li>Plan for alternative water collection/storage to be used to preserve the most valuable individuals</li> <li>Consider planting arrangements that create microclimates around valuable sensitive specimens</li> </ul>
 Increase in mean temperature				
	Increased frequency, duration and intensity of drought events	Vegetation sensitivity heightened if no access to recycled water/captured stormwater	<ul style="list-style-type: none"> <li>Water restrictions (long-term or permanent), impacts on landscapes and damage to structures through cracking or splitting</li> </ul>	





## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days (&gt;35°C and &gt;40°C)</p>	<p>Increased frequency and intensity of bushfires</p>	<p>Directly related to proximity and/or connectivity to the bush</p>	<ul style="list-style-type: none"> <li>○ Direct loss and damage</li> </ul>	<ul style="list-style-type: none"> <li>○ Prepare for fire season by managing fuel/vegetation</li> <li>○ Prepare emergency/defence plan</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>○ Prepare disaster recovery plan</li> <li>○ Explore nature-based firebreak solutions</li> </ul>
	<p>Heatwaves and extreme temperatures</p>	<p>Depends on micro-climate and ability to manage impacts in the short-term (e.g. through watering)</p>	<ul style="list-style-type: none"> <li>○ Plant damage from heat or sun exposure during heatwaves</li> </ul>	<ul style="list-style-type: none"> <li>○ Plan for transition into heat resistant plants that preserve character/heritage value</li> <li>○ Assess potential damage to heritage infrastructure and buildings in the parks and gardens and risk mitigation options that preserve value (e.g. heat reflective roofs, etc.)</li> </ul>
 <p>More extreme rainfall events (acute)</p>	<p>Flooding, erosion and landslips</p>	<p>Depends on terrain (local conditions)</p>	<ul style="list-style-type: none"> <li>○ Damage from the force of flood water, debris, sediments and mould</li> </ul>	<ul style="list-style-type: none"> <li>○ Flood mapping and plan for defence where possible and appropriate; defence may aim to simply reduce the worst impacts of the flood (e.g. flow velocity) rather than avoid flooding altogether</li> <li>○ Post-flood recovery plan to manage mould/other negative impacts</li> <li>○ Assess infrastructure including site drainage, and opportunities for harvesting water</li> <li>○ Explore nature-based water attenuation system work</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding on heritage properties in coastal zones – depending on their elevation, this could be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible in consultation with local community</li> <li>○ Protect: barriers/diversions where possible</li> <li>○ Consider opportunities to create new coastal or intertidal habitats for threatened native species</li> <li>○ Prepare nature-based barriers where possible (not hard ones) and maintain them</li> </ul>
 <p>More intense or more frequent storms</p>	<p>Coastal erosion</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for storm damage to heritage properties in coastal zones, either through modification of soil (salinity ingress) or through direct damage (storms)</li> </ul>	<ul style="list-style-type: none"> <li>○ Increased monitoring and maintenance regime to identify growing hazards</li> <li>○ Record for data sharing</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Same impacts as above under 'more hotter days', but amplified and more frequent, with less recuperation time overnight</li> </ul>	<ul style="list-style-type: none"> <li>Plan for transition into heat resistant plants that preserve character/heritage value</li> <li>Adapt infrastructure where possible and appropriate (e.g. use different paving materials, etc.)</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Higher daily minimum temperatures and changes in precipitation</p>	Changed freeze-thaw cycles, reduced snow cover and fewer cold days	Current distribution of native/non-native vegetation	<ul style="list-style-type: none"> <li>Loss of local ecosystems and species</li> <li>Structural deterioration of buildings due to wet-frost</li> <li>Pest incursions</li> </ul>	<ul style="list-style-type: none"> <li>Plan for transition to more resilient plants that preserve character/heritage value</li> </ul>

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**VULNERABILITY ASSESSMENT TABLE**

# Interior objects or collections, murals, wallpaper and painted decoration


This table highlights some of the ways interior objects or collections, murals, wallpaper and painted decoration may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place, object or collection.


**EXPOSURE — GENERAL**

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 Change in seasonal rainfall (chronic)	Increase in rainfall events and their intensity leading to increased frequency and intensity of flooding, erosion and soil degradation	Depends on the fabric and construction of the objects, murals and decoration and the local conditions in which they are stored or located	<ul style="list-style-type: none"> <li>Types of material (e.g. wood, metal, stone, plant fibre, animal products, paint, glass, paper) will be affected differently</li> <li>Objects, murals and decoration may be affected as a consequence of impacts to the buildings in which they are stored or located</li> <li>Changes in humidity may impact the fabric especially when stored or located in environments without artificial temperature control</li> <li>Variations in temperature and humidity may increase risk of insect or pest infestation</li> </ul>	<ul style="list-style-type: none"> <li>Monitor structural integrity of building and increase maintenance and repair regime</li> <li>Re-evaluate temperature control and ventilation</li> </ul>
 Increase in mean temperature				



## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
<i>continued from previous page</i>	Increased frequency, duration and intensity of drought events	Cracking and instability of buildings in which the objects are stored or where the murals and decoration are located	<ul style="list-style-type: none"> <li>Drying, cracking or movement of soils may affect the stability of buildings in which the objects are stored or where the murals and decoration are located</li> <li>Increased dryness will affect materials (e.g. wood, metal, stone, plant, fibre, animal products, paint, glass, paper) in different ways, and vary according to the environmental conditions in which the objects are stored or where the murals and decoration are located</li> </ul>	<ul style="list-style-type: none"> <li>Monitor structural integrity of building and increase maintenance and repair regime</li> <li>Consider potential thermal gain through windows – possible use of blinds or insulation of the place in which the object, collection, murals or decoration are located</li> </ul>
 More hotter days (>35°C and >40°C)	Increased frequency and intensity of bushfires	Directly related to proximity and/or connectivity to bush	<ul style="list-style-type: none"> <li>Damage to or destruction of internal objects, murals and decoration through smoke, fire and fire suppression substances; types of material will be affected differently</li> <li>Loss of vegetation cover, heating and cracking of soils, and increased erosion following a bushfire event may affect the stability of buildings in which objects are stored or murals and decoration located</li> </ul>	<ul style="list-style-type: none"> <li>Monitor fire index risk at the location</li> <li>Add defences where possible, such as sprinklers, gutter clearance or wrapping against ember attack</li> <li>Notify land managers that the building contains significant objects or interior decoration that require protection</li> <li>Relocate objects/collections permanently or temporarily during bushfire high-risk season</li> <li>Ensure damper controls on natural ventilation to eliminate potential of smoke getting into the building</li> <li>Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>





## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
<i>continued from previous page</i>	Heatwaves and extreme temperatures	Soils susceptible to drying and cracking	<ul style="list-style-type: none"> <li>○ Impacts will vary for different types of material (e.g. wood, metal, stone, plant fibre, animal products, paint, glass, paper) and the environmental conditions in which they are stored or located</li> <li>○ Drying, cracking and movement of soils may affect the stability of buildings in which objects are stored or mural and decoration located</li> </ul>	<ul style="list-style-type: none"> <li>○ Consider temperature control measures within building</li> </ul>
	More extreme rainfall events (acute)	Flooding, erosion and landslips	Depends on structures and local conditions in which the objects and collections are stored and the murals and decorations located	<ul style="list-style-type: none"> <li>○ Changes in humidity may impact the fabric, especially when stored or located in environments without artificial temperature control</li> <li>○ Variations in temperature and humidity may increase risk of insect or pest infestation</li> <li>○ Consider humidity control measures within building</li> <li>○ Ensure rainwater management system and drainage is adequate for managing extreme events</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas	Depends on terrain and potential defences (e.g. sea wall) – refer to local information	<ul style="list-style-type: none"> <li>Potential for inundation and flooding of the buildings in which the objects and collections are stored and the murals and decorations located; this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>Monitor inundation risk at the location</li> <li>Relocate permanently if risk increases and if appropriate</li> </ul>
 <p>More intense or more frequent storms</p>	Coastal erosion impacts	Depends on terrain and potential defences (e.g. sea wall) – refer to local information	<ul style="list-style-type: none"> <li>Potential for storm damage or destruction of the buildings in which the objects and collections are stored and the murals and decorations located</li> </ul>	<ul style="list-style-type: none"> <li>Monitor inundation risk at the location</li> <li>Relocate permanently if risk increases and if appropriate</li> <li>Proactive maintenance or refitting of roofs, rainwater and drainage infrastructure</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Heat stress: types of material will be affected differently according to the environmental conditions in which the objects and collections are stored and the murals and decorations located</li> </ul>	<ul style="list-style-type: none"> <li>Consider temperature control measures within building</li> <li>Ensure adequate ventilation</li> </ul>





## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place, object or collection and its values	Examples of possible management approaches
 <p>Higher daily minimum temperatures and changes in precipitation</p>	<p>Changed freeze–thaw cycles, reduced snow cover and fewer cold days</p>	<p>Water run-off from new thaw and changing drainage systems</p>	<ul style="list-style-type: none"> <li>○ Impacts will vary for different types of materials (e.g wood, metal, stone, plant fibre, animal products, paint, glass, paper) and will vary depending on the environmental conditions in which the objects and collections are stored and the murals and decorations located</li> </ul>	<ul style="list-style-type: none"> <li>○ Monitor inundation risk at the location</li> <li>○ Consider temperature and humidity control measures</li> </ul>

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**VULNERABILITY ASSESSMENT TABLE**

# Roofed buildings

This table highlights some of the ways ‘roofed buildings’ (e.g. including buildings from the nineteenth and early twentieth centuries and post-Second World War) may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place.





**EXPOSURE — GENERAL**

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
<p>Change in seasonal rainfall (chronic)</p>	<p>Increase in rainfall events and their intensity leading to increased frequency and intensity of flooding, erosion and soil degradation</p>	<p>Increased frequency and intensity of flooding leading to more frequent and prolonged saturation of foundations and exposed walls and erosion of soils</p>	<ul style="list-style-type: none"> <li>Types of material (e.g. wood, metal, stone, brick, mortar cement, fibro) will be affected differently by more prolonged and frequent saturation; design and construction techniques will influence the nature and extent of impacts</li> <li>Increased water erosion and movement of soils may destabilise structures causing cracking and potential collapse, with associated loss of use</li> </ul>	<ul style="list-style-type: none"> <li>Floods: build defences against flash flooding (e.g. divert water) and reinforce foundations to avoid collapse in a flood</li> <li>Re-engineer drainage</li> <li>Consider water attenuation away from the building</li> <li>Monitor erosion and increase maintenance and repair regime</li> </ul>
<p>Increase in mean temperature</p>	<p>Increased frequency, duration and intensity of drought events</p>	<p>Loss of ground cover, drying and cracking of soils, and wind erosion</p>	<ul style="list-style-type: none"> <li>Drying, cracking or movement of soils may affect the stability of structures</li> <li>Types of material (e.g. wood, metal, stone, brick, mortar cement, fibro) will be affected differently by increasing dryness; design and construction techniques will influence the nature and extent of impacts</li> </ul>	<ul style="list-style-type: none"> <li>Monitor cracking and increase maintenance and repair regime to ensure structural integrity</li> <li>Maintenance of roofs, rainwater and drainage infrastructure</li> </ul>





## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days (&gt;35°C and &gt;40°C)</p>	<p>Increased frequency and intensity of bushfires</p>	<p>Directly related to proximity and/or connectively to bush</p>	<ul style="list-style-type: none"> <li>Types of material and construction will be affected differently by fire</li> <li>Increased erosion following a bushfire event may affect the stability of structures</li> <li>Access routes may be damaged</li> <li>The setting of the building may be impacted</li> </ul>	<ul style="list-style-type: none"> <li>Bushfire planning</li> <li>Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>Ensure there is a vegetation maintenance regime</li> <li>Add defences where possible, such as sprinklers or wrapping against ember attack</li> <li>Undertake post-bushfire risk assessment for cumulative impacts (water run-off and erosion)</li> <li>Undertake post-bushfire remediation action including tree felling, vegetation clearance, firebreaks and grading</li> <li>Install natural ventilation dampers to eliminate smoke penetration</li> </ul>
	<p>Heatwaves and extreme temperatures</p>	<p>Construction materials and techniques will be affected differently by heat and soils will be susceptible to drying and cracking</p>	<ul style="list-style-type: none"> <li>Impacts will vary for different types of materials (wood, metal, stone, brick, mortar cement, fibro)</li> <li>Drying, cracking and movement of soils may affect the stability of structures</li> </ul>	<ul style="list-style-type: none"> <li>Monitor cracking and increase maintenance and repair regime to ensure structural integrity</li> <li>Improve ventilation potential where possible without impact to significant fabric</li> </ul>
 <p>More extreme rainfall events (acute)</p>	<p>Flooding, erosion and landslips</p>	<p>Depends on terrain (local conditions)</p>	<ul style="list-style-type: none"> <li>Structural damage or collapse and damage to access routes</li> </ul>	<ul style="list-style-type: none"> <li>Floods: build defences against flash flooding (divert water) and reinforce foundations to avoid collapse in a flood</li> <li>Retreat: plan for site recording and accept loss or relocation of site where feasible in consultation with local community</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding with damage to and destruction of buildings; depending on the elevation of the building; this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> <li>○ The setting of the building may be impacted</li> <li>○ Salt water may affect construction materials in different ways</li> </ul>	<ul style="list-style-type: none"> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>○ Protect: add barriers/diversions where possible</li> <li>○ Consider early nature-based solutions such as revegetation of mobile coastal dunes</li> </ul>
 <p>More intense or more frequent storms</p>	<p>Coastal erosion impacts</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for storm damage or destruction of buildings (or parts) during storms and through coastal erosion caused by individual and recurring storm events</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase maintenance and structural integrity regime</li> <li>○ Increase rainwater management and drainage</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 More hotter days	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Heat stress: types of building material materials will be affected differently by heat; the nature and extent of impacts will depend on the design of the building and the construction techniques used</li> </ul>	<ul style="list-style-type: none"> <li>Increase shading (integrated planning)</li> <li>Increase monitoring and repairs regime</li> <li>Increase ventilation</li> <li>Consider thermal gain through windows, walls and roofs, retrofitting glazing and insulating building</li> </ul>
	Flash flooding	Depends on the condition of the structure and surrounding terrain and drainage system	<ul style="list-style-type: none"> <li>Direct impact on the fabric of the structure</li> <li>Pressure on house gutters and drainage with increased potential for flooding of roofed structures</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring, repair and/or upgrading of gutters, drains and stormwater infrastructure</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 Higher daily minimum temperatures and changes in precipitation	Changed freeze-thaw cycles, reduced snow cover and fewer cold days	Water run-off and changing drainage patterns	<ul style="list-style-type: none"> <li>Types of materials may be affected differently</li> </ul>	<ul style="list-style-type: none"> <li>Monitor erosion and increase maintenance and repair regime</li> </ul>

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## VULNERABILITY ASSESSMENT TABLE

# Shipwrecks

This table highlights some of the ways shipwrecks (partially or fully exposed, and submerged) may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place or object.





### EXPOSURE — GENERAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Ocean acidification and general change in chemical composition</p>	<p>Changes in material deterioration rate</p> <p>Changes in marine pest distribution</p>	<p>Depends on fabric, and local conditions</p>	<ul style="list-style-type: none"> <li>○ Increase in marine pest infestation leading to material degradation</li> <li>○ Changes in material degradation rate due to acidification</li> </ul>	<ul style="list-style-type: none"> <li>○ Assess risk and consider appropriateness of protecting or relocating at-risk wrecks or artefacts</li> <li>○ Consider further use and more frequent changing of sacrificial anodes to protect metal elements</li> <li>○ Document wrecks and artefacts at risk</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding with damage to and destruction of buildings; depending on the elevation of the building, this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> <li>○ The setting of the building may be impacted</li> <li>○ Salt water may affect construction materials in different ways</li> </ul>	<ul style="list-style-type: none"> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> <li>○ Protect: add barriers/diversions where possible</li> <li>○ Consider early nature-based solutions such as revegetation of mobile coastal dunes</li> </ul>
 <p>More intense or more frequent storms</p> <p>More extreme rainfall events (acute) leading to riverine floods</p>	<p>Coastal erosion impacts, flooding, erosion and landslips caused by river flows in estuarine locations</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for storm damage or destruction of wrecks</li> <li>○ Potential for loss or movement and exposure of wrecks and artefacts during storms and through coastal erosion caused by individual and recurring storm events or changes in river flows caused by flooding</li> </ul>	<ul style="list-style-type: none"> <li>○ Assess risk and consider appropriateness of protecting or relocating at-risk wrecks or artefacts</li> <li>○ Document wrecks and artefacts at risk</li> </ul>



## EXPOSURE — COASTAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place and its values	Examples of possible management approaches
 <p>More hotter days (&gt;35°C and &gt;40°C)</p>	<p>Temporary increase in water temperature, especially in shallow water</p>	<p>Exposed wrecks or those resting in shallow water</p>	<ul style="list-style-type: none"> <li>Possible damage to, or destruction of, exposed wrecks, and artefacts</li> <li>Increase in marine pest infestation leading to material degradation</li> <li>Types of material will be affected differently</li> </ul>	<ul style="list-style-type: none"> <li>Assess risk and consider appropriateness of protecting or relocating at-risk wrecks or artefacts</li> <li>Document wrecks and artefacts at risk</li> </ul>
	<p>Bushfires</p>	<p>Exposed wrecks or those resting in shallow water</p>	<ul style="list-style-type: none"> <li>Debris and deposits from bushfires can damage wreck or artefacts, especially those carried away by run-off</li> </ul>	<ul style="list-style-type: none"> <li>Assess risk and consider appropriateness of protecting or relocating at risk wrecks or artefacts</li> </ul>

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## VULNERABILITY ASSESSMENT TABLE

# Subsurface archaeological deposits

This table highlights some of the ways subsurface archaeological deposits may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place or object.




### EXPOSURE — GENERAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 Change in seasonal rainfall (chronic)	Increase in rainfall events and their intensity leading to soil degradation	Directly related to the condition and integrity of archaeological deposits and the nature of the sediment matrix	<ul style="list-style-type: none"> <li>○ Archaeological material (e.g. wood, brick, metal, stone, ceramic, faunal remains, plant remains) will be affected differently</li> <li>○ Increase in rainfall: more frequent and prolonged saturation of archaeological deposits and erosion of soils and deposits</li> <li>○ Increase in rainfall: increased water erosion, movement and destabilisation of soils causing exposure of archaeological deposits, with loss of integrity and archaeological material</li> <li>○ Decrease in rainfall: drying, cracking of soils and increased wind erosion leading to destabilisation of soils and exposure of archaeological deposits, with loss of integrity and archaeological material</li> </ul>	<ul style="list-style-type: none"> <li>○ Re-engineer drainage</li> <li>○ Monitor erosion or degradation</li> <li>○ Plan for rescue excavation and off-site conservation of material, if appropriate and possible</li> </ul>
 Increase in mean temperature				



## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
<i>continued from previous page</i>	Increased frequency, duration and intensity of drought events	Directly related to the condition and integrity of archaeological deposits and the nature of the sediment matrix  Soils susceptible to drying and cracking	<ul style="list-style-type: none"> <li>○ Archaeological material (e.g. wood, brick, metal, stone, ceramic, faunal remains, plant remains) will be affected differently</li> <li>○ Loss of ground cover, drying, cracking and movement of soils with exposure of archaeological deposits, causing loss of integrity and archaeological material</li> <li>○ Increased wind erosion exposing archaeological deposits, causing loss of integrity and archaeological material</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Increased monitoring and/or targeted education around the illegality of disturbing archaeological sites</li> <li>○ Introduce additional protection in the form of vegetation or other wind/weathering protection</li> </ul>
 More hotter days (>35°C and >40°C)	Increased frequency and intensity of bushfires	Directly related to proximity and/or connectivity to bush	<ul style="list-style-type: none"> <li>○ Loss of vegetation cover, heating and cracking of soils, increased water and wind erosion following bushfire event impacting on different types of materials (e.g. wood, brick, metal, stone, ceramic, faunal remains, plant remains)</li> <li>○ Exposure of archaeological deposits, with loss of integrity and archaeological material</li> <li>○ Increased visibility of archaeological material leading to increased susceptibility to looting</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase maintenance regime (e.g. vegetation management)</li> <li>○ Importation of additional protective fill material if appropriate and possible</li> </ul>
	Heatwaves and extreme temperatures	Directly related to the condition and integrity of archaeological deposits and the nature of the sediment matrix  Soils susceptible to drying and cracking	<ul style="list-style-type: none"> <li>○ Drying, cracking and movement of soils impacting on different types of materials (e.g. wood, brick, metal, stone, ceramic, faunal remains, plant remains)</li> <li>○ Exposure of archaeological deposits with loss of integrity and archaeological material</li> <li>○ Increased visibility of archaeological material leading to increased susceptibility to looting</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> </ul>



## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
<p>More extreme rainfall events (acute)</p>	Flooding, erosion and landslips	Depends on terrain (local conditions)	<ul style="list-style-type: none"> <li>○ Damage to buried deposits from the force of flood water, debris and sediments</li> <li>○ Exposure of previously buried archaeological materials</li> </ul>	<ul style="list-style-type: none"> <li>○ Ensure drainage is adequate for managing extreme events</li> <li>○ Cover sites if appropriate and their value warrants the resources required</li> <li>○ Increased monitoring and/or targeted education around the illegality of disturbing archaeological sites</li> </ul>





## EXPOSURE — SUBMERGED / OCEANIC (SUBMERGED LANDSCAPES)

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
<p>Sea temperature rise</p>	Different and more rapid chemical and biological processes	Depends on the nature and context of deposits	<ul style="list-style-type: none"> <li>○ Degrading of archaeological materials that may characterise cultural deposits</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring regime</li> </ul>
<p>More intense or more frequent storms</p>	Scouring and increased erosion	Directly related to the condition and integrity of archaeological deposits, and the nature and depth of the overlying sediment matrix	<ul style="list-style-type: none"> <li>○ Loss of overlying and cultural deposits with exposure by currents</li> <li>○ Loss of integrity and archaeological material</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring regime</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation and flooding with damage to, or destruction of, subsurface archaeological deposits depending on their elevation; this could be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>○ Improve drainage</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>
 <p>More intense or more frequent storms</p>	<p>Coastal erosion</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for storm damage to buried archaeological deposits in coastal zones, either through modification of soil (salinity ingress) or through direct damage (storms) exposing, damaging and destroying buried deposits</li> </ul>	<ul style="list-style-type: none"> <li>○ Introduce coastal protection</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>Low potential for impact to subsurface archaeological deposits beneath built structures and roads</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>Higher daily minimum temperatures and changes in precipitation</p>	Changed freeze-thaw cycles, reduced snow cover and fewer cold days	Local distribution of native/non-native vegetation	<ul style="list-style-type: none"> <li>Loss or change in ground cover may affect soil stability with potential to expose subsurface archaeological deposits</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> </ul>

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## VULNERABILITY ASSESSMENT TABLE

# Surface archaeological remains

This table highlights some of the ways surface archaeological remains may be vulnerable to the effects of climate change. It is not intended to be comprehensive and the examples of possible management approaches will not be appropriate in all cases. Qualified and experienced heritage specialists should be consulted in undertaking any climate vulnerability or risk assessment of your place or object.




### EXPOSURE — GENERAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 Change in seasonal rainfall (chronic)	Increase in rainfall events and intensity leading to increased frequency and intensity of flooding, erosion and soil degradation	Depends on fabric and local conditions	<ul style="list-style-type: none"> <li>Types of material (e.g. wood, brick, metal, stone, bone, ceramic, glass) will be affected differently</li> <li>Increased frequency and intensity of flooding may directly impact and destabilise and move structures and artefacts</li> <li>Frequent and prolonged saturation of soil may impact archaeological features, re-burying or exposing archaeological material</li> <li>Increased water erosion and movement of soils may destabilise structures causing cracking and collapse of structures</li> </ul>	<ul style="list-style-type: none"> <li>Re-engineering drainage</li> <li>Monitor erosion or degradation and plan for removal and off-site conservation of material, if/where possible</li> <li>Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>
 Increase in mean temperature				




## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
<i>continued from previous page</i>	Increased frequency, duration and intensity of drought events	Loss of ground cover, drying and cracking of soils, and wind erosion	<ul style="list-style-type: none"> <li>○ Drying, cracking or movement of soils may affect the stability of structures and the location of artefacts</li> <li>○ Increased dryness will affect materials (e.g. wood, brick, metal, stone, bone, ceramic, glass) in different ways</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>
 More hotter days (>35°C and >40°C)	Increased frequency and intensity of bushfires	Directly related to proximity and/or connectivity to bush	<ul style="list-style-type: none"> <li>○ Damage to, or destruction of structures, features and artefacts; types of material will be affected differently</li> <li>○ Loss of vegetation cover, heating and cracking of soils, and increased erosion following a bushfire event may affect the stability of structures and location of artefacts</li> <li>○ Increased visibility of archaeological material leading to increased susceptibility to looting</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase maintenance regime (e.g. vegetation management)</li> <li>○ Increased monitoring and/or targeted education around the illegality of disturbing archaeological sites</li> <li>○ Plan for recording and relocation if risk is unacceptable, and if appropriate and possible</li> <li>○ Plan for rescue excavation and off-site conservation of material, if/where possible</li> </ul>
	Heatwaves and extreme temperatures	Soils susceptible to drying and cracking	<ul style="list-style-type: none"> <li>○ Impacts will vary for different types of materials (e.g. wood, brick, metal, stone, bone, ceramic, glass)</li> <li>○ Drying, cracking and movement of soils may affect the stability of structures and location of artefacts</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Indoor relocation if appropriate and possible</li> </ul>




## EXPOSURE — GENERAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>More extreme rainfall events (acute)</p>	<p>Flooding, erosion and landslips</p>	<p>Depends on terrain (i.e. local conditions)</p>	<ul style="list-style-type: none"> <li>○ Damage to or collapse of structures, impact to archaeological features and re-burying or exposing of archaeological material</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — COASTAL

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>Sea-level rise</p>	<p>Worsened coastal flooding, storm surge and coastal erosion that over time can result in permanent inundation of low-lying areas</p>	<p>Depends on terrain and potential defences (e.g. sea wall) – refer to local information</p>	<ul style="list-style-type: none"> <li>○ Potential for inundation, flooding and loss of archaeological features and artefacts</li> <li>○ Damage and destruction of structures</li> <li>○ Depending on the elevation of the archaeological material this may be intermittent during high tide and storm surge events (acute) and eventually permanent</li> </ul>	<ul style="list-style-type: none"> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>






## EXPOSURE — COASTAL *continued*

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>More intense or more frequent storms</p>	Coastal erosion impacts	Depends on terrain and potential defences (e.g. sea wall) – refer to local information	<ul style="list-style-type: none"> <li>○ Potential for storm damage or destruction of structures, archaeological features and artefacts during storms and through coastal erosion caused by individual and recurring storm events</li> </ul>	<ul style="list-style-type: none"> <li>○ Plan for recording, excavation and off-site conservation if risk is unacceptable, and if appropriate and possible</li> <li>○ Retreat: plan for site recording and accept loss or relocation of site where feasible, in consultation with local community</li> </ul>




## EXPOSURE — URBAN

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 <p>More hotter days</p>	Heat island effect in urban areas can increase local temperatures by several degrees compared to nearby rural areas	Local 'urban heat island' mapping determines specific micro-climate risks	<ul style="list-style-type: none"> <li>○ Heat stress: types of material will be affected differently</li> </ul>	<ul style="list-style-type: none"> <li>○ Increase monitoring and maintenance regime</li> <li>○ Indoor relocation if appropriate and possible</li> </ul>



## EXPOSURE — ALPINE

Climate change variables	Key climate change impacts	Sensitivity of the place to climate change impacts	Examples of impacts on the place or object and its values	Examples of possible management approaches
 Higher daily minimum temperatures and changes in precipitation	Changed freeze–thaw cycles, reduced snow cover and fewer cold days	Local distribution of native/non-native vegetation	<ul style="list-style-type: none"> <li>Loss or change in ground cover may affect soil stability with potential to expose subsurface archaeological deposits</li> </ul>	<ul style="list-style-type: none"> <li>Increase monitoring and maintenance regime</li> </ul>

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