6.14 Bushfire

This section provides a summary of the assessment of potential bushfire risks during construction and operation of the proposal and identifies mitigation measures to address these impacts. A detailed assessment of bushfire risk is presented in the technical working paper – bushfires (Appendix P).

6.14.1 Methodology

The bushfire risk assessment involved the following:

- Review of the existing bushfire management arrangements for the proposal area
- Desktop review of the existing environment including weather patterns, climate change projections, topography, vegetation, historic fires and potential ignition sources
- Development of most likely bushfire scenarios
- Assessment of the bushfire attack level for the proposal in accordance with AS3959:2018 Construction of building in bushfire prone areas.

6.14.2 Existing environment

Bushfire weather

The study area experiences a temperate climate, characterised by cool and relatively dry winters and warm and relatively wet summers. Afternoon winds in the study area are predominantly from the west, south-west or east during the main fire danger period. These winds tend to be associated with more dangerous fire weather conditions (characterised by higher temperature, lower humidity and elevated wind speed).

Average monthly fire danger ratings are generally in the low to moderate range throughout the year. Days of very high fire danger rating have been recorded in every month apart from May, June and July. Days with severe fire weather conditions have only been recorded between November and February (18 days over 26 years).

The bushfire season generally runs in the study area between October and March (Lithgow BFMC, 2020), but may be extended earlier or later depending on seasonal conditions. The most extreme fire weather conditions occur on days with temperature, low humidity and strong, gusty north-westerly winds. Lightning storms are common in the mountains throughout the region during the bushfire season and are one of the main causes of bushfire ignition.

Climate change is projected to alter fire weather conditions in the study area resulting in increased temperatures, decreased cool season rainfall and increased warm season rainfall, decreased relative humidity and small changes to wind. These projections indicate that bushfire weather will generally become harsher, although some extreme values may be moderated as a result of projected increases in summer rainfall. Days with more dangerous fire weather conditions (fire danger rating of very high or above) are projected to become more frequent and occur through more months of the year. Fire danger is projected to extend into the extreme range by 2050, although such days would be uncommon.

Topography and vegetation

Landforms in the area surrounding the proposal are highly variable. Elevation ranges from less than 750 metres along the valley of the River Lett to over 1100 metres at the Hassans Walls and over 1000 metres around Mount Victoria. Slopes along the ridges connected to the Blue Mountains (e.g. Hassans Walls, Mount Victoria, and Mount York) are typically very steep. The hills to the west of Hartley are lower (typically less than 900 metres) and their slope is more subdued.

Fire behaviour is strongly influenced by slope and aspect. The rate of spread of a fire approximately doubles for each 10 degree increase in slope. Vegetation and bushfire fuels on southerly aspects (particularly in areas with significant topographic relief) are typically wetter and less fire prone than vegetation on more northerly aspects. While vegetation and other bushfire fuels may become highly flammable after prolonged drought and under extreme fire weather conditions, fires in these areas are typically less intense and slower moving.

Bushfires in elevated areas are typically exposed to stronger winds. This may exacerbate fire behaviour and contribute to long-distance spotting activity.

Topography and the location of native vegetation will strongly influence fire conditions experienced along the proposed route of the proposal. Where the highway is located below areas of vegetation and steep slope (e.g. below Hassans Walls), it is likely to be relatively protected from fire. However, where the proposal is located at the top of steep, vegetated slopes (e.g. in the hills to the west of Little Hartley village), it may be exposed to a rapidly moving, intense wildfire.

In higher elevation areas, vegetation typically comprises dry or wet sclerophyll forest. Along lower sections of the Greater Western Highway between Hartley and Little Hartley the vegetation consists of fragmented areas of grassy woodland. A riparian corridor (forested woodlands) has been retained along at the River Lett. Apart from the ranges areas that are connected with the Blue Mountains, native vegetation throughout the study area is quite fragmented, as a result of the long history of agricultural clearing and land use.

Most reasonably intact areas of native vegetation in the study area are classified category 1 (high risk) bushfire prone vegetation. The remainder of the study areas supports category 2 (moderate risk) vegetation, apart from Mount Victoria township.

Fire history and ignition sources

The Lithgow Bush Fire Management Committee (BFMC) area, which includes the area surrounding the proposal, has on average 128 bush or grass fires each year, of which about three per year develop into major fires (greater than 20 hectares). The two largest bushfires in the landscape around the study area were at Mount Victoria and Mount York region in the 2013-14 and 2019-20 seasons, respectively. The 2019-20 bushfires affected over 200,000 hectares of land in the Lithgow BFRMP area (Lithgow BFMC, 2020).

The main ignition sources in the landscape surrounding the study area are (Lithgow BFMC, 2020):

- Lightning activity
- Escaped fires from legal burning activities by private landholders
- Illegal or careless burning activities by private landholders, mostly in grasslands or vegetated areas near villages

While bushfires occur at relatively high frequency in the Blue Mountains, they are uncommon in the immediate proposal environs.

6.14.3 Potential impacts

Potential bushfire scenarios

There are a variety of circumstances that could give rise to bushfire risk to the proposal and study area. Three key scenarios that pose the greatest risk are:

Scenario 1

A fire ignites in one of the large patches of native vegetation areas within or to the north-west of the study area (e.g. Marrangaroo National Park, Hassans Walls) on a day with elevated fire weather conditions and strong winds from the north-west. The fire descends or spots into lower lying rural land and then runs to the south-east as a grass/bushfire through the South Bowenfels, Little Hartley and/or Hartley areas – roughly parallel to the Great Western Highway. The fire would burn rapidly up vegetated north-west facing slopes of the low hills in this area and more slowly down the hills. Depending on wind direction, the fire could then burn rapidly uphill along a wide front from south of Mount Victoria to Mount York.

The fire would spread rapidly along the path of the highway and generate flames, smoke and embers that could affect signs, guard rails and other road furniture, as well as pose a safety risk to any road users (or construction crews, if the fire occurred during that phase of the proposal). Farming land and settlements in the study area would be threatened. Large trees along on the roadside with hollows or other defects may be further damaged by the fire and could burn out at the base and collapse or pose a safety risk after the fire has passed.

This scenario describes circumstances where the most severe bushfires are likely to occur within the study area. Based on fire history in the landscape surrounding the study area, a fire of this nature could occur every decade or so, although not every such fire would actually affect the immediate proposal environs

Scenario 2

A fire ignites within grassy woodland areas on either side of the highway corridor during a period of moderately elevated fire weather, with strong winds blowing from the west or east. Depending on the ignition point, prevailing winds could drive the fire towards and (most likely) across the Great Western Highway (towards Mount Blaxland or the Blue Mountains). Embers, smoke and radiant heat from the fire would affect road furniture, road users, construction crews and construction equipment (during this phase) but not likely to the same extent as under scenario 1. Fire impacts would be greatest where fires were driven up heavily vegetated slopes towards the highway

Scenario 3

Road accident, careless behaviour of road users or construction activity resulted in fire ignition allow the Great Western Highway on a day with highly elevated fire weather conditions. Depending on the location of the ignition point, the fire could burn in grassland or grassy woodland along the highway corridor or divert to the south or north, affecting road users, the smaller settlements within and near the study area and/or burn into the Blue Mountains (where it would be difficult to contain).

This scenario is similar to scenario 1, although that the fire in this scenario would be attributable to construction or operation of the proposal. Since the fire would ignite in close proximity to the proposal, it may not affect as much of the highway corridor as scenario 1 and may not affect the smaller settlements in the study area to the same extent. If such a fire reached the Blue Mountains, it would be difficult to contain and could grow to a significant size.

Bushfire attack level exposure

Bushfire Attack Level (BAL) is a quantitative measure of potential bushfire risk calculated using AS3959:2018 Construction of building in bushfire prone areas (Standards Australia, 2018). Bushfire attack level is affected by the area, vegetation, distance from the vegetation, and the slope of the area. There are six bushfire attack levels (refer to Table 6-124).

Table 6-124 Bushfire attack level

BAL	Description of risk
Low	Lowest risk from a potential fire

BAL	Description of risk
12.5	Risk is primarily from potential embers during a fire
19	Moderate risk, particularly from embers and burning debris
29	High risk, particularly from embers, debris and heat
40	Very high risk, likely to be impacted by embers, debris, heat and potentially flames
Fire Zone	Extreme risk, directly exposed to the flame of a potential fire front

Should native vegetation in the vicinity of the proposal be ignited in a bushfire, it would potentially expose infrastructure, construction crews and road users to radiant heat and embers. BAL was calculated for sections of the road where there were forests or woodlands adjacent to the construction footprint. A slope of five to ten degrees was assumed for sections where the terrain was sloping up towards the road. A flat surface was assumed elsewhere. Areas of bushfire attack level within the proposal are shown in Figure 6-58 and Figure 6-59.

Figure 6-58 Bushfire attack level in the southern portion of the proposal

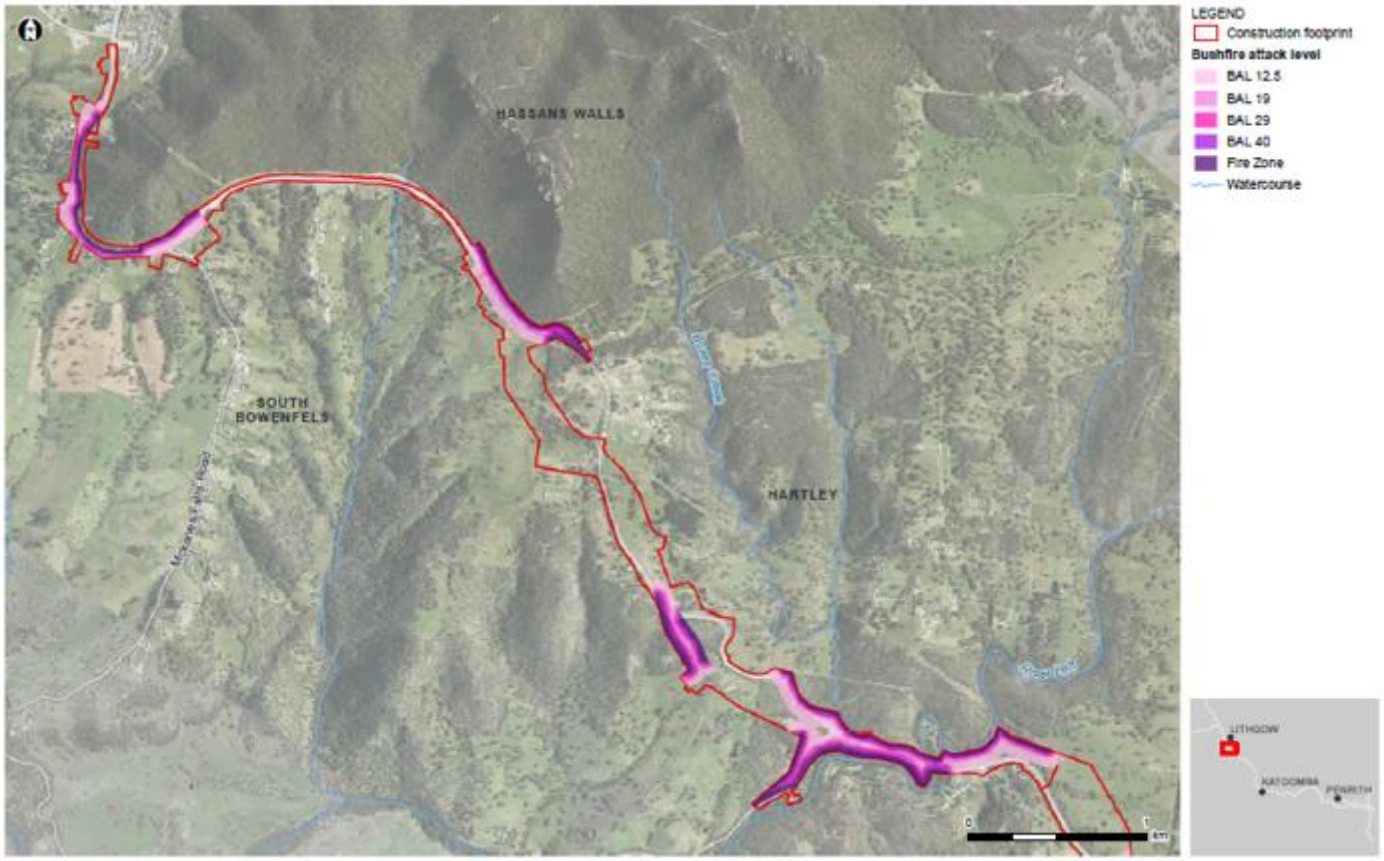

Figure 6-59 Bushfire attack level in the northern portion of the proposal

6.14.4 Safeguards and management measures

Table 6-125 Safeguards and management measures – bushfire

Ref	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
BF01	Emergency access during construction	In the event of a fire, emergency services will be able to gain access via existing Great Western Highway or tracks used for construction activities. Access and egress to/from private properties in bushfire prone areas adjoining the construction corridor will be maintained, with advice on any access changes provided to RFS in advance of the bushfire season.	Construction contractor	Construction	Appendix P	All
BF02	Hot works	Works that have potential to generate sparks or heat and ignite fires will be subject to the contractor's hot works safety	Construction contractor	Construction	Appendix P	All

Ref	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
		management procedures. Hot works will not be undertaken on total fire ban days except where permission has been given by the RFS. Construction equipment and contractor's vehicles will carry fire extinguishers or knap sacks to help extinguish any small fires that may be ignited by construction activities.				
BF03	Hazardous materials storage	Storage of hazardous and flammable materials should follow environmental protection guidance and be located in areas with low radiant heat exposure in the event of a bushfire. Any hazardous fuel storage areas should be free of vegetation or any other combustible materials that could contribute to a fire ignition.	Construction contractor	Construction	Appendix P	All
BF04	Emergency management	On site bushfire emergency management arrangements will be addressed through the construction contractor's site emergency management plan. This plan will specify notifications to emergency services in case of fire, emergency assembly areas and evacuation procedures. If a fire is ignited and cannot be safely contained using fire extinguishers or other materials at hand, construction crews will dial 000 and seek emergency service assistance.	Construction contractor	Construction	Appendix P	All
BF05	Operational bushfire risks	Grass within the highway corridor should be inspected and maintained at the commencement of	Transport	Operation	Appendix P	All

Ref	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
		the fire season (and through the fire season, if required) to reduce fuel loading and the potential for fire ignition and to create a low bushfire fuel zone in the immediate vicinity of the road. Woody vegetation in the vicinity of the road should also be actively managed to remove dead plants. Roadside trees should be inspected for stability and safety following any fire event to minimise the risk posed to road users.				
BF06	Operational access	Design would incorporate the need for safe emergency vehicle access at all times.	Transport	Operation	Appendix P	All
BF07	Fire weather signage	Roadside signage should be erected at either end of the proposal that informs road users of the daily fire weather forecast (i.e. the daily Fire Danger Rating). On days of highly elevated fire danger (extreme or catastrophic fire danger), additional advice should be posted that advises road users to reconsider the need for travel.	Transport	Operation	Appendix P	All
BF08	Road closures	During active fire events in the landscape surrounding the proposal, emergency services should consider temporary road closures to all but emergency service vehicles.	Transport	Operation	Appendix P	All