Notice of and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act* 2016 (the Act), has made a Final Determination to list the shrub *Grevillea rivularis* L.A.S.Johnson & McGill. as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Grevillea rivularis* L. Johnson & McGillivray from Part 2 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

The NSW Threatened Species Scientific Committee has found that:

1. *Grevillea rivularis* L.A.S.Johnson & McGill. (family Proteaceae), the Carrington Falls Grevillea, is described as a "spreading almost glabrous shrub 1–2 m high. Leaves with secondary or occasionally tertiary divisions, 3–6 cm long, with 3–9 primary lobes each with 3–5 divaricate secondary lobes, ultimate lobes linear to very narrow-triangular, 1–3 cm long, 1–2.5 mm wide, pungent; margins revolute, enclosing most or all of the lower surface except the midvein. Inflorescences secund, 5–6 cm long. Perianth cream becoming pearly pink or grey, glabrous. Gynoecium 27–32 mm long; ovary densely hairy; style cream becoming pearly pink or grey, glabrous, pollen presenter erect to oblique. Follicle hairy with reddish brown stripes or blotches" PlantNET (2016).

2. *Grevillea rivularis* is endemic to New South Wales (NSW) and is only known from Carrington Falls in the Southern Highlands near Robertson, 34 km south-west of Wollongong. The only known population mostly occurs in the area formerly known as Carrington Falls Reserve (NSW NPWS 1998), now part of Budderoo National Park.

3. *Grevillea rivularis* is confined to the riparian zone in an area receiving 1,000–1,600 mm annual rainfall (Benson and McDougall 2000; Pickup *et al.* 2003). It predominantly grows on moist creek-sides in open wet heath or *Eucalyptus*-dominated woodland or forest on sandstone geology (McGillivray 1975; Benson and McDougall 2000; PlantNET 2016; Pickup *et al*. 2003; OEH 2015). Associated species include *Leptospermum lanigerum, Baeckea utilis, Acacia longifolia, A. terminalis, Callicoma serratifolia, Ceratopetalum apetalum, Hakea microcarpa, Banksia ericifolia, B. paludosa, Melaleuca squarrosa, Epacris impressa, Persoonia* sp.*, Pomaderris* sp.*, Isopogon* sp., *Gleichenia* sp. and numerous sedges and rushes (TSSC 2008). Eleven individuals have also been found in woodland > 500 m from the stream edge (OEH 2015) and one isolated plant occurs in an old quarry (J. Devereaux *in litt.* 26 April 2016).

4. *Grevillea rivularis* is subject to periodic disturbance from floods (Pickup *et al.* 2003). Damage to *G. rivularis* individuals is evident post-flood but mortality of adult plants appears to be rare (J. Devereaux *in litt.* April 2016). However, there have been recent observations of seedling mortality due to flooding (J. Devereaux pers. comm. October 2016). *Grevillea rivularis* habitat is also subject to periodic fire. Most of the habitat was last burnt in 1982–1983, apart from a small area burnt during hazard reduction in March 2016 (J. Devereaux pers. comm. October 2016). *Grevillea rivularis* is an obligate seeder, with plants killed by fire and the species relying on regeneration from a soil-stored seedbank (Pickup *et al.* 2003). Some germination of seeds occurs between fires (Pickup *et al*. 2003). In the habitat last burnt in 1982–1983, there is a dense canopy layer that shades much of the understorey. Within the understorey, ferns, grasses and sedges may compete with *G. rivularis* seedlings such that successful establishment is rare unless there is a disturbance that partly opens the canopy. In long-unburnt

habitat, seedling mortality rates are high and few young *G. rivularis* plants are successfully recruited into the mature population (OEH 2015). Seedling recruitment events have been observed in response to fires, flood events and soil disturbance by heavy machinery (Pickup *et al*. 2003).

5. The total number of mature individuals of *Grevillea rivularis* is low. There are currently estimated to be fewer than 1,000 plants (J. Devereaux *in litt.* December 2016) of which around half are mature. Repeat surveys across part of the known distribution in 1999 and 2015 indicated a ~60% reduction in abundance of plants (this includes mature plants, juveniles and seedlings) (J. Devereaux *in litt.* October 2016). This may reflect a natural decline in numbers due to senescence with increasing time since fire and/or a reduction in habitat quality brought about by human-related factors.

6. The geographic distribution of *Grevillea rivularis* is very highly restricted. The area of occupancy (AOO) and extent of occurrence were both estimated to be 4 km^2. The AOO is based on 2 x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2016).

7. A number of threats to *Grevillea rivularis* have been identified including habitat disturbance, adverse fire and flood regimes, impacts of weeds and introduced herbivores, climate change and drought (Department of Environment 2015; J. Devereaux *in litt.* April 2016). About 25% of the population occurs adjacent to tracks or roads (J. Devereaux *in litt.* April 2016). The risk of damage to *G. rivularis* is considered to be low along track edges but much greater near roads that are subject to maintenance or re-alignment (J. Devereaux *in litt.* April 2016). Illegal vehicle use on a gated trail, trampling by visitors, road verge maintenance and dumping of household and industrial waste are also threats to *G. rivularis* (Department of the Environment 2015; J. Devereaux *in litt.* April 2016). High frequency fire is considered a threat because the species is an obligate seeder, the population is restricted to one location and it only contains a small number of individuals (OEH 2015; J. Devereaux *in litt.* April 2016). In addition, *G. rivularis* has been reported to have a long primary juvenile period (>5 years) (OEH 2010). A combination of fire and flood in close succession may also be a threat as evidenced by the March 2016 flood destroying numerous seedlings which had emerged following a fire (J. Devereaux pers. comm. November 2016). Feral deer are present in the area and browsing is considered a threat to seedling survival (J. Devereaux *in litt.* April 2016). Since *G. rivularis* is largely restricted to riparian habitats, it is inferred that a drier climate, increased fire frequency and increased severe weather events (including droughts) are current and future threats (CSIRO 2015). 'Anthropogenic climatic change', 'Herbivory and environmental degradation caused by feral deer' and 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' are listed as Key Threatening Processes under the Act.

8. *Grevillea rivularis* L.A.S.Johnson & McGill. is eligible to be listed as a Critically Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation* 2017:

Clause 4.3 - Restricted geographic distribution of species and other conditions
(Equivalent to Equivalent to IUCN criterion B)

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted.
and the following conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species.

Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

Exhibition period: 01/12/17 – 26/01/18 Proposed Listing date: 01/12/17

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