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21 June 2021

Jillian Santry
Design and Product Development Manager, Scenic Rim Trail
Spicer's Retreats Hotels and Lodges Pty Ltd
168 Knapp Street, Fortitude Valley, QLD, Australia 4006
E-mail: Jillian.Santry@spicersretreats.com

Dear Jillian,

RE: TECHNICAL MEMORANDUM
Vegetation transect survey of Winder trail

Please find attached the results of a vegetation transect monitoring survey at representative sites along the existing and re-opened Winder management track for the 2020/21 reporting period.

Yours sincerely,

Dr Penn Lloyd
Principal Ecologist and Director
Biodiversity Assessment and Management Pty Ltd

File No	Author	Reviewer
0435-005TM2		

BACKGROUND

Spicer's Retreats Hotels and Lodges Pty Ltd (Spicers) has developed a multi-day bushwalking experience called the Scenic Rim Trail - Thornton Trailhead to Spicers Canopy Nature Reserve (SRT) that extends from Mt Mistake to Spicers Peak Nature Refuge, traversing the Main Range National Park (MRNP) in southern Queensland and the Gondwana Rainforests of Australia World Heritage Area. Construction of the re-opened section of the Winder management track between Mt Mistake and the northern end of the existing Winder fire management track was completed in April 2020. Commercial operation of the walking trail commenced on 21st June 2020. The re-opened section of the Winder management track follows the original road alignment of a former forestry road from the crest of the Mistake Range, about 500 m inland from the scarp, and traverses through cool subtropical rainforest. Construction of the re-opened section involved clearing regenerating rainforest vegetation along the old alignment to create a 2.5 m-wide management vehicle track and walking track.

The Scenic Rim Trail (SRT) Management Plan, State Version: Scenic Rim Trail – Main Range National Park commits to annually monitor transects established at representative sites along the existing and re-opened Winder management track to establish vegetation response to track construction and operation to meet Queensland Government conditions of approval for the Project.

This technical memorandum has been prepared to present the methodological approach and results of the second monitoring survey conducted by Dr Penn Lloyd on 28 March 2021 and compare the results to those of the first survey conducted on 25 September 2020.

METHODS

The purpose of the monitoring is to establish vegetation response to track construction and operation, with a particular focus on the introduction and spread of weeds. Weeds are predicted to affect the ground cover and shrub layers primarily. Consequently, the transect monitoring method focusses on native and introduced species richness and cover within these vegetation layers. Two representative monitoring sites were selected along each of the existing and re-opened Winder management track. A modified BioCondition transect sampling approach was conducted at each of the sites as follows. First, species richness of native and introduced species was measured within a 50 m x 5 m plot on either side the outer edge of the vehicle track, resulting in a 50 m x 10 m plot that does not include the vehicle track running along the plot centerline, recording native and introduced species richness in the grass, forb, vine and shrub vegetation layers. Second, ground vegetation cover (native and introduced) was measured within five 1 m x 1 m quadrats spaced at 10 m intervals along the 50 m transect, on alternating sides of the transect midline, where the midline excludes the vehicle track itself. Third, four photo-point photographs were taken at the midpoint of the transect in each of four directions, looking down the transect midline on each side and perpendicular to the transect midline on each side. Observations of general weed species occurrence were also recorded while traversing the different sections of the management track between monitoring sites.

RESULTS

The transect location co-ordinates are summarised in **Table 1** below.

Table 1. Summary of the location co-ordinates for the vegetation monitoring transects on the existing and re-opened sections of the Winder management track.

Track	Transect	Position	Latitude	Longitude
Existing	T1	Start	-27.962952	152.377912
Existing	T1	Middle	-27.962835	152.377666
Existing	T1	End	-27.962712	152.377463
Existing	T2	Start	-27.928611	152.348569
Existing	T2	Middle	-27.928391	152.34842
Existing	T2	End	-27.928243	152.348345
Re-opened	T3	Start	-27.920906	152.346331
Re-opened	T3	Middle	-27.920683	152.346259
Re-opened	T3	End	-27.920419	152.34621
Re-opened	T4	Start	-27.906944	152.342712
Re-opened	T4	Middle	-27.906714	152.342687
Re-opened	T4	End	-27.906506	152.342647

The results of the transect assessments are summarised in **Table 2** and **Table 3**.

Table 2. Summary of species richness and average cover in the grass, forb, vine and shrub layers at the four vegetation monitoring transects in March 2021.

Feature / Transect	Status	T1	T2	T3	T4
Grass species richness	Native	5	3	1	0
	Introduced	2	0	0	0
Forb species richness	Native	23	18	15	9
	Introduced	8	2	0	0
Shrub species richness	Native	11	23	20	13
	Introduced	1	1	0	0
Vine species richness	Native	10	5	9	3
	Introduced	0	0	0	0
Native grass cover (%)		4.4	1.8	0	0
Native forb & vine (<1m high) cover (%)		89.4	4.0	31.2	42.8
Native shrub (<1m high) cover (%)		0	1.6	2.4	1.4
Introduced grass cover (%)		0	0	0	0
Introduced forb, vine & shrub cover (%)		5.2	0	0	0
Litter cover (%)		1.0	76.0	43.0	24.8
Bare ground cover (%)		0	16.4	23.4	30.0
Rock cover (%)		0	0.2	0	1.0

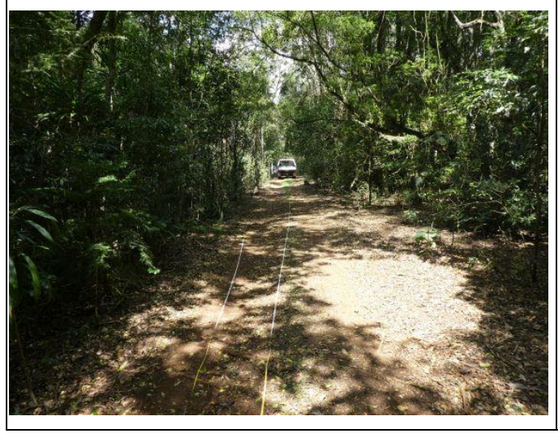
Table 3. Description and photo-point photos of the four vegetation monitoring transects.

Transect 1 (existing: 2020): Ecotone between eucalypt open forest and cool subtropical rainforest, affected by wildfire in late 2019. Dense ground layer dominated by diverse native forbs and grasses; sparse shrub layer dominated by rainforest tree saplings. Introduced weed species present in the ground layer only: *Ageratina adenophora* (Crofton Weed), *Ageratina riparia* (Mistflower), *Bidens pilosa* (Cobbler's Pegs), *Cerastium glomeratum* (Mouse-ear Chickweed), *Cirsium vulgare* (Spear Thistle), *Cyclospermum leptophyllum* (Slender Celery), *Crassocephalum crepidioides* (Thickhead), *Physalis peruviana* (Gooseberry), *Phytolacca octandra* (Inkweed), *Senecio madagascariensis* (Fireweed), *Solanum nigrum* (Blackberry Nightshade), *Sonchus asper* (Spiny Sowthistle), *Pennisetum clandestinum* (Kikuyu).	
	
	

Transect 1 (existing: 2021): Ecotone between eucalypt open forest and cool subtropical rainforest, affected by wildfire in late 2019. Dense ground layer dominated by diverse native forbs and grasses; sparse shrub layer dominated by rainforest tree saplings. Introduced weed species present in the shrub layer: *Lantana camara* (Lantana); and ground layer: *Ageratina adenophora* (Crofton Weed), *Ageratina riparia* (Mistflower), *Bidens pilosa* (Cobbler's Pegs), *Cirsium vulgare* (Spear Thistle), *Cyclospermum leptophyllum* (Slender Celery), *Physalis peruviana* (Gooseberry), *Phytolacca octandra* (Inkweed), *Solanum nigrum* (Blackberry Nightshade), *Sonchus asper* (Spiny Sowthistle), *Paspalum* sp., *Pennisetum clandestinum* (Kikuyu).	
	
	

Transect 2 (existing: 2020): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern) and *Adiantum formosum* (Giant Maidenhair Fern); mid-dense shrub layer dominated by rainforest tree saplings and *Cordyline petiolaris* (Broad-leaved Palm Lily). Introduced weed species present in the shrub layer only: *Lantana camara* (Lantana).






Transect 2 (existing: 2021): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern) and *Adiantum formosum* (Giant Maidenhair Fern); mid-dense shrub layer dominated by rainforest tree saplings and *Cordyline petiolaris* (Broad-leaved Palm Lily). Introduced weed species present in the shrub layer: *Lantana camara* (Lantana); and ground layer: *Ageratina adenophora* (Crofton Weed), *Sida rhombifolia* (Paddy's Lucerne). Extensive disturbance of soil surface by feral pigs.




Transect 3 (re-opened: 2020): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern); mid-dense shrub layer dominated by rainforest tree saplings, *Eupomatia laurina* (Bolwarra) and *Cordyline petiolaris* (Broad-leaved Palm Lily). No introduced weed species present in any vegetation layer.




Transect 3 (re-opened: 2021): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern); mid-dense shrub layer dominated by rainforest tree saplings, *Eupomatia laurina* (Bolwarra) and *Cordyline petiolaris* (Broad-leaved Palm Lily). No introduced weed species present in any vegetation layer. Extensive disturbance of soil surface by feral pigs.




Transect 4 (re-opened: 2020): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern); mid-dense shrub layer dominated by rainforest tree saplings, *Eupomatia laurina* (Bolwarra) and *Pittosporum multiflorum* (Orange Thorn). No introduced weed species present in any vegetation layer.




Transect 4 (re-opened: 2021): Cool subtropical rainforest. Sparse to mid-dense ground layer dominated by *Lastreopsis decomposita* (Shield Fern); mid-dense shrub layer dominated by rainforest tree saplings, *Eupomatia laurina* (Bolwarra) and *Pittosporum multiflorum* (Orange Thorn). No introduced weed species present in any vegetation layer. Extensive disturbance of soil surface by feral pigs.




EXISTING WINDER MANAGEMENT TRACK

The existing Winder management track passes through cool subtropical rainforest and along the ecotone between rainforest and eucalypt open forest along the crest of the escarpment. Ecotone areas as well as the rainforest ground cover in some areas were burned during the bushfires that the region experienced towards the end of a severe drought in late 2019. Ecotone areas, represented by Transect 1, had dense ground cover regrowth a year after the fire, with high native forb and vine species richness and cover. Ecotone areas also had higher species richness and cover of introduced weed species, including two Weeds of National Significance: Lantana and Fireweed; however, these did not dominate the shrub or ground cover (**Table 2**). Lantana occurred patchily along the rainforest edge whereas Fireweed occurred as occasional plants growing along the management track itself. Along sections of the management track passing through rainforest, represented by Transect 2, weeds were restricted to the edges of the track, mostly in areas where there were openings in the rainforest canopy; commonly occurring weeds in these locations were Lantana and Mistflower, but these did not dominate the shrub or ground cover (**Table 2**). Rainforest sections had lower native forb and grass species richness but higher shrub species richness due to a diversity of rainforest tree saplings in the understorey. There was little detectable change in vegetation at the transect sites between September 2020 and March 2021. In September 2020, there was limited evidence of recent feral pig activity along the existing Winder management track, but in March 2021 there was extensive evidence of recent feral pig activity along much of the track.

RE-OPENED WINDER MANAGEMENT TRACK

The re-opened Winder management track passes mostly through cool subtropical rainforest west of the crest of the escarpment, only occasionally passing through ecotone vegetation along the crest of the escarpment for very short stretches at its southern extent. The construction of the re-opened management track has involved minimal clearing of understorey vegetation to the width of the track only and no disturbance to the rainforest canopy; consequently, the vegetation adjoining the track had the same structure and species composition as the adjoining rainforest, with high shrub and vine species richness but relatively low forb and grass species richness, and introduced weed species were either absent or very occasional (**Table 2**, Transects 3 and 4). The vegetation along short sections in ecotone areas were fire-affected and had similar introduced weed species as observed along the existing Winder management track, particularly Lantana, Crofton Weed, Blackberry Nightshade and Inkweed, but these did not dominate the shrub or ground cover. A single occurrence of Fireweed was detected at the edge of the re-opened track in an ecotone area in September 2020. There was little detectable change in vegetation at the transect sites between September 2020 and March 2021 besides the effects of surface soil disturbance by feral pigs. In September 2020, no evidence of recent feral pig activity was detected along the re-opened Winder management track, but in March 2021 there was extensive evidence of recent feral pig feeding activity along most of the track traversed during the survey (**Photos 1** and **2**). Feral pig diggings extended for up to 20-30 m on both sides of the track and included extensive areas of soil surface disturbance.

	
Photo 1: Feral pig mud wallow dug on the edge of the re-opened Winder management track, March 2021.	**Photo 2**: Extensive surface soil disturbance from feral pig diggings along the edge of the re-opened Winder management track, March 2021.