Perthville Black Gum (*Eucalyptus aggregata*) Offset Site

Annual Condition Assessment Report

Bathurst Regional Council
August 2023

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Introduction

During August 2023, a condition assessment was carried out by Bathurst Regional Council (BRC) on 148 planted Black Gum's (*Eucalyptus aggregata*) at the Perthville Black Gum Offset Site, 8km south of Bathurst NSW.

The assessment is part of a twenty-year monitoring program as per the requirements of the *Environmental Planning & Assessment Act (NSW)* (EP&A Act) granted concurrence.

The assessment will allow BRC to determine existing vegetation condition three years on from initial planting in 2020 and assist BRC to understand how the trees are responding to planting treatment. The assessment will also clearly demonstrate that the project is achieving the primary objectives of the NSW Department of Planning & Environment (DPE) endorsed Perthville Black Gum Offset Site Offset Management Plan (OMP) (Bathurst Regional Council, 2020).

As per the requirements of the EP&A Act granted concurrence and OMP, the results of monitoring will be submitted in an annual report to the DPE and will be available online via the BRC website for view by the public.

Monitoring Method

A revegetation condition assessment methodology devised by Skillset Landworks Pty Ltd was used to score the health condition of each individual tree. Carried out by Council's environmental staff, each tree was assigned a condition score based on the criteria presented in **Table 1**.

Table 1 - Plant condition assessed using a point index assessment method.

Score	Description
3	Tree is alive and in a healthy condition. Tree is actively growing with no signs of significant stress or damage.
2	Tree is alive and in a moderately healthy condition. Tree is still actively growing but showing some evidence of stress.
1	Tree is alive but showing significant signs of stress that are impacting growth.
0	Tree is dead with no evidence of growth.

In addition to the above, it was noted if each individual tree exhibits any visual signs of the following:

- Browsing by herbivores and/or insects
- Frost damage
- Evidence of dehydration
- Evidence of vandalism (specific to people)
- Evidence of nutrient deficiency
- Evidence of damage by parasite

General observational notes were also taken to provide further information on the current condition of the offset site.

As per industry environmental monitoring guidelines, five (5) fixed photo monitoring points were established to provide baseline data on the ecological condition of the site prior to project commencement in February 2020. The projects third year of photo monitoring was conducted, almost three years on from the planting of the Black Gums in September 2020, to aid in assessing the impact of the environmental works over the life of the project and allow Council to make adaptive management measures, if required.

In addition to photo monitoring, weed mapping was undertaken to establish current site condition, to assess the effectiveness of weed management as well as the expected recovery of native vegetation following the removal of woody and herbaceous weeds. Although photo monitoring will provide a series of visual records of gross changes in vegetation it will not produce the quantitative records preferred for monitoring hence its use. Five (5) point quadrants using 10m line transects were located at respective photo monitoring points to ensure that different areas of the project site were sampled.

Surveys using indirect method of scat and track identification was conducted to determine the presence of vertebrate pests, livestock and macropods including kangaroo and/or wallaby.

Results

Revegetation

Overall condition ratings identified that 63.5% (94) of the trees surveyed received the highest health score of three (3) with trees alive and in healthy condition, and actively growing with no signs of significant stress or damage. 28.4% (42) of the trees surveyed received a health score of two (2) with trees alive, in a moderately healthy condition, and actively growing, however showing some evidence of stress. 2% (3) of trees surveyed received a health score of one (1) with trees alive but showing significant signs of stress that are impacting on growth. 6.1% (9) of the trees surveyed received the lowest health score of zero (0) as the trees were dead with no evidence of growth.

Of all trees surveyed, 16.2% (24) exhibited stunted growth, however 92% (136) exhibited the early stages of new growth, with 10.8% (16) of trees showing pre-flowering capsules (opercula).

Total survival rate of trees surveyed is 93.9% (139).

Weed Management

A total of five (5) monitoring points were surveyed with all monitoring points showing no evidence of target invasive weed species. The most prominent non-native grass species identified across the site was Phalaris sp. (*Bromus sp.*) with a median occurrence rate of 52%, with Monitoring Point 2 having the highest occurrence rate of 87% and Monitoring Point 1 having the lowest occurrence rate of 0%. Clover (*Trifolium sp.*), Phalaris Grass (*Phalaris sp.*), Dock (*Rumex sp.*), and Dandelion (*Taraxacum sp.*) were also identified across all monitoring points with a median occurrence rate of 10.1%.

Pest Management

91.89% (136) of trees surveyed exhibited partial to full canopy insect damage, with 2% (3) hosting psyllids or aphids and accompanying black sooty mould.

Discussion

As on the previous year's results, revegetation over the third year of the project has maintained a high survival rate of 92% (136) with an additional five (5) dead trees to last year's four (4) dead trees, bringing the total dead trees to nine (9) at the end of the reporting period. This is well above the minimum required survival rate of 80% identified in the Perthville Black Gum Offset Site OMP TARP. It must be noted that the four (4) dead trees were the same trees assessed as dead in the 2021 and 2022 Annual Condition Assessment Report and were not replaced although recommended. The decision to delay replacement was due to flood levee remediation works within the location of the four (4) dead trees, which if replaced would have impacted on their survivability. Council has been advised that replacement of these four (4) trees can proceed within that location pending the completion of minor earthworks to remediate a disused

drainage channel at the base of the North Street Flood Levee. The replacement of the additional five (5) trees will be undertaken throughout September 2023.

A total of 63.5% (94) of trees surveyed received the highest health score of three (3), 28.4% (42) of trees receiving a moderate health score of two (2), and 2% (3) of trees receiving a low health score of one (1). Approximately 92% (136) of trees surveyed exhibited the early stages of new growth, with pre-flowering capsules (opercula) evident across 42.57% (63) of trees surveyed (Figure 1). These high health scores, new growth and the increased presence of pre-flowering capsules (opercula) on previous year's data (only one (1) tree exhibited pre-flowering capsules) appear to correlate with the season (late Winter pre-Spring) at the time of survey, above-average rainfall that has persisted since early 2020 due to *La Niña* weather events, and milder temperatures during the of Summer 2020, 2021 and 2022 and Winter 2023. From observations, flooding in November 2022 and the subsequent depositing of alluvial soils rich in humus and organic nutrients, appears to have increased water retention capacity across the site aiding in the uptake of nutrients by the trees. Such conditions tend to promote or assist a climate conducive to healthy vegetation, high survival rates of revegetation and increased presence of flowering and fruiting eucalypts.

Whilst 16.2% (24) of trees exhibited stunted growth, this appeared to be restricted to trees located within the vicinity of the flood levee where soils have been highly disturbed, and where flood waters have pooled following flood events most recently as November 2022.

Figure 1: Black Gum no. 59 showing evidence of pre-flowering capsules (opercula). Note chewed leaf margins and curled leaves from insects on leaves at the top of the image.

Regular weed control works carried out across the site has made a significant contribution to nil (0%) target weed species notably Willow (*Salix sp*.), Blackberry (*Rubus fruticosus sp.*) and Poplar (*Populus sp.*) being present at the site. Although surveys conducted via the point quadrant method identified Prairie Grass (*Bromus sp.*) as a dominant non-invasive weed species with a median occurrence rate of 52%, regular slashing between plantings during the growing season will ensure minimal competition with the Black Gums and minimize seed set of the grass and other perennial and herbaceous weed species across the site.

Impacts by invertebrate pest species continue to present challenges in the management of the Black Gums with damage from insects including irregular holes, curled leaves, and chewed leaf margins observed (Figure 1) on 91.89% (136) of trees surveyed, with psyllids and aphids observed on 2% (3) of trees with accompanying black sooty mould observed on 1.35% (2) of trees. As on the previous year's figures, above-average rainfall from early 2020 to present, and milder conditions during the summers of 2020, 2021 and 2022, tend to promote an environment conducive to increased invertebrate pest activity. It is anticipated that with the establishment and maturity of the Black Gums that potential impacts by invertebrate pest species would be negligible.

Upgrading of fencing including the installation of a locked gate along North Street, and the installation of interpretative signage as per the Perthville Black Gum Offset Site OMP, have yet to be undertaken due to increased contractor rates because of supply chain issues, increased material costs and labour availability. It is proposed that these works will be undertaken during the 2023-2024 financial year pending funding.

Recommendations

1. Dead trees replaced with Black Gums or Box-Gum Grassy Woodland PCT species as per OMP TARP.
2. Repair or replace damaged mesh tree guards as per OMP TARP.
3. Increase slashing of groundcover across site during growing season to reduce competition by perennial and annual non-native grasses.
4. Replace degraded fencing along North Street with new fence posts, stock netting, sighter wire and gate.
5. Install interpretative signage at the North Street entrance to educate the public on the project.
6. Continue to monitor trees for leafhopper, sawfly, psyllids, and aphids and implement control program as per updated OMP TARP.

Reference

Bathurst Regional Council, 2020. *Perthville Black Gum Offset Site Offset Management Plan,* Bathurst NSW Australia: Bathurst Regional Council.

Attachments

Perthville Black Gum Offset Site - Site Map and Monitoring Points

Perthville Black Gum Offset Site Photo Point Monitoring Datasheets PP1-PP5

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LEGEND

Monitoring Points (PP#)

Fence

Black Gum trees

Brian Booth Recreational Ground

Seldon St

North St

Apsley St

BATHURST
REGIONAL COUNCIL
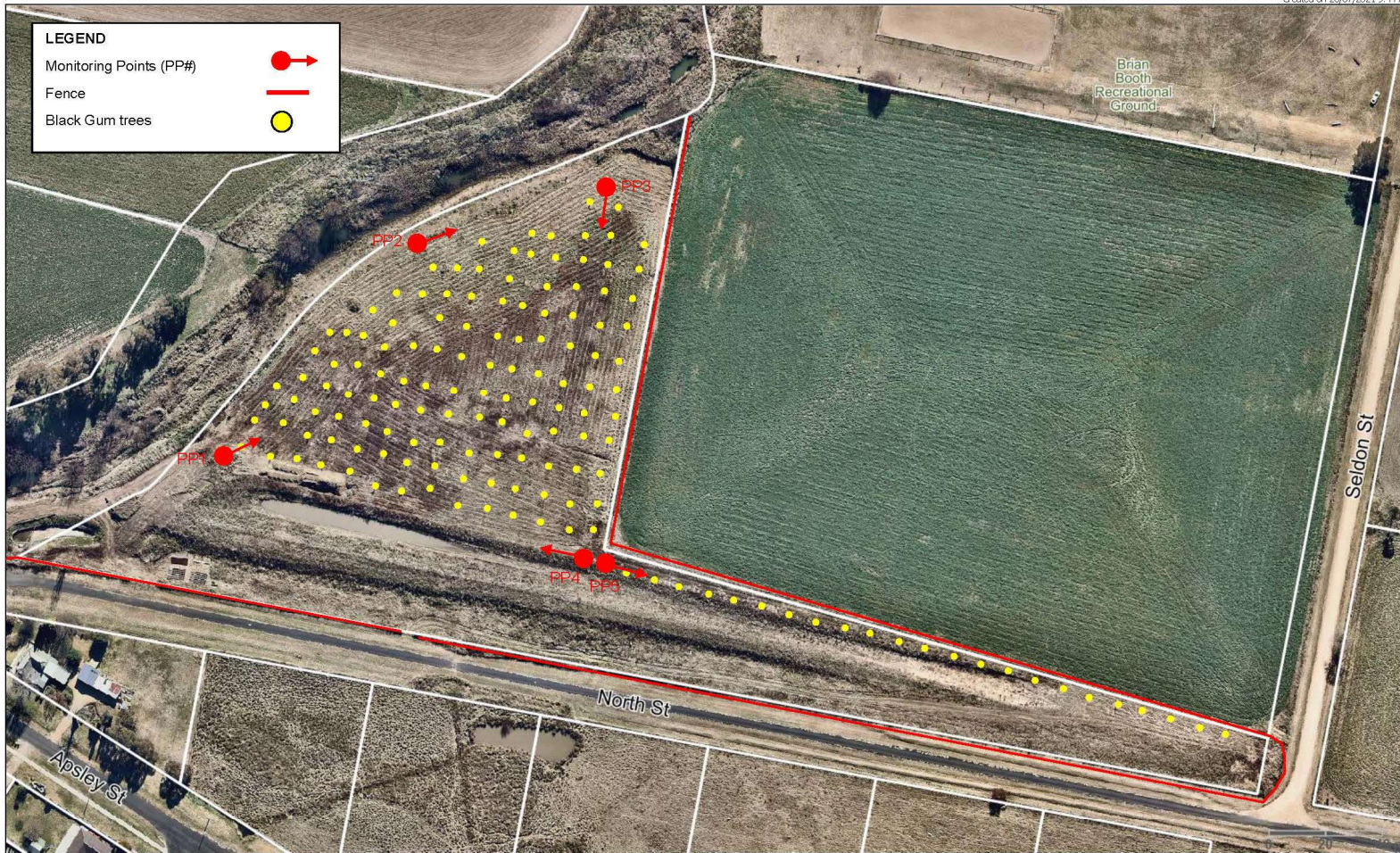
Bathurst Regional Council
PMB 17
158 Russell Street
BATHURST NSW 2795
Telephone: 02 6333 6111
Fax: 02 6331 7211
Email: council@bathurst.nsw.gov.au

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Drawn By: Kristie Kearney

Date: 28/07/2021

Projection: GDA94 / MGA zone 55

Map Scale: 1:1792 @ A4

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Perthville Black Gum Offset Site
Site Map & Monitoring Points

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site		Bearing		Longitude		Latitude
PP1	North Street, Perthville		72°		149.551453		-33.486819

Baseline (before works)	End of Year 1	End of Year 2	End of Year 3
Date	Date	Date	Date
7 February 2020	27 August 2021	10 August 2022	11 August 2023
Description	Description	Description	Description
Baseline photo prior to site preparation, weed control and planting of Black Gum	12 months after planting of Black Gums, 4 months after slashing of grass between plantings.	24 months after planting Black Gums, grass short due to recent slashing.	36 months after planting Black Gums, grass short due to regular slashing.
Comments	Comments	Comments	Comments
Floodplain between North Street flood levee and Queen Charlotte Vale Creek with stockpiled soil and road base from flood levee mitigation works. Ground highly compacted due to heavy machinery used on site.	Evidence of soil compaction from heavy machinery, and unauthorised storage of concrete form work from flood levee mitigation works. 57% of 10m line transect comprising of dead grass species, 30% bare earth, 10% unidentified grass species and 3% Clover. 0% target weed species were identified along the 10m line transect.	Evidence of recent flood due to water inundation and detritus. 80% of 10m line transect comprising of Phalaris, 10% Indian Mustard, 3% Purple top, Prairie grass and dead grass respectively. 0% target weed species were identified along the 10m line transect. Significant growth on Black Gums with 0.7% trees exhibiting early stages of flower buds, and 44% having adult (mature) foliage.	Evidence of recent floods (Nov 22) with detritus. 67% of 10m line transect comprising of Clover, 17% Prairie grass and dead grass respectively. 0% target weed species were identified along the 10m line transect. Although 16% of Black Gums are stunted in growth, 92% are exhibiting new foliage growth, and 10.8% trees exhibiting unopened flower buds.

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site	Bearing	Longitude	Latitude
PP2	North Street, Perthville	71°	149.552308	-33.486112

Baseline (before works)	End of Year 1	End of Year 2	End of Year 3
Date	**Date**	**Date**	**Date**
7 February 2020	27 August 2021	10 August 2022	11 August 2023
Description	**Description**	**Description**	**Description**
Baseline photo prior to site preparation, weed control and planting of Black Gum	12 months after planting of Black Gums and ongoing monthly maintenance, 4 months after slashing of grass between plantings.	24 months after planting of Black Gums, grass short due to recent slashing.	36 months after planting Black Gums, grass short due to regular slashing.
Comments	**Comments**	**Comments**	**Comments**
Riparian zone along Queen Charlotte Vale Creek. Significant weed growth including *Brassica sp. Rumex sp. Foeniculum sp.* and *Rubus fruticosus.* Ground highly compacted due to heavy machinery use on site. Erosion control barrier from flood levee mitigation works visible however not functioning proper due to damage.	Riparian area of Queen Charlotte Vale Creek. Grass understorey short due to previous slashing of grass and dormancy of perennial grasses. 70% of 10m line transect comprising of dead grass species, and 30% Prairie Grass (*Bromus sp.*). 0% target weed species were identified along the 10m line transect.	Evidence of recent flooding due to water inundation and Detritus. 97% of 10m line transect comprising of Phalaris, and 3% comprising of Dock (*Rumex sp.*) 0% target weed species were identified along the 10m line transect. Significant growth on Black Gums with 0.7% trees exhibiting early stages of flower buds, and 44% having adult (mature) foliage.	Evidence of recent floods (Nov 22) with detritus. 83% of 10m line transect comprising of Prairie grass (*Bromus sp.*) and 17% Phalaris. 0% target weed species were identified along the 10m line transect. Although 16% of Black Gums are stunted in growth, 92% are exhibiting new foliage growth, and 10.8% trees exhibiting unopened flower buds.

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site		Bearing		Longitude		Latitude
PP3	North Street, Perthville		151°		149.552833		-33.485959
Baseline (before works)	**End of Year 1**		**End of Year 2**			**End of Year 3**	
Date	**Date**		**Date**			**Date**	
7 February 2020	27 August 2021		10 August 2022			11 August 2023	
Description	**Description**		**Description**			**Description**	
Baseline photo prior to site preparation, weed control and planting of Black Gum	12 months after planting of Black Gums and ongoing monthly maintenance, 4 months after slashing of grass between plantings.		24 months after planting Black Gums, grass short due to recent slashing			36 months after planting Black Gums, grass short due to regular slashing.	
Comments	**Comments**		**Comments**			**Comments**	
Looking south toward North Street. Confluence of Queen Charlotte Vale Creek and drainage channel behind. Stockpiled soil and road base from flood levee mitigation works. Significant weed growth including *Brassica sp. Rumex sp. Foeniculum sp.* and *Rubus fruticosus.* Ground highly compacted due to heavy machinery use on site.	Grass understorey short due to previous slashing of grass and dormancy of perennial grasses. 63.3% of 10m line transect comprising Prairie Grass (*Bromus sp.*), 30% dead grass species, 3.3% bare earth and 3.3% Dock (*Rumex sp.*). 0% target weed species were identified along the 10m line transect. Sightings of Rabbit within the vicinity however no visible signs of scats, diggings or burrows.		Evidence of recent flooding due to water inundation and detritus. 97% of the 10m line transect comprising of Phalaris, and 3% comprising of Dandelion *(Taraxacum sp.)* 0% target weed species were identified along the 10m line transect. Significant growth on Black Gums with 0.7% trees exhibiting early stages of flower buds, and 44% having adult (mature) foliage.			Evidence of recent floods (Nov 22) with detritus. 87% of 10m line transect comprising of Prairie grass (*Bromus sp.*), 10% dead grass and 3% Dock (*Rumex sp.*). 0% target weed species were identified along the 10m line transect. Although 16% of Black Gums are stunted in growth, 92% are exhibiting new foliage growth, and 10.8% trees exhibiting unopened flower buds.	

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site	Bearing	Longitude	Latitude
PP4	North Street, Perthville	312°	149.552871	-33.487148

Baseline (before works)	End of Year 1	End of Year 2	End of Year 3
Date	Date	Date	Date
7 February 2020	27 August 2021	10 August 2022	11 August 2023
Description	Description	Description	Description
Baseline photo prior to site preparation, weed control and planting of Black Gum	12 months after planting of Black Gums, 4 months after slashing of grass between plantings.	24 months after planting of Black Gums, grass short due to recent slashing	36 months after planting Black Gums, grass short due to regular slashing.
Comments	Comments	Comments	Comments
Floodplain between North Street flood levee and Queen Charlotte Vale Creek with stockpiled soil and road base from flood levee mitigation works. Ground highly compacted due to heavy machinery used on site.	Floodplain between North Street flood levee and Queen Charlotte Vale Creek. Grass understorey short due to previous slashing of grass and dormancy of perennial grasses. 50% of 10m line transect comprised of Prairie Grass (*Bromus sp.*), 46.7% dead grass species, and 3.3% Dandelion (*Taraxacum sp.*). 0% target weed species were identified along the 10m line transect.	Still evidence of soil compaction because of vehicle movement. 83% of 10m line transect comprised of Phalaris, 10% clover (*Trifolium sp.*) and 7% Dandelion (*Taraxacum sp.*) 0% target weed species were identified along the 10m line transect. Significant growth on Black Gums with 0.7% trees exhibiting early stages of flower buds, and 44% having adult (mature) foliage.	Evidence of recent floods (Nov 22) with detritus. 53% of 10m line transect comprising of Clover, 43% Dandelion (*Taraxacum sp.*) and 3% unknown species. 0% target weed species were identified along the 10m line transect. Although 16% of Black Gums are stunted in growth, 92% are exhibiting new foliage growth, and 10.8% trees exhibiting unopened flower buds.

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site		Bearing		Longitude		Latitude
PP5	North Street, Perthville		106°		149.552911		-33.487168

Baseline (before works)	End of Year 1	End of Year 2	End of Year 3
Date	Date	Date	Date
7 February 2020	27 August 2021	10 August 2022	11 August 2023
Description	Description	Description	Description
Baseline photo prior to site preparation, weed control and planting of Black Gum	12 months after planting of Black Gums, 4 months after slashing of grass between plantings.	24 months after planting Black Gums, grass short due to recent slashing	36 months after planting Black Gums, grass short due to regular slashing.
Comments	Comments	Comments	Comments
Recently installed bank of the Perthville flood levee looking east southeast and running parallel with North Street. Ground highly compacted due to heavy machinery used on site. New fencing installed along northern boundary.	Grass understorey short due to previous slashing of grass and dormancy of perennial grasses. 46.7% of 10m line transect comprised of Prairie Grass (*Bromus sp.*), 46.7% dead grass species, 3.3% Dock (*Rumex sp.*) and 3.3% Indian Mustard (*Rapistrum rogusum*). 0% target weed species were identified along the 10m line transect. Presence of rabbits digging at the base of one (1) tree only.	Still evidence of soil compaction because of vehicle movement. 77% of 10m line transect comprised of Phalaris, 17% Dock (*Rumex sp.*) 7% Clover (*Trifolium sp.*) 0% target weed species were identified along the 10m line transect. Significant growth on Black Gums with 0.7% trees exhibiting early stages of flower buds, and 44% having adult (mature) foliage.	Evidence of recent floods (Nov 22) with detritus. 73% of 10m line transect comprising of Prairie grass (*Bromus sp.*), 10% dead grass and 3% Dock (*Rumex sp.*). 0% target weed species were identified along the 10m line transect. Although 16% of Black Gums are stunted in growth, 92% are exhibiting new foliage growth, and 10.8% trees exhibiting unopened flower buds.