![Bathurst Regional Council logo]

BATHURST REGIONAL COUNCIL

Perthville Black Gum (*Eucalyptus aggregata*) Offset Site

Annual Condition Assessment Report

Bathurst Regional Council
August 2022

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Introduction

During August 2022, 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 two 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 second year of photo monitoring was conducted, almost two 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 85.1% (126) 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. 9.5% (14) 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. 2.71% (4) of trees surveyed received a health score of one (1) with trees alive but showing significant signs of stress that are impacting on growth. 2.71% (4) 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, 68.46% (102) exhibited the early stages of new growth.

42.57% (63) of trees surveys exhibited adult leaves with one (1) tree showing pre-flowering capsules (opercula).

Total survival rate of trees surveyed is 97.3% (144).

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 83%, with Monitoring Point 2 and 3 having the highest occurrence rate of 97% and Monitoring Point 1 having the lowest occurrence rate of 77%. Dock (*Rumex sp.*), Clover (*Trifolium sp.*), Indian Mustard (*Rapistrum rogusum*), Dandelion (*Taraxacum sp.*) and Purple Top (*Verbena bonariensis*) were also identified across all monitoring points with a median occurrence rate of 5%.

Nutrient

Of the 148 Black Gums surveyed, 1.4% (2) showed signs of possible phosphorus (*P*) deficiency characterised by the appearance of small purple interveinal blotches on mature leaves with the centre of the blotch necrotic.

Pest Management

Of all trees surveyed 94.6% (140) were impacted by insect pest species with 2.0% (3) of trees showing signs of damage from sawfly and 1.35% (2) of trees showing signs of damage from aphids.

Discussion

As on the previous year's results, revegetation over the second year of the project has achieved a high survival rate of 97.3% (144) with only four (4) dead trees. 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 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 can proceed within that location as these works are now complete.

A total of 85.1% (126) of trees surveyed received the highest health score of three (3), 9.51% (14) of trees receiving a moderate health score of two (2), and 2.71% (4) of trees receiving a low health score of one (1). The presence of adult foliage and flowering capsules was not predicted until years three or four let alone the second year, with 42.57% (63) of trees surveys exhibiting adult leaves and one (1) tree showing pre-flowering capsules (opercula) (Figure 1). These high health scores, adult foliage and early stages of flowering appear to correlate with drought-breaking above-average rainfall that has persisted since early 2020 due to *La Niña* weather events, and milder temperatures during Summer 2020 and 2021 in comparison to the previous summers record breaking high temperatures. Such conditions tend to promote or assist a climate conducive to healthy vegetation, high survival rates of revegetation and adult foliage.

Figure 1: Black Gum no. 14 showing evidence of pre-flowering capsules (opercula) on adult foliage.

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 *Phalaris sp.* as a dominant non-invasive weed species with a median occurrence rate of 83%, 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.

The assessment identified a significant improvement in tree health with only 1.4% (2) of trees surveyed displaying signs of nutrient deficiency. This contrasts with the assessment carried out in 2021 that noted 77.7% (115) of trees surveyed showing signs like that of phosphorus (*P*) deficiency with a characteristic appearance of small purple interveinal blotches on mature leaves with the centre of the blotch necrotic (Dell, et al., 2001). The low observance of nutrient deficiency could be attributed to the depositing of alluvial soils across the site following flood events during 2021 and 2022, that are rich in humus, contain organic nutrients and have good water retention capacity that aid in the uptake of nutrients by the trees.

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 on 94.60% (140) of trees surveyed, with sawfly observed on 2.7% (4) of trees surveyed and aphids 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 and 2021, 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.

Repairs and/or upgrading of fencing and the installation of a locked gate, as per the Perthville Black Gum Offset Site OMP, have yet to be undertaken at the site due to flood levee remediation works within the vicinity. As these works are now complete and temporary fencing panels have been removed, repairs to existing fencing and the installation of a lockable service gate will be undertaken during October 2022, with the replacement of degraded fencing and the installation of interpretative signage to be undertaken in 2023 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. Re-installment of gate and repair of fencing along North Street upon completion of Perthville Flood Mitigation Works.
5. Replace degraded fencing along North Street with new fence posts, stock netting and sighter wire.
6. Install interpretative signage at the North Street entrance to educate the public on the project.
7. Continue to monitor trees for leafhopper, sawfly 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.

Dell, B., Malajczuk, N., Xu, D. & Grove, T., 2001. *Nutrient Disorders in Plantation Eucalypts. 2nd edition.,* Canberra: Research, Australian Centre for International Agricultural.

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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

Important Notice!
This map is not a precise survey document. Accurate locations can only be determined by a survey on the ground.
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Drawn By:	Kristie Kearney
Date:	28/07/2021
Projection:	GDA94 / MGA zone 55
Map Scale:	1:1792 @ A4

Perthville Black Gum Offset Site
Site Map & Monitoring Points

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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	
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	
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.	

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	
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.	
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.	

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site	Bearing	Longitude	Latitude
PP3	North Street, Perthville		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	
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	
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.	

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	
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	
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.	

Perthville Black Gum Offset Site Photo Point Monitoring

Photo Point ID	Site	Bearing	Longitude	Latitude
PP5	North Street, Perthville		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	
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	
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.	