TRUSTED EXPERTISE. PROVEN OUTCOMES.

Groundwater-dependent Ecosystem Baseline BioCondition Assessment

Futura Resources – Fairhill Coal Project

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EXECUTIVE SUMMARY

The Fairhill Coal Project, a small mine near Emerald, Queensland, operates in accordance with a Groundwater-dependent Ecosystems Management Plan. A commitment of this plan is that baseline BioCondition monitoring of groundwater-dependent ecosystems is undertaken in the first September-October after the commencement of construction. A field survey was conducted by ecologists from MEC Mining Group Pty Ltd, on 8-9 October 2025 to meet this obligation.

Four “impact sites” (within a zone of potential groundwater drawdown) and four “control sites” (outside the zone of potential drawdown but in similar ecosystems to the impact sites) were surveyed. The impact sites and control sites possessed very similar baseline BioCondition scores (mean of 43.3 versus 43.8 out of 80, respectively), indicating that the control sites are an appropriate reference for the impact sites.

The following actions are recommended based on results from the baseline surveys:

1. The Groundwater-dependent Ecosystems Management Plan should be revised to:
    a. list the coordinates of the star pickets that were installed to mark the start and end of each monitoring site.
    b. change the benchmarks used for assessing BioCondition from regional ecosystem 11.3.25 to regional ecosystems 11.3.1, 11.3.2 and 11.3.6, to better accord with the vegetation types present at the monitoring sites.
2. The baseline data presented in this report is to be used to track changes in BioCondition at impact and control sites over subsequent years.

1 BACKGROUND

Futura Resources Ltd (Futura) recently commenced the Fairhill Coal Project, a small coal mine located north-east of Emerald, in the Bowen Basin of Queensland. Approval of the project was granted in 2024 on the condition that groundwater-dependent ecosystems along Cooroora Creek and Sandy Creek maintain their extent and BioCondition (environmental authority BRID0071 condition D2). To achieve these commitments, Futura operates the Fairhill Coal Project in accordance with a Groundwater-dependent Ecosystems Management Plan.

The Groundwater-dependent Ecosystems Management Plan specifies that baseline BioCondition surveys of groundwater-dependent ecosystems are to be undertaken in the first September-October following commencement of construction at the Fairhill Coal Project. MEC Mining Group Pty Ltd was engaged by Futura to complete these baseline surveys on 8-9 October 2025. This report describes the surveys undertaken and presents the baseline condition of four impact sites and four control sites.

2 METHODS

Field surveys were completed by ecologists, Dr Chris Wiley and Mark Cachia, with assistance from Futura employee, Wade Vine. Conditions at the time of survey were dry, as was intended by the Groundwater-dependent Ecosystems Management Plan. No rain was recorded at the nearby Talagai weather station (Bureau of Meteorology station 035131) over the two weeks prior to the survey. A total of only 25.6 mm was recorded over the previous two months.

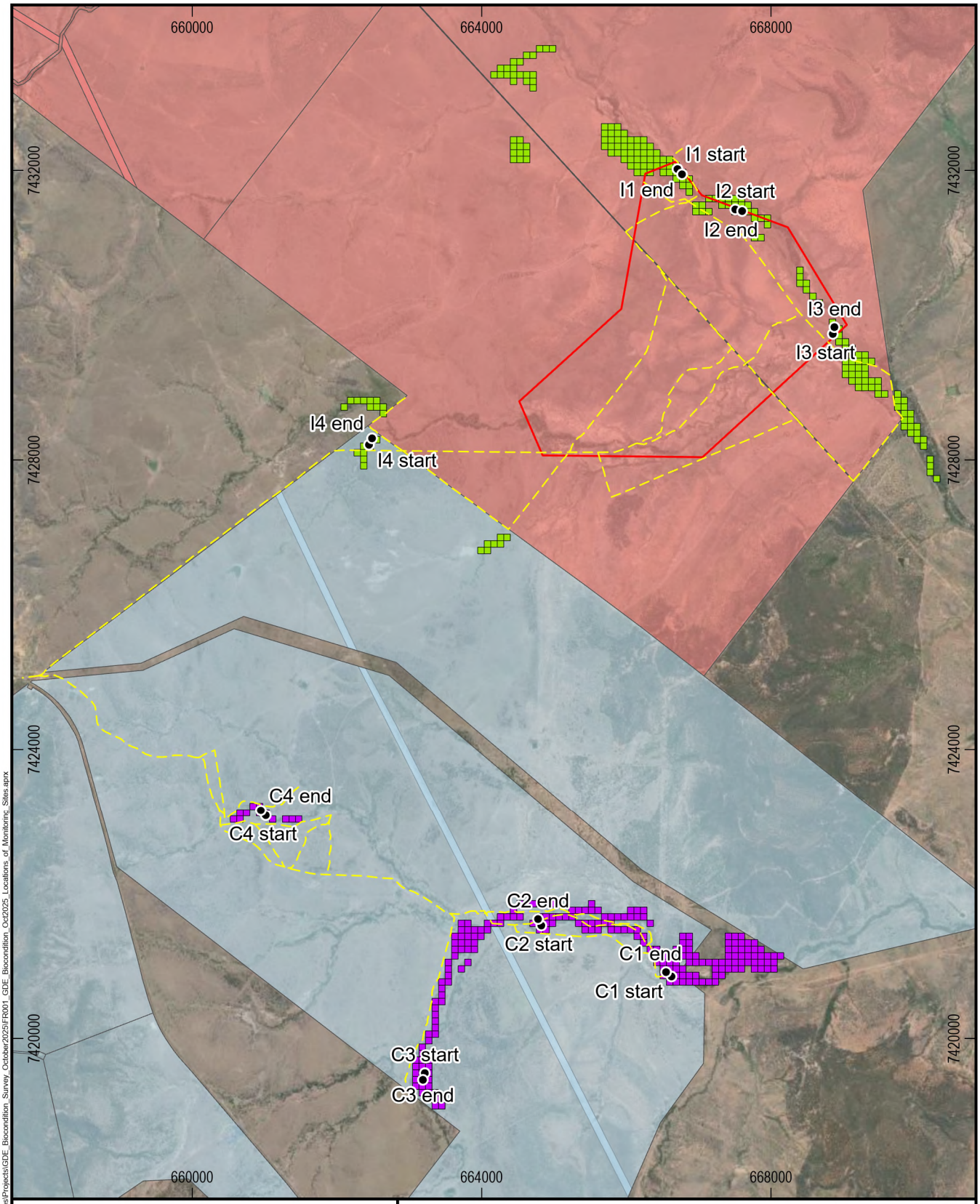
The methodology adopted during field surveys followed the Groundwater-dependent Ecosystems Management Plan. In accordance with section 6.4.2 of this plan, four “impact sites” and four “control sites” were sampled for BioCondition. Impact sites are located in a zone of potential groundwater drawdown, while control sites are located in nearby analogous landscape positions outside the zone of potential groundwater drawdown. Steel star pickets were permanently installed at the start and end points of each BioCondition monitoring site. The precise locations of these start and end points were recorded using GPS and are listed in **Table 2-1.**

Table 2-1. Survey locations

Site	Latitude (start)	Longitude (start)	Latitude (end)	Longitude (end)
C1	-23.313332	148.629534	-23.312793	148.628780
C2	-23.307160	148.611856	-23.306361	148.611401
C3	-23.325725	148.596334	-23.326566	148.596085

Site	Latitude (start)	Longitude (start)	Latitude (end)	Longitude (end)
C4	-23.293772	148.574458	-23.293148	148.573789
I1	-23.212538	148.629109	-23.213185	148.629728
I2	-23.217490	148.636973	-23.217687	148.637902
I3	-23.232883	148.650333	-23.232033	148.650542
I4	-23.247359	148.587856	-23.246541	148.588259

At each site, BioCondition was measured across a 100 m × 50 m quadrat in accordance with the *BioCondition Assessment Manual v 2.2* (Eyre et al. 2015). The start and end points are of the midline through each quadrat.



Legend

- BioCondition Monitoring Sites
- Access Roads and Tracks
- ML 700043
- Impact Area
- Control Area
- Cadastre Property Boundaries
- Chapman
- Comiskey

Source: BOM 2020, State of Queensland (Department of Resources) 2023, Futura Resources 2025, MEC 2025, Maxar.

Fairhill Coal Project

Locations of Monitoring Sites

0 1 2 3

Kilometers

Scale: 1:76,000 (A4)

4/11/2025

Datum: GDA2020
Projection: MGA55

FIGURE 2-1

Futura Resources

MEC

Path: S:\Projects\FR001 Fairhill Project\GIS\Fairhill\ArcGIS\Project_Files\Projects\GDE_Biocondition_Survey_October2025\FR001_GDE_Biocondition_Oct2025_Locations_of_Monitoring_Sites.aprx

BioCondition scores are calculated based on comparisons with benchmark values published for each regional ecosystem by the Queensland Herbarium. The Groundwater-dependent Ecosystems Management Plan specified that benchmark values for regional ecosystem 11.3.25 were to be used for calculating all BioCondition scores. However, field surveys indicated that this ecosystem was not an appropriate choice, due to this ecosystem being a very minor component (or was absent) at all sampling sites. Instead, for most sites, the benchmarks for regional ecosystem 11.3.1 were used to calculate the BioCondition scores. The exceptions were sites C2 and I4, which matched ecosystems 11.3.6 and 11.3.2, respectively. As the published benchmarks are updated by the Queensland Herbarium periodically as new data is collected, it is important that consistent benchmarks are adopted throughout the life of the Fairhill Coal Project. For this reason, and for future reference, the benchmarks current in October 2025 are shown in **Table 2-2**.

Table 2-2. Published benchmarks adopted for calculating BioCondition at the Fairhill Coal Project

Attribute	Published Benchmarks		
	RE 11.3.1	RE 11.3.2	RE 11.3.6
Recruitment (%)	100	100	100
Non-native plant cover (% of total plant cover)	0	0	0
Tree species richness	4	2	4
Shrub species richness	4	2	4
Grass species richness	6	9	10
Forb/other species richness	10	15	15
Emergent canopy height (m)	na	na	na
Tree canopy height (m)	15	18	15
Tree subcanopy height (m)	7	9	na
Emergent canopy cover (%)	na	na	na
Tree canopy cover (%)	35	37	33
Tree subcanopy cover (%)	15	7	na
Large tree threshold: eucalypts (cm DBH)	na	44	45
Large tree threshold: non-eucalypts (cm DBH)	30	na	na
Total number of large eucalypts per hectare	na	18	34
Total number of large non-eucalypts per hectare	53	na	na
Shrub canopy cover (%)	15	4	2
Native perennial grass cover (%)	33	26	51
Litter ground cover (%)	30	35	26
Coarse woody debris (total length in m/ha)	1520	281	158

3 RESULTS

Site photos are presented in **Appendix A**. Raw data is presented in **Appendix B**. The BioCondition scores for impact sites were very similar to control sites (mean of 43.3 versus 43.8: **Table 3-1**). All sites have a relatively low score for remnant vegetation, due to the largely non-native ground vegetation (the ground layer at all sites

was dominated by the non-native) and low density of large trees. The similar baseline condition of control sites and impact sites indicates that they are exposed to similar pressures from weeds and grazing. This baseline survey confirms that the control sites are suitable references for monitoring changes in the BioCondition of impact sites due to groundwater extraction over time.

Table 3-1. BioCondition scores for each survey site

Site	Large Trees	Tree canopy height	Recruitment of dominant canopy species	Tree canopy cover	Shrub layer cover	Coarse woody debris	Native plant richness: trees	Native plant richness: shrubs	Native plant richness: grasses	Native plant richness: other	Non-native plant cover	Native perennial grass cover	Litter cover	TOTAL SITE SCORE
Max Score	**15**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**10**	**5**	**5**	**80**
C1	5	5	5	5	3	2	5	5	2.5	5	0	0	3	45.5
C2	0	5	5	2	0	5	5	5	2.5	5	0	0	5	39.5
C3	5	5	5	2	0	2	5	5	2.5	5	0	0	3	39.5
C4	5	4	3	5	5	5	5	5	2.5	5	0	1	3	48.5
I1	5	5	5	5	0	2	5	2.5	2.5	5	0	0	3	40
I2	5	4	5	5	0	5	5	5	0	5	0	0	3	42
I3	5	5	5	5	3	2	5	5	5	5	0	0	3	48
I4	5	5	5	5	3	2	5	5	2.5	2.5	0	0	5	45

4 RECOMMENDATIONS

The following actions are recommended based on results from the baseline surveys:

1. The Groundwater-dependent Ecosystems Management Plan should be revised to:
    a. list the coordinates of the star pickets that mark the start and end of each monitoring site.
    b. change the benchmarks used for assessing BioCondition from regional ecosystem 11.3.25 to regional ecosystems 11.3.1, 11.3.2 and 11.3.6.
2. The baseline data presented in this report is to be used to track changes in BioCondition at impact and control sites over subsequent years.

5 REFERENCES

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual*. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.

A APPENDIX

Site photos

I1 start

I1 end

I2 start

I2 end

I3 start

I3 end

I4 start

I4 end

C1 start

C1 end

C2 start

C2 end

C3 start

C3 end

C4 start

C4 end

B APPENDIX

Raw BioCondition data

			Species Richness								Groundcover (%)												
Site	RE	Date	Trees	Tree_Benchmark	Shrubs	Shrub_Benchmark	Grass	Grass_Benchmark	Forbs	Forbs_Benchmark	Perennial grass	Perennail grass_Benchmark	Annual grass	Forbs	Shrubs	Shrub_benchmark	Weed	Litter	Litter-Benchmark	Bare	Rock	Wood	Total
C1	11.3.6	8/10/2025	11	4	6	4	4	10	17	15	0.8	51	0	0.8	0.2	2	10	74.8	26	13.2	0	0.2	100
C2	11.3.1	8/10/2025	9	4	10	4	3	6	16	10	0.8	33	0.4	1.8	0.6	15	17.6	49.4	30	24.6	0	4.8	100
C3	11.3.1	8/10/2025	6	4	11	4	5	6	18	10	0.2	33	0.6	2.6	0.2	15	4.4	60.2	30	31	0	0.8	100
C4	11.3.1	8/10/2025	13	4	13	4	2	6	11	10	8.2	33	0	0.6	12.2	15	14	61.6	30	2.8	0	0.6	100
I1	11.3.1	9/10/2025	11	4	2	4	3	6	10	10	0	33	0	3.2	0	15	7.8	84.8	30	2.6	0	1.6	100
I2	11.3.1	9/10/2025	12	4	10	4	1	6	9	10	0	33	0	0.8	0.4	15	13.8	73.6	30	10.6	0	0.8	100
I3	11.3.1	9/10/2025	7	4	6	4	6	6	10	10	2.8	33	0	2.2	2	15	2.2	63.4	30	27.4	0	0	100
I4	11.3.2	9/10/2025	16	2	16	2	7	9	11	15	1.2	26	0	0.8	0.4	4	26	67	35	2.8	0	1.8	100

Site	Weed cover (% of total plant cover)	Canopy Cover (%)	Canopy cover_Benchmark	Subcanopy cover (%)	Subcanopy cover_Benchmark	Canopy height (m)	Canopy height_Benchmark	Subcanopy height (m)	Subcanopy height_Benchmark	Recruitment (%)	Coarse woody debris (m/ha)	Coarse woody debris_Benchmark	Number of large trees/ha	Number of large trees_Benchmark	Large eucalypts (list of circumferences) per 0.5 ha	Large non-eucalypts (list of circumferences) per 0.5 ha
C1	80	17	33	21.9	na	13.8	15	8.7	na	75	420.8	158	2	34	96, 127, **167**	122, 77, 93, 69, 77, 87, 67, 74, 90, 99, 74, 80, 117, 68, 95, 71, 69, 74, 64, 95, 105, 64, 66, 64, 65, 75, 88, 82
C2	80	4	35	12.8	15	12.1	15	5.9	7	100	969.5	1520	0	53	99, 109, 110, 117, 131, 134, 147, 165, 198	66, 73, 87, 89, 88, 75, 90, 80, 78, 74
C3	81	5.7	35	26.3	15	15.2	15	9.2	7	80	556	1520	18	53	133, 134, 160	85, 70, 70, 87, 72, 74, **117**, 89, **119**, 73, 64, **104**, 58, 75, 77, 67, 78, **126**, 82, **104**, **109**, **98**, 65, 67, 79, 86, 68, 63, **107**, 71, 74, 86, **116**
C4	62	22.7	35	3.7	15	8.9	15	6.5	7	67	889.9	1520	16	53	94, 124	77, 82, 75, 78, 72, 74, 63, 92, **103**, 73, **108**, **112**, **128**, 70, **100**, 84, 82, 66, 67, **144**, 70, **101**, 75, 91, 88, 81, 74, 75, 84, 66, 73, 67, **134**, 85, 83, 69
I1	74	38.3	35	<0.1	15	11.8	15	6.8	7	80	739	1520	26	53	103, 139, 173, 269	71, 71, 66, **136**, 64, **118**, 84, 64, **135**, 70, **95**, 70, 75, 73, **134**, **102**, 88, 86, 78, 76, 85, **118**, 81, 92, 66, **128**, 83, 64, 73, 87, 90, 75, 94, 78, **105**, **96**, 68, **101**, 70, 69, 69, 79, 81, 63, 74, 80, 80, 72, 63, 91, 84, 65, 69, **99**, 66, 79, **128**, 87, 79, 71, 70
I2	94	20.3	35	26.2	15	11.2	15	4.5	7	75	1053.3	1520	24	53	125, 150, 157, 176, 216	65, 81, **126**, **108**, **107**, **110**, 87, **102**, 69, 80, **153**, **135**, 88, **123**, **117**, **104**, **95**, 91, 78, **137**, 65, 94, 72
I3	60	42.1	35	18.2	15	11.8	15	6.6	7	75	154.4	1520	14	53	135, 154, 186, 214, 216, 250	**101**, 82, 78, 80, 76, 75, 81, **106**, 85, 64, 80, **107**, 89, **114, 99**, 81, 79, 84, **131, 103**, 90, 77, 65, 69, 70, 81, 63, 93, 81, 68, 86, 82, 84, 74, 72, 70
I4	86	31.6	37	12.4	7	13.7	18	9.9	9	100	60.4	281	4	18	105, 118, 120, 121, 130, 136, **165, 207**	81, 92, 75, 70, 85, 74, 94, 84, 70, 126, 74, 78, 83, 75, 79, 66, 68, 74, 83, 84, 70

DOCUMENT INFORMATION

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