

Comet Vale Sand Project
Mine Closure Plan



Comprehensive Mine Site Services

Prepared by MLG Oz Limited

Mining Lease Application

Environmental Group Site Name: To be Advised

Environmental Group Site Code: To be Advised

Version Number: V0.1

Date of Submission: 23 March 2023

Tenement Holder: MLG Oz Limited

Phone Number: (08) 9022 7746

Revision Summary Table

Date	Revision	Document Name	File Name	Summary
23 March 2023	Reg ID: To be advised. Version 0.1	Comet Vale Project Mine Closure Plan	Comet Vale Mine Closure Plan.Docx	This Mine Closure Plan is being submitted as part of the Mining Proposal for the Mining Lease application

2020 MCP Checklist

Q#	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page	Comments	Changes from Previous Version Y/N	Page #	Summary
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company? (See bottom of checklist.)	Y	V	Endorsed by Murray Leahy, Director, MLG Oz Limited.	N	N/A	N/A
Public Availability							
2	Are you aware that all approved MCPs will be made publicly available?	Y	N/A	N/A	N	N/A	N/A
3	Is there any information in this MCP that should not be publicly available?	N	N/A	N/A	N	N/A	N/A
4	If "Yes" to Q3, has confidential information been submitted in a separate document/section?	N/A	N/A	N/A	N	N/A	N/A
Cover Page, Table of Contents							
5	Does the MCP cover page include: <ul style="list-style-type: none"> Project title Company name\ Contact details (including telephone numbers and email addresses) Document ID and version number Date of submission (needs to match the date of this checklist) 	Y	Cover Page	N/A	N	N/A	N/A
Scope and Purpose							
6	State why the MCP is submitted (e.g. as part of a mining proposal, a reviewed MCP or to fulfil other legal requirements)	Y	N/A	MCP is being submitted as part of the Comet Vale Mining Proposal	N	N/A	N/A

Q#	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page	Comments	Changes from Previous Version Y/N	Page #	Summary
Project Overview							
7	Does the project summary include: <ul style="list-style-type: none"> Land ownership details (include any land management agency responsible for the land / reserve and the purpose for which the land / reserve [including surrounding land] is being managed). Location of the project. Comprehensive site plan(s). Background information on the history and status of the project. 	Y	9	N/A	N	N/A	N/A
Legal Obligations and Commitments							
8	Does the MCP include a consolidated summary or register of closure obligations and commitments?	Y	3	N/A	N	N/A	N/A
Stakeholder Engagement							
9	Have all stakeholders involved in closure been identified?	Y	15	N/A	N	N/A	N/A
10	Does the MCP include a summary or register of historic stakeholder engagement with details on who has been consulted and the outcomes?	Y	18	N/A	N	N/A	N/A
11	Does the MCP include a stakeholder consultation strategy to be implemented in the future?	Y	16	N/A	N	N/A	N/A
Post-mining land use(s) and Closure outcomes							
12	Does the MCP include agreed post-mining land use(s), closure outcomes and conceptual landform design diagram?	Y	36	N/A	N	N/A	N/A
13	Does the MCP identify all potential (or pre-existing) environmental legacies, which may restrict the post mining land use (including contaminated sites)?	N	N/A	There are no aspects that could inhibit the successful rehabilitation of the Project.	N	N/A	N/A
14	Has any soil or groundwater contamination that occurred, or is suspected to have occurred,	N	14	N/A	N	N/A	N/A

Q#	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page	Comments	Changes from Previous Version Y/N	Page #	Summary
	during the operation of the mine, been reported to DWER as required under the Contaminated Sites Act 2003?						
Development of Completion Criteria							
15	Does the MCP include an appropriate set of specific completion criteria and closure performance indicators?	Y	43	N/A	N	N/A	N/A
16	Does the MCP include baseline data (including pre-mining studies and environmental data)?	Y	18	N/A	N	N/A	N/A
17	Has materials characterisation been carried out consistent with applicable standards and guidelines (e.g. GARD Guide)?	N	N/A	No waste materials are produced as part of this Project.	N	N/A	N/A
18	Does the MCP identify applicable closure learnings from benchmarking against other comparable mine sites?	Y	47	N/A	N	N/A	N/A
19	Does the MCP identify all key issues impacting mine closure outcomes and outcomes (including potential contamination impacts)?	Y	43	N/A	N	N/A	N/A
20	Does the MCP include information relevant to mine closure for each domain or feature?	Y	Appendix 6	N/A	N	N/A	N/A
Identification and Management of Closure Issues							
21	Does the MCP include a gap analysis/risk assessment to determine if further information is required in relation to closure of each domain or feature?	Y	37	N/A	N	N/A	N/A
22	Does the MCP include the process, methodology, and has the rationale been provided to justify identification and management of the issues?	Y	37	N/A	N	N/A	N/A
23	Does the MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y	46	N/A	N	N/A	N/A

Q#	Mine Closure Plan (MCP) Checklist	Y/N/NA	Page	Comments	Changes from Previous Version Y/N	Page #	Summary
24	Does the MCP include a closure work program for each domain or feature?	Y	Appendix 6	N/A	N	N/A	N/A
25	Does the MCP contain site layout plans to clearly show each type of disturbance as defined in Schedule 1 of the MRF Regulations?	Y	Figure 2	N/A	N	N/A	N/A
26	Does the MCP contain a schedule of research and trial activities?	Y	47	N/A	N	N/A	N/A
27	Does the MCP contain a schedule of progressive rehabilitation activities?	N	N/A	Progressive rehabilitation is continuously undertaken	N	N/A	N/A
28	Does the MCP include details of how unexpected closure and care and maintenance will be handled?	Y	46	N/A	N	N/A	N/A
29	Does the MCP contain a schedule of decommissioning activities?	Y	46	N/A	N	N/A	N/A
30	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Y	48	N/A	N	N/A	N/A
Closure Monitoring and Maintenance							
31	Does the MCP contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	Y	48	N/A	N	N/A	N/A
Financial Provisioning for Closure							
32	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y	51	N/A	N	N/A	N/A
33	Does the MCP include a process for regular review of the financial provision?	Y	51	N/A	N	N/A	N/A
Management of Information and Data							
34	Does the MCP contain a description of management strategies including systems and processes for the retention of mine records?	Y	51	N/A	N	N/A	N/A

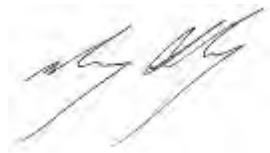
Corporate Endorsement:

I hereby certify that to the best of my knowledge, the information within this mine closure plan and checklist is true and correct and addresses all the requirements of the Guidelines for Mine Closure Plans approved by the Director General of the Department of Mines, Industry Regulation and Safety.

Name: Murray Leahy

Position: Director, MLG Oz Limited

Signed:

A handwritten signature in black ink, appearing to read 'Murray Leahy', is written over a faint, light-colored rectangular stamp or watermark.

Date: 23 March 2023

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Appendix 2:	Flora and Vegetation Survey (2018)
Appendix 3:	Flora and Fauna Desktop Assessment
Appendix 4:	Flora and vegetation Survey 2022
Appendix 5:	AHIS Heritage Report
Appendix 6:	Closure Task Register

1. PROJECT SUMMARY

1.1 Scope

The Comet Vale Sand Project (Comet Vale, the Project) is a new sand and gravel mine located 96 km north of Kalgoorlie in the Goldfields-Esperance region of Western Australia. The Project is owned and operated by MLG Oz Limited (MLG). Sand and gravel products are mined at the Project and sold on demand to the domestic markets of Kalgoorlie-Boulder and surrounding districts.

This Mine Closure Plan (MCP) has been prepared to support a Mining Proposal that is being submitted to the Department of Mines, Industry Regulation and Safety (DMIRS) for the Mining Lease application (MLA). The Mining Proposal requests approval to undertake mining operations across 77.7 ha with an additional 19.27 ha for development of site access tracks. The MCP has been developed in accordance with the DMIRS Statutory Guidelines for Mine Closure, released in March 2020 (DMIRS 2020).

1.2 Project Ownership

The Comet Vale Sand Project is owned solely by MLG (ABN 53 102 642 366). MLG is listed on the Australian Stock Exchange as ASX:MLG.

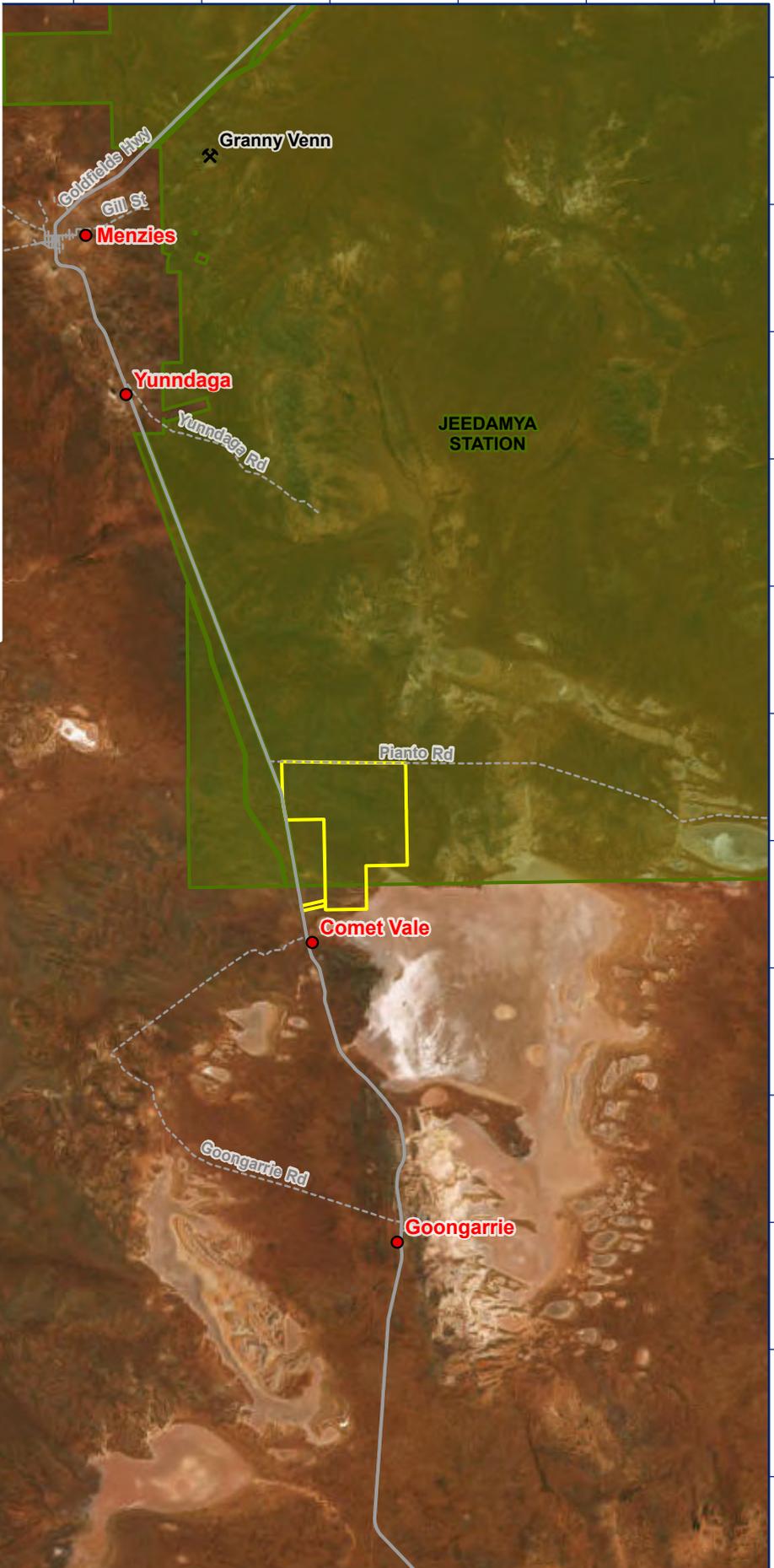
All compliance and regulatory requirements regarding this assessment document should be forwarded by email or post to the following addresses:

Proponent: MLG Oz Limited
Address: PO Box 1484
Kalgoorlie WA 6433

Contact: Mr Murray Leahy
Title: Managing Director
Company: MLG Oz Limited
Phone: (08) 9022 7746
E-mail: murray@mlgoz.com.au

1.3 Location, Access and Tenure

The Project is located 26 km southeast of Menzies and 96 km north of Kalgoorlie-Boulder, in the Goldfields-Esperance Region of Western Australia. It is accessed from the Goldfields Highway and unsealed site access roads. The Mining Lease Application covers an area of 1,938.6 ha. The location of the Project is shown in Figure 1.



Legend

- Pastoral Leases
- Mining Lease Application

Points of Interest (WALIS 2022)

- Town
- Minesites (DMIRS 2022)

Road Network (MRWA 2017)

- State Road
- Other Roads

Scale: 1:250,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PROJECT		CLIENT
<h2>Comet Vale - Mine Closure Plan</h2>		 Comprehensive Mine Site Services
<h3>Location Plan</h3>		
Figure 1	ADV-AU-00382	March 2023

1.4 Operations and Infrastructure

The Project is a sand and gravel mining operation that consists of shallow excavation of sand and gravel for use in the local construction industry. The proposed site layout is provided in Figure 2.

The proposed mining operation will be carried out using a basic strip-mining methodology, comprising:

- Pre-stripping of vegetation and soil, which will be stockpiled in low windrows perpendicular to the active mining area for later use in rehabilitation.
- Excavating sand and gravel to a typical depth of 1.5 m (maximum of 5 m) that is subsequently screened into different product sizes and loaded into road trains for transport offsite.
- Progressive rehabilitation of mined areas.

The operation will typically be carried out by:

- 1 x Komatsu 155 bulldozer (pre-strip and rehabilitation activities).
- 1 x Caterpillar 966H front end loader (road train loading of the material).
- 2 x Kenworth road trains (transport of the mined sand and gravel to the end customer).
- 1 x Kenworth water truck (dust suppression).
- 1 x Caterpillar 140H grader for road maintenance.
- 1 x Mobile screening plant.

Explosives will not be used as part of strip-mining activities, and disturbed land will be progressively rehabilitated.

No waste rock or tailings will be produced by this operation.

Sand and gravel will be mined from four separate areas, referred to as Pit 1, 2, 3 and 4. The sand and gravel will be picked up by a front-end loader and loaded into the mobile screening plant. The plant will be situated within already disturbed areas and will move across the active working area as required. The screened product will be stockpiled and loaded into road trains when required by a front-end loader. No further processing is proposed for this Project.

Up to 70,000 tonnes per annum of sand and gravel material will be excavated from the Project area. The life of mine (LoM) for this Project is approximately 20 years (2043).

Project disturbance areas are shown in Figure 2 and summarised in Table 1 with a total of 96.87 ha of proposed disturbance.

Table 1: Comet Vale Infrastructure and Disturbance

DMIRS Description (EARS Online)	MLG Description	Total (ha)
Shallow excavation (depth of less than 5 m – above groundwater)	Pit 1-4	77.75
Transport Corridor	Tracks	19.13
Total		96.87



Scale: 1:30,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 250 500 1,000 m

RPMGLOBAL

PROJECT		CLIENT
Comet Vale - Mine Closure Plan		MLG Comprehensive Mine Site Services
Proposed Site Layout		
Figure 2	ADV-AU-00382	March 2023

2. IDENTIFICATION OF CLOSURE OBLIGATIONS

Legislation and other legal obligations applicable to closure and rehabilitation of the Comet Vale Project are summarised in the following subsections. These will be incorporated within a Legal Obligations Register that will be developed and maintained by MLG to include all commitments and obligations that must be adhered to at closure (refer to Section 2.3).

2.1 Legislation

2.1.1 *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Cth)*

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) has established a nationally consistent framework for environmental assessment of new projects and variations to existing projects. Mining projects that have the potential to impact on matters of national environmental significance are assessed under this legislation.

The Project been referred under the EPBC Act and is currently under assessment. There are currently no closure obligations recognised under the EPBC Act.

2.1.2 *Mining Act 1975 (WA) (Mining Act)*

The *Mining Act 1978* (Mining Act) regulates mining leases, licences, and terms and conditions for mines on private and crown land. Relevant aspects relating to mine closure are summarised below.

Mining Proposals

This MCP supports a new Mining Proposal application (2023) for the development of a sand and gravel mine. Commitments made from Mining Proposal applications are added to the Legal Obligations Register (Section 2.3).

Mine Closure Plan

There is no existing MCP for Comet Vale. This MCP is the first version for the project and has been prepared to support the Mining Proposal.

Tenement Conditions

There are no current tenement conditions.

2.1.3 *Environmental Protection Act 1986 (WA)*

The *Environmental Protection Act 1986* (EP Act) provides for the prevention, control and abatement of pollution and environmental harm for the conservation, preservation, protection, enhancement and management of the environment. Parts of the EP Act relevant to the Project are summarised below.

Part IV – Environmental Impact Assessment

A Part IV assessment occurs when the Environmental Protection Authority (EPA) determines that the proposal should be assessed due to the potential for a **significant impact on the environment**. **An explanation of 'significance' is provided in the document 'Statement of Environmental Principles, Factors and Objectives' prepared by the EPA in June 2018.** Using this guidance, the impact of the proposed MLG operations should not trigger significance under Part IV of the EP Act requiring assessment by the EPA and thereby being bound by a Ministerial approval and associated conditions under Part IV.

Part V – Prescribed Premise, Works Approval and Licences

Part V (Section 52) of the EP Act establishes a range of statutory instruments to permit the assessment and management of environmental outcomes arising from emissions from industry by the Department of Water and Environmental Regulation (DWER). Prescribed Premise categories are defined in Schedule 1 of the *Environmental Protection Regulations 1987*. Registration of the mobile screening unit at the Project will be required, with an application to be submitted in 2023. Any closure-related obligations will be added to the Legal Obligations Register.

Part V – Clearing of Native Vegetation

Part V (Section 51) of the EP Act specifies that clearing of native vegetation in Western Australia requires a permit. The clearing provisions of this Act are described in the *Environmental Protection Amendment Act 2003* (Western Australia) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

A Native Vegetation Clearing Permit (NVCP) which encompasses proposed clearing within the MLA will be submitted for the proposed disturbance area in 2023. Closure and rehabilitation obligations associated with the permit will be added to the Legal Obligations Register (Section 2.3).

2.1.4 Contaminated Sites Act 2003

The *Contaminated Sites Act 2003* (CS Act) requires that known or suspected contamination is reported to DWER where the substance is present at above background concentrations in the land or waters of a site that presents or potentially presents a risk of harm to human health, the environment or any environmental value.

A search of the DWER Contaminated Sites Database indicated that no confirmed contaminated sites have been listed under the CS Act within the Project area. There are no suspected contaminated sites associated with the Project. Should this change, any associated closure obligations will be updated within the Legal Obligations Register (Section 2.3).

2.2 Guidelines

2.2.1 ANZMEC/MCA Strategic Framework for Mine Closure

The Australian and New Zealand Minerals and Energy Council (ANZMEC) and Minerals Council of Australia (MCA) developed '**The Strategic Framework for Mine Closure (Strategic Framework)**' (ANZMEC/MCA, 2000) which is intended to promote a nationally consistent approach to mine closure management in all Australian jurisdictions. The Strategic Framework has established principles for mine closure that are agreed between regulating authorities and the mining industry.

2.2.2 DMIRS Guidelines for Preparation of MCPs

In March 2020, DMIRS released revised, statutory guidelines for the development of MCPs. These guidelines adopted the objectives and principles of the Strategic Framework, whilst providing further description of how MCPs in Western Australia can meet these objectives and principles. This MCP has been developed in accordance with the 2020 statutory guidelines (DMIRS 2020).

2.3 Legal Obligations Register

All closure obligations identified under the various acts and approval documentation, as discussed above, will be collated into a single Legal Obligations Register. The Legal Obligations Register will form a comprehensive checklist

for MLG to use during the closure process and will be updated annually to reflect any changes and maintain its relevance.

3. STAKEHOLDER ENGAGEMENT

MLG is committed to actively engaging with stakeholders to assist with effective mine closure planning. MLG's stakeholder engagement process includes:

- Identification of stakeholders and interested parties (Section 3.1)
- Development of a communication strategy for engaging stakeholders throughout the life of mine (Section 3.2)
- Maintenance of a Stakeholder Engagement Register that tabulates the outcomes of stakeholder engagement (Section 3.3)

3.1 Stakeholder Identification

A list of stakeholders and their primary interest in the Project are identified in the Stakeholder Identification Register presented in Table 2. The Stakeholder Identification Register will be reviewed and updated accordingly throughout the life of the Project as new stakeholders are identified.

Table 2: Stakeholder Identification Register

Stakeholder Group	Stakeholder Identification	Vested Interests
Federal Government	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	<ul style="list-style-type: none"> • Matters of national environmental significance (<i>Leipoa ocellata</i>).
State Government	Department of Water Environment Regulation (DWER)	<ul style="list-style-type: none"> • Licensing • Contaminated sites • Final land use • Regulatory reporting of emissions • Surface water and groundwater protection
	Department of Mines, Industry Regulation and Safety (DMIRS)	<ul style="list-style-type: none"> • Mining Proposals and Mine Closure Plans and associated closure and rehabilitation • Regulatory reporting of disturbances • Mine safety • Final land use and achievement of completion criteria • Consultation strategy
	Department of Planning, Lands and Heritage (DPLH)	<ul style="list-style-type: none"> • Post closure land use • Transfer of liability
	Department of Biodiversity, Conservation and Attractions (DBCA)	<ul style="list-style-type: none"> • Protection of biodiversity
	Department of Aboriginal Affairs (DAA)	<ul style="list-style-type: none"> • Aboriginal heritage / cultural sites • Final land use
	Main Roads Western Australia (MRWA)	<ul style="list-style-type: none"> • Road maintenance
	Menzies Shire	

Stakeholder Group	Stakeholder Identification	Vested Interests
Local Government and Industry organisations	Town of Menzies	<ul style="list-style-type: none"> • Use of public roads and Shire amenities • Final land use • Long-term safety of closed site • Employment opportunities during operations and closure • Use of infrastructure following cessation of mining
	Goldfields-Esperance Development Commission	<ul style="list-style-type: none"> • Transition to closure
	Goldfields-Esperance and Regional Chamber of Commerce and Industry	<ul style="list-style-type: none"> • Employment opportunities during closure and rehabilitation
Local Community/Land Users/Industries	Local Community	<ul style="list-style-type: none"> • Protection of heritage sites • Mine closure planning and long-term liabilities • Final land use and rehabilitation
Pastoralist	Jeedamya Pastoral Lease (PLN050457)	<ul style="list-style-type: none"> • Post closure land use • Weed management
MLG Oz	Shareholders	<ul style="list-style-type: none"> • Closure liability • Sustainability
	Employees, caretakers and families	<ul style="list-style-type: none"> • Employment opportunities • Training • Transition into closure
	Corporate and senior manager	<ul style="list-style-type: none"> • Closure and rehabilitation • Financials and liabilities
	Consultants / contractors	<ul style="list-style-type: none"> • Transition to closure • Contracting opportunities

3.2 Stakeholder Communication Strategy

The purpose of the stakeholder closure communication strategy is to ensure that relevant stakeholders are kept informed and have the opportunity to provide input on mine closure aspects of mining operations. It also aims to minimise the impact of mine closure on both workers and the local community. The communication strategy is targeted at the different stakeholder groups listed in Table 2 to ensure closure information is distributed in a timely and coordinated manner and will be updated as the operation progresses and key stakeholder groups change. The closure communication strategy is summarised in Table 3.

Table 3: Stakeholder Communication Strategy

Stakeholder Group	Stakeholder Identification	Vested Interest	Focus
Local Government, Community and Land Users			
Menzies Shire/ Town of Menzies and local community	As required	<ul style="list-style-type: none"> • Shire council meetings 	<ul style="list-style-type: none"> • End land use • Transition to post-mining business
Pastoralist	Annually	<ul style="list-style-type: none"> • Annual meeting with pastoralist or as required to 	<ul style="list-style-type: none"> • Final land use and potential use of some mine

Stakeholder Group	Stakeholder Identification	Vested Interest	Focus
		provide an update on operations and mine closure	infrastructure (E.g. retention of roads)
Goldfields-Esperance Development Commission, Goldfields-Esperance and Regional Chamber of Commerce and Industry	As required	<ul style="list-style-type: none"> Meetings 	<ul style="list-style-type: none"> Final land use Employment opportunities
Federal			
DCCEEW	As Required	<ul style="list-style-type: none"> Meetings 	<ul style="list-style-type: none"> Matters of national environmental significance (<i>Leipoa ocellata</i>).
State			
DMIRS	Annually	<ul style="list-style-type: none"> Review of MCP (every three years) Annual Environmental Report (AER) Site inspections 	<ul style="list-style-type: none"> Decommissioning Safety Materials characterisation Closure designs and task register Rehabilitation progress Closure criteria Landform stability Final land use Consultation strategy
DWER	As required	<ul style="list-style-type: none"> Site inspections Correspondence 	<ul style="list-style-type: none"> Pollution control Contaminated sites Post closure surface water management.
Other Departments (e.g., DPLH, EPA, DBCA, DAA, MRWA)	As required	<ul style="list-style-type: none"> Meetings Correspondence 	<ul style="list-style-type: none"> Biodiversity Protection of heritage sites Road maintenance
MLG Oz			
MLG Management Team	Biannual	<ul style="list-style-type: none"> Management meetings Three yearly review of MCP Annual reporting 	<ul style="list-style-type: none"> Cost of closure Future liabilities Closure and rehabilitation methodology Relationships with community and government stakeholders Sustainability Training
Shareholders	Annually	<ul style="list-style-type: none"> Annual Report 	<ul style="list-style-type: none"> Cost of closure

Stakeholder Group	Stakeholder Identification	Vested Interest	Focus
		<ul style="list-style-type: none"> Annual General Meeting 	<ul style="list-style-type: none"> Sustainability Liabilities
Employees	One year prior to closure.	<ul style="list-style-type: none"> Workshops Group meetings 	<ul style="list-style-type: none"> Transition to mine closure Training

3.3 Stakeholder Engagement Register

To date, stakeholder engagement has largely focused on the development and operation of the Project. Closure related consultation is therefore limited. MLG understands that early engagement on closure related aspects is an important part of achieving positive closure outcomes. MLG will undertake stakeholder engagement as detailed above and will maintain a consultation register that documents all closure related communications with stakeholders. This register will be updated regularly and will be included in future iterations of the MCP.

4. BASELINE DATA

The following subsections provide a summary of baseline environmental and closure related data. This has been used to:

- Inform rehabilitation and closure requirements (Section 5).
- Identify closure related risks and the management measures needed to treat these risks during the mine closure process (Section 6).
- Inform the development of criteria for closure monitoring and performance (Section 7).
- Inform the establishment of achievable closure outcomes and goals in a local and regional context (Section 7).
- Establish baseline conditions for closure monitoring programs (Section 9).

The baseline data used for this MCP has been derived from a number of studies, desktop assessments and field surveys.

4.1 Regional Setting

The Project is located within the East Murchison subregion of the Murchison Region as described by the Interim Biogeographic Regionalisation from Australia (IBRA) Version 7 (DoEE 2020). The East Murchison sub region is situated in the Yilgarn Craton covering an area of 7,847,996 ha (Cowan et al., 2001).

The Murchison sub-region is characterised by its internal drainage and elevated red desert sandplains with minimal dune development. The vegetation is dominated by Mulga woodlands with ephemerals, hummock grasslands, saltbush shrublands and *Halosarcia* shrublands (Cowan et al., 2001).

The Project is located on relatively flat land with undulating dune systems. The Project slopes from northwest to southeast with an upper contour of 415.5 m (relative level to Australian Height Datum – RL AHD) to a lower contour of RL 358 m (AHD).

Closure Considerations

Landforms should be profiled and rehabilitated as far as practicable to be compatible with the surrounding landscape, with consideration to slope angles and elevations.

4.2 Geology

The tenement area is located within the Kalgoorlie Province as defined by Tille in *Soil-landscapes of Western Australia's rangelands and arid interior* (2006). The Kalgoorlie Province is located on the central eastern portion of the Yilgarn Craton, predominantly over Archean rocks. The basement rocks consist mainly of granite, gneiss and greenstone. To the north, where the tenement area is located, even-grained porphyritic granite rocks with quartz vein and dolerite dyke intrusions are common (Tille, 2006).

Interdunal areas consist of flat undulating zones containing residual iron rich pisolithic gravels. The pisolites are up to 1.5 cm in diameter, consist mainly of goethite and are used for maintenance of gravel roads. There is a surficial quartz sand sheet and dune sand cover.

Closure Considerations

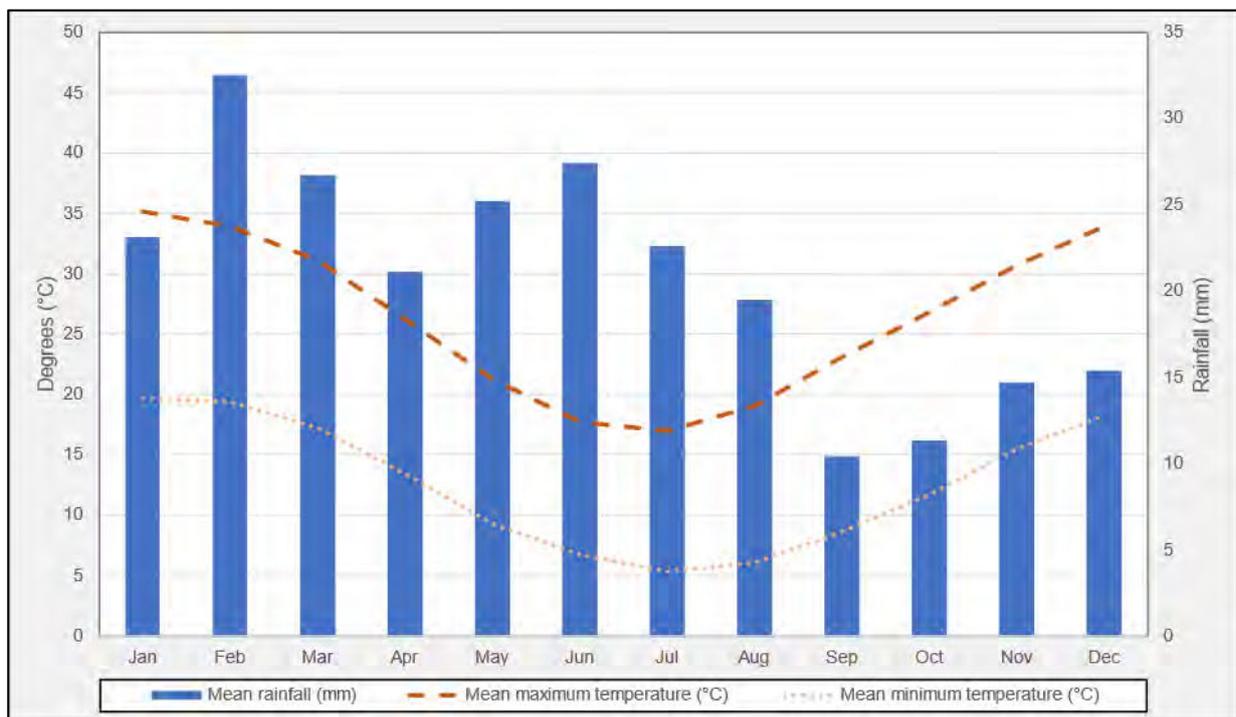
Based on all available geological information, it is not anticipated that the geology within the Project area will have any closure implications, with all materials being geochemically benign.

4.3 Climate

The nearest meteorological station to the Project is Menzies (Bureau of Meteorology site number 012052), located approximately 26 km to the north. Site 012052 readings commenced in 1986 with the latest available data from 13 April 2019 (Chart 1).

The annual average rainfall reported at the site is 254 mm (BOM n.d.). The highest rainfall typically occurs in February (32.5 mm) and the lowest rainfall occurs in September (10.4 mm). The annual average number of days of rain is 32.3 (BOM n.d.). Temperatures range from a mean maximum of 35.1°C in January to 17.0°C in July. Minimum mean temperatures at the Project site range from 19.7°C in January to 5.3°C in July. On average, there are 63.5 days per annum where the temperature is above 35°C. The highest mean number of days per month is January, with 17.9 days above 35°C.

Chart 1: Menzies Climate Data



Closure Considerations

Climate modelling (CSIRO n.d.) generally points towards a hotter, drier climate for the region, which is currently described as hot and dry for most of the year. Where water is already limited, increased evapotranspiration and less rainfall will put additional stress on the water resources available, suggesting that both mining companies and the local community will need to adapt their practices to use less water and cope in the hotter extremes. A greater incidence and severity of extreme weather events or storms is also predicted, including high winds (10 to 15% increase by 2030) and intense rainfall (20 to 30% increase by 2030). While closure designs include consideration to these conditions, climate change is unlikely to significantly affect closure of the Project given the subtle landforms and favourable soil properties.

4.4 Soils and Landforms

The Project is located within the Norseman Zone of the Kalgoorlie Province (Tille, 2006). The Norseman Zone consists of undulating plains and uplands on granitic rock of the Yilgarn Craton. Soils of the Norseman Zone include calcareous loamy earths, yellow sandy and loamy earths, red loamy earths, red deep sands and salt lake soils (Tille, 2006).

The soils of the middle and western areas of the Project are characterised by dunes and plains with some granitic outcrop and considerable surface cover of ironstone gravels with some calcrete in low lying areas. Chief soils are yellow and red earthy sands on the plains, sometimes containing ironstone gravel.

The north-eastern section of the Project area is characterised by flat to undulating valley plains and pediment with some rock outcrop. Chief soils are alkaline and neutral red earths often with a scatter of gravel. The southern section of the Project is characterised by salt lakes and their associated areas with common soils being gypseous and saline loams.

4.4.1 2022 Soil Assessment

RPM Global was commissioned by MLG to conduct a Soil Assessment of MLG's three proposed sites including Comet Vale (tenement E29/742), Mt Keith (tenement E53/1480), and Jonah Bore (tenement M36/657). The full report is provided in Appendix 1. The key findings from this survey specific to Comet Vale comprise (RPM 2022):

- The materials are loose, pale red-brown aeolian sands with very low plant available water capacity.
- Although the sands have a low risk of generating significant amounts of dust, they contain substantial amounts of fine to medium sand-sized particles that are easily mobilised by moderate to strong wind. The growth of emerging seedlings may be impacted by the associated sand blasting if the area is not thoroughly ripped.
- The sands are moderately acidic, with pH values ranging from 5.3 to 5.6. As the soils are comprised mainly of silica particles with very low concentrations of exchangeable aluminium, the acidity levels are unlikely to be a problem for common sand dune species (notably spinifex) in the arid regions of WA.
- The sands are non-saline and non-sodic.
- Nutrient contents and soil organic matter contents are extremely low. Low phosphorus buffering capacity (PBI) and cation exchange capacity (CEC) values indicate soils have very little capacity to retain soluble nutrients applied as soluble fertilisers or mineralised organic materials. The very low nutrient status is unlikely to support high vegetation densities or complex communities, and application of slow-release, balanced fertilisers may be beneficial for initial revegetation of the site.
- Heavy metal and metalloid concentrations are exceptionally low and, with the exception of slightly elevated nickel.

Overall, the soils are described as stable, geochemically benign aeolian sands with limited nutritional value for plant growth. Given that local, native plant species are adapted to these conditions, revegetation of disturbed surfaces is expected to occur over time. This is reinforced by the positive performance of areas that have already been rehabilitated by MLG at other nearby mining operations, as demonstrated by rehabilitation performance monitoring reports (Blueprint, 2021a, 2021b) and general site observations.

Closure Considerations

The soils at the Project show no limiting factors that could impede the successful rehabilitation of disturbed areas. The use of local native species, which are well adapted to the local soil conditions, will be used to progressively rehabilitate the site.

Soils from clearing activities will be appropriately stored and protected during operations (e.g., from vehicle traffic, saline water, erosion) to aid in the successful rehabilitation of disturbed areas. Topsoil stockpiles are to be used as part of progressive rehabilitation work as soon as possible to take advantage of residual seedbank and organic matter.

The use of fertiliser is unlikely necessary to revegetate disturbed areas, however this will be determined based on the performance of early rehabilitation work.

4.5 Flora and Vegetation

Several flora and vegetation surveys have been completed for Comet Vale comprising:

- Flora and Vegetation Survey of the Comet Vale Project (Goldfields Landcare Services (GLS 2018) Appendix 2)
- Flora and Fauna Desktop Assessment (RPM 2021) (Appendix 3)
- Flora and Vegetation Survey of the Comet Vale Project (GLS 2022) Appendix 4)

The information presented here is a comprehensive overview of flora and vegetation based on the findings of each survey completed for the Project

4.5.1 Vegetation Communities

Recent field flora and vegetation surveys were completed by GLS (2022), surveying approximately 774 ha of the Comet Vale Sand Project area. Based on the vegetation condition scale adapted from Kieghery 1994 and Trudgen 1998 as cited in the Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016), the condition of the vegetation within the Project area was classified as Good. Disturbance present within the survey area (36.5 ha) was mostly attributed to access tracks and historic mining activities.

A total of six vegetation communities were identified in the Project area (Figure 3) and consist of:

- Frankenia Low Shrublands (2.70 ha).
- Greenstone Hill Non-halophytic Eucalypt Woodlands (0.98 ha).
- Mulga Wanderrie Grassy Shrublands (150.18 ha).
- Sandplain Acacia Shrubland (440.32 ha).
- Sandplain Gum Stratum (100.57 ha).
- Sand Dune Shrubland (78.53 ha).

None of the vegetation associations are aligned with any federal or state listed Threatened Ecological Communities (TECs) or state-listed Priority Ecological Communities (PECs).

4.5.2 Conservation Significant Flora

A desktop assessment of the Project area was undertaken on 15 June 2021 by interrogating the NatureMap database (DBCA n.d.) and EPBC Protected Matters Search Tool (DCCEEW n.d.). The desktop assessment identified 20 conservation significant flora species with the potential to occur in the area. The desktop component of the detailed flora and vegetation survey conducted by GLS in 2021 **identified the closest TEC being 'Depot Springs stygofauna complex' located approximately 273 km northwest of the Project. The nearest PEC recorded is the 'Emu Land System' 23 km south of the Project area.**

The field survey component recorded a total of 215 species (including sub-species and varieties) from 40 families and 106 genera in the Project area; conservation significant flora species recorded are shown on Figure 4. The following conclusions were drawn based on the survey results:

- No plant species gazetted as Threatened or Declared Rare Flora under the *Biodiversity Conservation Act 2016 (W.A.)* (BC Act) were recorded in the Project area.
- No plant species listed as Threatened under the EPBC Act were recorded.
- Nine Priority species were recorded in the Project area, with the greatest concentration occurring where their populations overlapped in the southeast corner of the Project area. While some of these species are widespread regionally and abundant within the Project area, one species, *Persoonia leucopogon* (Priority 1) was restricted within the survey area to one small population of 27 stems in Sand Plain Acacia Scrubland (but within 50 m of base of a dune) and three single stems, encountered elsewhere (GLS 2022).

4.5.3 Weeds

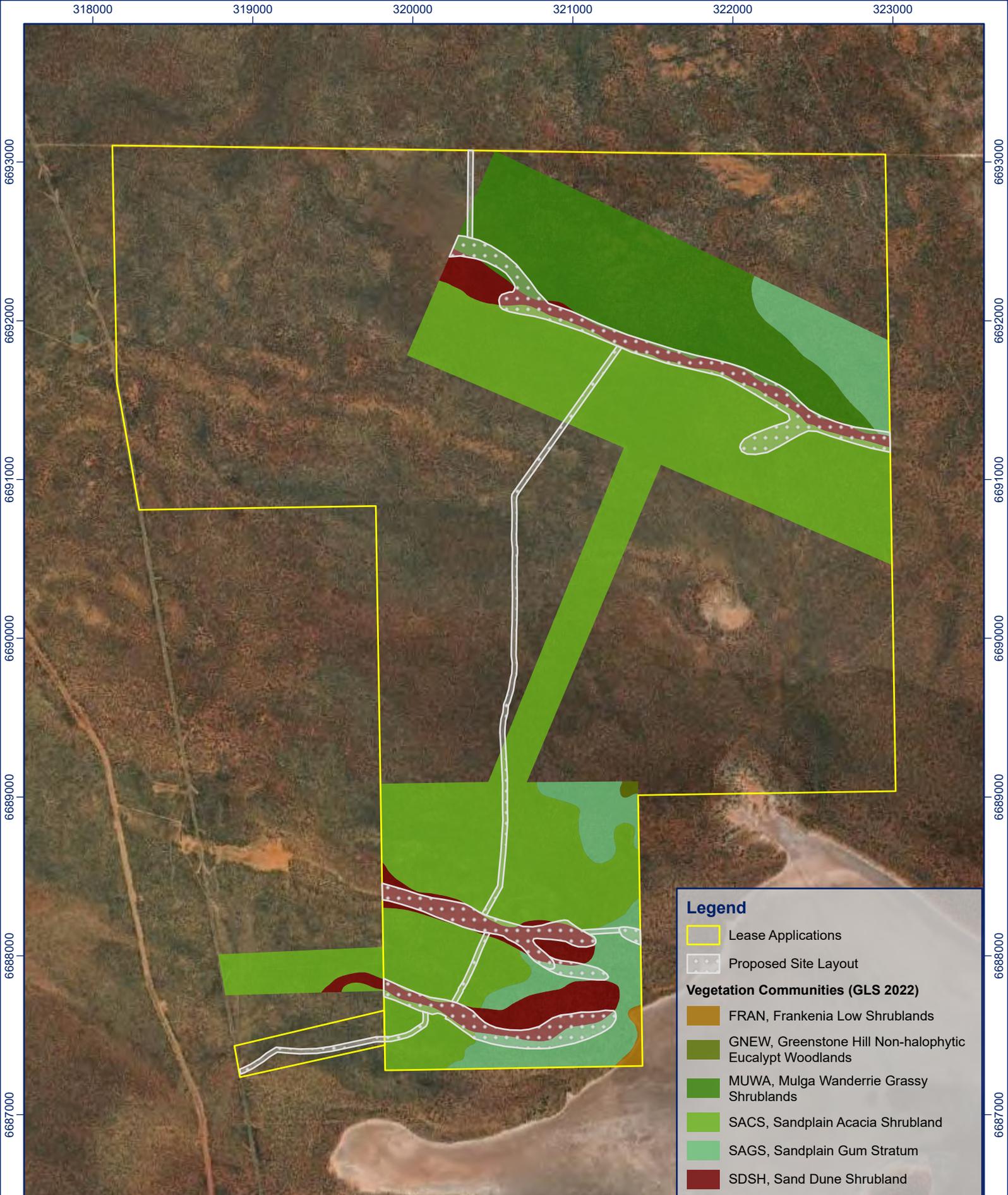
Recent field survey (GLS 2018) provided the following findings on weeds and introduced species:

- No introduced weed species or plants listed as *Weeds of National Significance* (WoNS) under the *EPBC Act* were recorded within the survey area.
- No introduced species or Declared Pests listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) were recorded from the study area.

Closure Considerations

It is not anticipated that closure would have any additional impact on the surrounding flora and vegetation. Closure activities are planned to minimise the impact on surrounding environment with the intent to return the environmental biodiversity to an acceptable level which includes safe, stable and non-polluting landforms. All rehabilitated areas will use seed stored in the stockpiled topsoil with additional seeding unlikely to be required. As observed in other comparable projects operated by MLG, vegetation via natural recruitment processes is also expected to contribute to revegetation of disturbed surfaces. Monitoring of the rehabilitation will occur to assess if additional seeding of local provenance species is necessary.

The MLG weed management program will ensure that all vehicles and plant equipment are in a clean condition and free of soil and vegetative matter prior to entering the Project site. The proposed weed management and monitoring processes during and post closure will ensure that weed populations and diversity do not increase.



Legend

- Lease Applications
- Proposed Site Layout

Vegetation Communities (GLS 2022)

- FRAN, Frankenia Low Shrublands
- GNEW, Greenstone Hill Non-halophytic Eucalypt Woodlands
- MUWA, Mulga Wanderrie Grassy Shrublands
- SACS, Sandplain Acacia Shrubland
- SAGS, Sandplain Gum Stratum
- SDSH, Sand Dune Shrubland

Scale: 1:30,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 250 500 1,000 m

RPMGLOBAL

PROJECT		CLIENT
Comet Vale - Mine Closure Plan		 Comprehensive Mine Site Services
Vegetation Communities		
Figure 3	ADV-AU-00382	March 2023

4.6 Fauna and Habitat

4.6.1 Vertebrate Fauna and Habitat

MLG commissioned Western Wildlife to undertake a Targeted Malleefowl Survey in conjunction with a Basic Vertebrate Fauna Survey in 2021. A desktop assessment followed by field survey was conducted to identify fauna habitats and likely presence of conservation significant fauna species within the proposed disturbance areas. The fauna survey was conducted in accordance with the following guidance:

- *Technical guidance: terrestrial vertebrate fauna surveys for environmental impact assessment* (Environmental Protection Authority (EPA), 2020).
- **Survey Guidelines for Australia's Threatened Birds** (Department of the Environment, Heritage, Water, and the Arts (DEWHA 2010).

The fauna habitat types identified are relatively common in the IBRA region with restricted habitat types such as granite outcrops and wetlands largely absent from the Project area. The habitats include (Western Wildlife, 2022):

- Mulga Woodland.
- Acacia Shrubland.
- Sand Dune.
- Eucalypt-spinifex Sandplain.
- Salt Lake.

The Project area is likely to support a relatively intact faunal assemblage as it is situated in a larger tract of relatively undisturbed native vegetation. A total of four amphibians, 78 reptiles, 150 birds and 39 mammals have the potential to occur in the survey area.

4.6.2 Conservation Significant Species

The fauna study identified four species listed under the EPBC Act as having the potential to occur in the Project area:

- Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) – Critically Endangered – Not recorded.
- Night Parrot (*Pezoporus occidentalis*) – Endangered – Not recorded.
- Malleefowl (*Leipoa ocellata*) – Vulnerable – Recorded.
- Chuditch (*Dasyurus geoffroii*) – Vulnerable – Not recorded.

The five fauna habitats identified in the study area have been assessed for their likelihood to support Malleefowl as summarised in Table 4 and graphically presented on Figure 5.

Table 4: Fauna Habitat

Fauna Habitat	Key Habitat Elements	Likely Malleefowl Presence	Total Area (ha)
Mulga Woodland	<ul style="list-style-type: none"> Tall, dense shrubland provides habitat for nesting birds. Larger mulga trees provide crevices and small hollows. Leaf litter and gravelly sands provide breeding habitat for Malleefowl. 	<ul style="list-style-type: none"> Known to occur. Malleefowl mounds identified during field survey. Evidence such as tracks observed during field survey. Highly likely mounds identified during LiDAR surveys. 	150.5
Acacia Shrubland	<ul style="list-style-type: none"> Tall, dense shrubland provides habitat for nesting birds. Leaf litter and gravelly sands provide breeding habitat for Malleefowl. Scattered mallee eucalypts provide crevices and small hollows. 	<ul style="list-style-type: none"> Known to occur. Malleefowl mounds identified Evidence such as tracks observed during field survey Highly likely mounds identified during LiDAR surveys. 	423.3
Sand Dune	<ul style="list-style-type: none"> Loose sands provide habitat for fossorial reptiles. Scattered mallee eucalypts provide crevices and small hollows. 	<ul style="list-style-type: none"> Known to traverse through Sand Dune habitat type. No mounds identified during field survey or LiDAR survey. 	81.7
Eucalypt-spinifex Sandplain	<ul style="list-style-type: none"> Scattered mallee eucalypts provide crevices and small hollows. Consolidated sands provide habitat for burrowing fauna. Spinifex provides habitat for some reptiles. 	<ul style="list-style-type: none"> Known to traverse through Eucalypt-spinifex Sandplain habitat type. No mounds identified during field survey or LiDAR survey. 	115.5
Salt Lake	<ul style="list-style-type: none"> May support waterbirds when inundated. 	<ul style="list-style-type: none"> No evidence of Malleefowl as unsuitable for breeding or foraging. 	2.3
Total			773.3

The desktop assessment included a review of the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) known locations of Malleefowl records within 70 km of the Project. The database identified numerous records of Malleefowl that was supported with the identification of five Malleefowl mounds in the survey area including one recently active, one inactive and three historic mounds. An additional recently active mound was identified opportunistically by Western Wildlife outside of the study area (Western Wildlife, 2022).

A Light Detecting and Ranging (LiDAR) survey was undertaken by Andiditi in 2022 to understand the potential extent of Malleefowl within the initial survey area and the surrounding area of 49 km². The LiDAR results were analysed to identify potential mounds and rated on the degree of certainty. The ratings used are:

- Rating 1: Very closely matches a typical Malleefowl mound shape and is highly likely to be a Malleefowl mound.
- Rating 2: Is similar to a Malleefowl mound shape and could be a Malleefowl mound.
- Rating 3: Is a mound shape that is approximately within the parameters of size for a Malleefowl mound. This could be an old Malleefowl mound, a mound of earth around living or dead tree/vegetation, natural hummocks around waterways, etc.

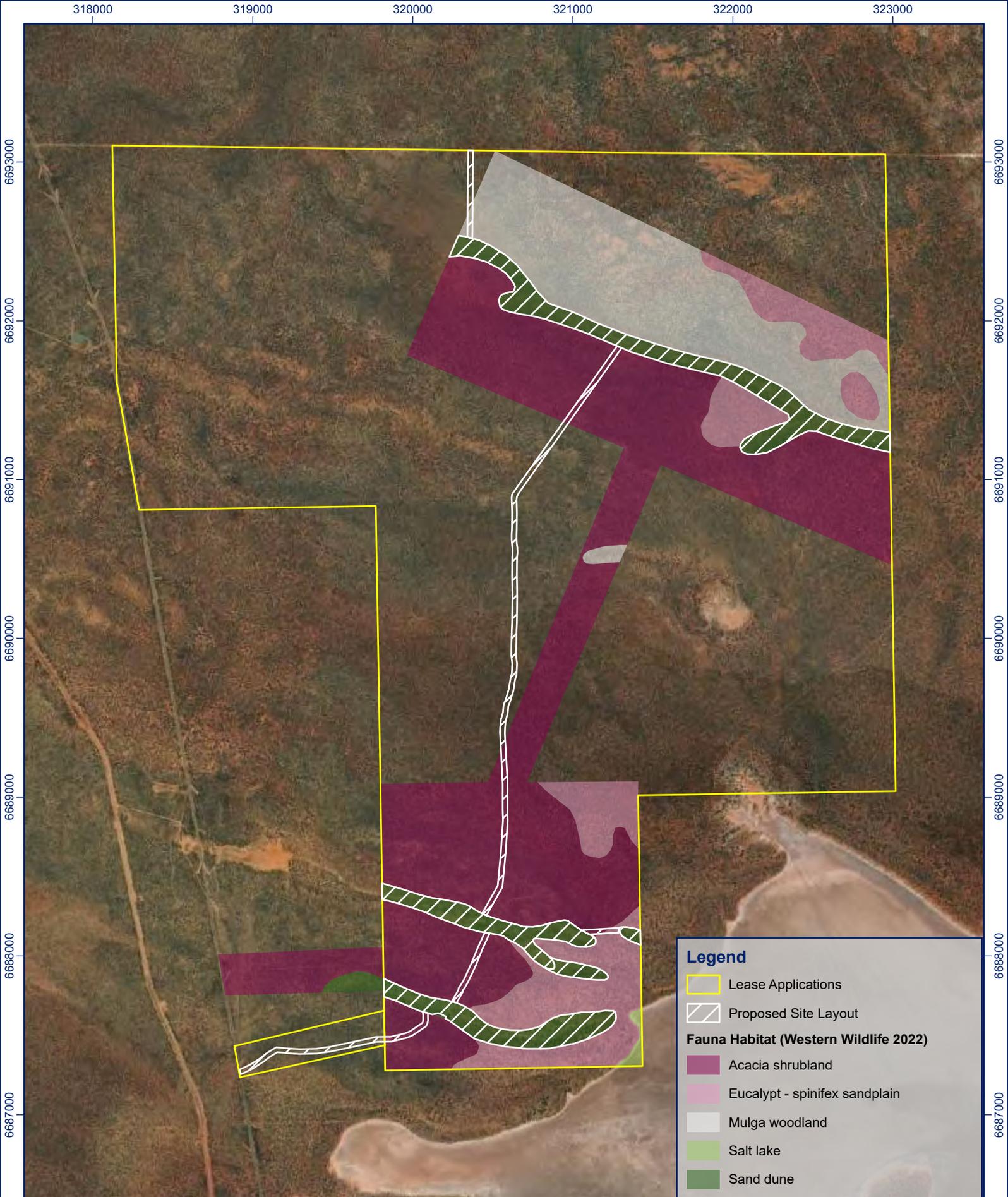
The results of the LiDAR survey are outlined in Table 5. These combined with the records from the field survey conducted by Western Wildlife are displayed in Figure 6.

Table 5: LiDAR Malleefowl Mound Detections

Rating	Survey Area	Regional Area	Total
Rating 1	4	7*	11
Rating 2	1	6	7
Rating 3	3	8	11
Total	8	21	29

* Initial report of Survey area classified this mound as a Rating 2. It was subsequently upgraded in the regional survey analysis.

Source: (Anditi, 2022a, 2022b).



Legend

- Lease Applications
- Proposed Site Layout

Fauna Habitat (Western Wildlife 2022)

- Acacia shrubland
- Eucalypt - spinifex sandplain
- Mulga woodland
- Salt lake
- Sand dune

Scale: 1:30,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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PROJECT		CLIENT
Comet Vale - Mine Closure Plan		 Comprehensive Mine Site Services
Fauna Habitat		
Figure 5	ADV-AU-00382	March 2023

4.6.3 Short Range Endemics

Invertebrate Solutions Pty Ltd (2022) was contracted to complete a Short Range Endemic (SRE) desktop assessment of MLGs four proposed deposits sites including Comet Vale (tenement E297/42), Mt Keith (tenement E53/1480), 16 Mile Well (tenement E36/1003) and Jonah Bore (tenement M36/657). This survey was undertaken in regard to the 'Technical Guidance – Sampling of short-range endemic invertebrate fauna' (EPA 2016).

The Project area has potential SRE habitats, associated with the drainage lines, sand dunes and the denser vegetated areas in the northeastern and south western sections of the Project area. The desktop assessment identified:

- No Confirmed SRE Species.
- One likely SRE Species with a high likelihood of occurrence.
- Anamid trapdoor spider (*Kwonkan goongarriensis*).
- One possible SRE Species with a moderate likelihood of occurrence.
- Anamid trapdoor spider (*Aname 'MYG347 -DNA'*).
- Three possible SRE Species with a low likelihood of occurrence.
- Pseudoscorpions (*Sundochernes 'PSE020'*, *Synsphyronus 'PSE023'* and *Beierolpium 'sp. 8/2'*).
- One potentially occurring conservation significant invertebrate with a moderate likelihood of occurrence.
- Mygalomorph spider – *Idiosoma clypeatum* - DBCA Priority 3.

Any potential SRE taxa would not be restricted to the small amount of habitat present within the Project area as these habitats extend beyond the Project area and are continuous in the regional landscape. All identified species are considered Possible SREs due to data deficiencies and absence of taxonomic frameworks that prohibit a conclusive assignment of SRE status. The remaining species identified from desktop resources were found to be widespread.

Closure Considerations

Re-establishment of local plant communities as part of progressive rehabilitation activities will assist in the return of fauna over time. For the species of conservation significance and others that may be present, none are restricted to habitats within the Project area, and many are wide-ranging. The status of all species of conservation significance, therefore, should not be adversely affected by the proposed closure works.

4.7 Subterranean Fauna

Subterranean fauna does not require investigation due to the mining operations not intersecting groundwater and the low impact activities undertaken on the tenement.

4.8 Hydrology

Regionally, the Project lies within the Raeside-Ponton catchment within the Salt Lake Basin of the Western Plateau Division, as delineated in the Department of Water and Environmental Regulations (DWER) Hydrographic Catchments Database (DWER, 2023).

Locally, the tenement is situated across five small catchments, with the Project footprint located almost entirely within two of these:

- A central, internally draining catchment with all associated drainage terminating within a small, unnamed mud pan located to the southeast of the tenement. This catchment covers approximately 13 km² and contains the northern mining area and the majority of the Project haul roads.
- A southern catchment that drains into the north-west extremity of Lake Goongarrie. This catchment covers approximately 29 km², of which 13 km² is situated within the tenement. The southern mining area and associated haul roads are located within this catchment.

Local topography is generally subdued, comprising a series of low sand dunes, a broader topographic high area towards the northwest corner of the tenement and a topographic low area where the tenement adjoins Lake Goongarrie. Elevations in the topographic high area are in the order of 415 m RL (AHD) while Lake Goongarrie is situated at approximately 353 m RL (AHD). Gradients across the tenement are low, averaging between 1 and 2% and generally not exceeding 10%. The steepest gradients are associated with the sand dune areas, which have gradients varying between 2% and 10%.

There are no defined drainage lines within the tenement, with stormwater flow expected to occur as sheetwash in a south-easterly direction. Under normal rainfall events, stormwater flows are expected to be limited across the Project area due to the highly permeable aeolian sands. More extreme storm events may produce sheetwash that will broadly follow drainage paths.

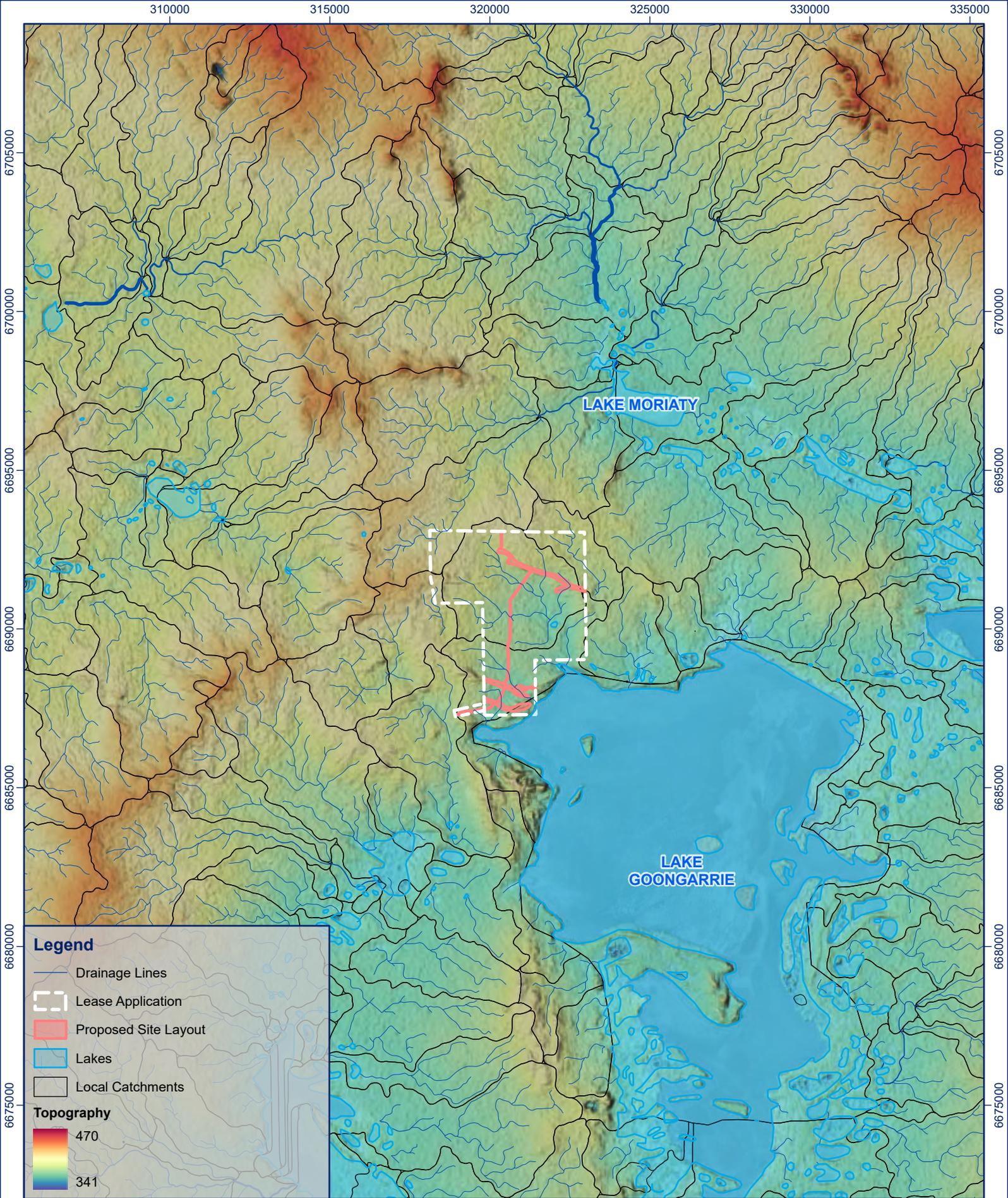
The nearest surface water features to the Project comprise the forementioned Lake Goongarrie and associated mud pan to the immediate north. Lake Goongarrie is an ephemeral salt-lake which covers an area of 113 km² and forms part of the Rebecca Paleochannel (oriented north to south) covering an area of approximately 8,715 km². This drainage has a dominant flow towards the east to the Eucla Basin through Lake Yindarlgooda and Lake Marmion.

Flooding associated with these two surface water features is not expected to impact the Project area, with a minimum 10 m elevation differential between the closest mine infrastructure and water body (Lake Goongarrie and/or mud flat).

Project hydrology is shown in Figure 7.

Closure Considerations

Rehabilitation activities should reinstate natural drainage conditions as far as practicable. The rehabilitated pits will form gentle depressions in the landscape. Stormwater inflow into the pits should be minimised as far as practicable to minimise ponding in the base of the pits. This can be achieved by standard stormwater management measures such as construction of earth bunds on the upstream pit crest. The established rehabilitation regime also includes the covering of the pit base with 300 mm of topsoil/growth medium. This can accommodate most storm events without any significant ponding.



Scale: 1:150,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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PROJECT		CLIENT
Comet Vale - Mine Closure Plan		MLG Comprehensive Mine Site Services
Project Hydrology		
Figure 7	ADV-AU-00382	March 2023

4.9 Hydrogeology

A review of several key studies undertaken on the Goldfields' hydrogeology, including those undertaken by Commander et.al. (1992), K.H. Morgan and Associates (2000), and Parsons Brinckerhoff (2004), has been used to develop a conceptual hydrogeological model of the regional hydrogeology:

- The Project is located within the Goldfields Groundwater Area (Rebecca Sub Area) and partially within the Lake Goongarrie catchment, where the bulk of the water resources are saline with a total dissolved solids content (TDS) of over 14,000 mg/L and dominated by Na and Cl ions.
- Rainfall infiltration is the main source of aquifer recharge throughout the region with increasing salinities as Lake Goongarrie is approached.
- Drainage is uncoordinated and directed towards the paleodrainages of Lake Goongarrie, Lake Ballard, and Lake Marmion.
- Discharge from the groundwater systems takes place by evaporation from salt lakes.
- Groundwater occurrence can be grouped as follows:
 - Tertiary sediments. The Lake Rebecca system, which includes Lake Goongarrie, is the surface expression of an extensive ancient river system. Locally these palaeochannel sediments reach a thickness of up to 60 m, generally being low permeability silts and clays but with basal layers of moderate permeability sands.
 - Regolith horizon. The Tertiary sediments are incised into a weathering profile, with a thickness of up to about 60 m. Permeability can range from low to very high and is typically greatest in saprock and oxidised bedrock near the base of the oxidised profile. It is commonly higher in ultramafic and siliceous sedimentary rocks. Water quality in these unconfined aquifers can be fresh to brackish and this resource has been used for pastoral supplies.
 - Bedrock. Below the base of oxidation, permeability is generally very low and decreases further with depth. Development in the footwall basalt produces very little water. Fresh rock mining in the region generally produces only small flows from fractured rock aquifers located in the ore environment. These waters are typically hypersaline.

Given the superficial depth of the target aeolian sands, groundwater will not be encountered as part of the Project's operations.

Closure Considerations

Groundwater depths are expected to be well below the base of the pits. No impacts on groundwater resources are anticipated as part of ongoing mining and closure implementation.

4.10 Waste Characterisation

No mine waste is produced by the Project.

4.11 Heritage and Social Setting

4.11.1 Land Use and Community

The Project is located 22.1 km south of Menzies within the Menzies Shire. Menzies is a small town with a population of 108, of which approximately 44 % are of indigenous descent (Australian Bureau of Statistics) (ABS n.d.). Kalgoorlie-Boulder is approximately 100 km south of the Project site which has a population of approximately 29,306 people (ABS n.d.) Mining, prospecting, pastoralism and tourism are the principal economic activities in the area.

4.11.2 Aboriginal Heritage

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry System (AHIS) was undertaken on 17 March 2023. This search confirmed that no registered or lodged Aboriginal heritage sites are listed within tenement E29/742 (DPLH n.d.). The nearest Aboriginal heritage sites are Menzies Field Site (Place ID: 17168; 15.4 km northwest of the Project) and Coongarrie Ceremonial Site (Place ID: 19938; 15.5 km south of the Project). The ML area and site layout is designed to avoid all Aboriginal heritage sites, with a minimum buffer of 10 m from the proposed disturbance and the ML area boundary. The full report is provided in Appendix 5 and results are represented in Figure 8.

4.11.3 European Heritage

A search of the Heritage Council State Heritage Office Inherit database was undertaken on 17 March 2023 (Heritage Council State Heritage Office, n.d.). No places of European heritage value were recorded within the Project area.

Closure Considerations

Social/heritage related impacts associated with closure activities are not anticipated. MLG will liaise with DPLH and Indigenous Groups to discuss relevant aspects of closure as required. MLG will notify relevant authorities should any artefacts or skeletal remains be uncovered during closure activities.



Legend

- Mining Lease Application
- Proposed Site Layout

Aboriginal Heritage Places (DPLH, 2023)

- Registered Site
- Lodged

Scale: 1:250,000
 Projection: GDA2020 MGA Zone 51
 Created/Reviewed By: AW/EL
 Aerial: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PROJECT		CLIENT
Comet Vale - Mine Closure Plan		 Comprehensive Mine Site Services
Aboriginal Heritage		
Figure 8	ADV-AU-00382	March 2023

4.12 Knowledge Gaps

There are no knowledge gaps that could impede the successful closure and rehabilitation of the Project. MLG has operated and rehabilitated a number of comparable projects in the broader Goldfields region of Western Australia which has allowed the rehabilitation process to be refined.

5. POST MINING LAND USE AND CLOSURE OBJECTIVES

5.1 Post Mining Land Use

The Project area currently comprises native ecosystems with the key land uses of the broader region comprising mining and pastoralism. The proposed post mining land use objective is the re-establishment of native ecosystems that are compatible with light grazing activities.

As part of stakeholder engagement, MLG Oz will ensure that the post-mining land use is further defined and agreed with key stakeholders.

5.2 Closure Objectives

The objectives of this MCP aim to facilitate well-planned and effective mine rehabilitation and closure for the Project by providing a process to (adapted from ANZMEC / MCA (2000)):

- Enable all stakeholders to have their interests considered during the mine closure process.
- Allow closure to occur in an orderly, cost-effective and timely manner.
- Enable the cost of closure to be adequately represented in MLG Oz accounts.
- Provide clear accountability and adequate resources for closure.
- Establish a set of indicators which will demonstrate the success of the closure process.
- Enable MLG Oz to meet agreed closure criteria to the satisfaction of the relevant authority.

The broad objectives for closure of the Project are (in line with the ANZMEC/MCA (2000) framework for mine closure and DMIRS closure guidelines (2020) to leave the site, to the extent required by the agreed post-mining land uses:

- Safe for future land uses with access to hazardous areas restricted.
- Stable, with post-mining landforms resistant to failure and erosion, and downstream deposition minimised or contained.
- Non-polluting, with adverse drainage from post-mining landforms prevented or contained and contaminated sites managed in accordance with current DWER guidelines.
- Rehabilitated such that soil profiles, drainage and other characteristics are reinstated as far as practicable, allowing a self-sustaining native vegetation cover to develop over time.

6. CLOSURE RISK ASSESSMENT

6.1 Risk Assessment Methodology

To identify closure issues associated with the Project, a risk assessment was undertaken in accordance with Australian Standards (AS / NZS 31000:2009). The risk assessment was undertaken as follows:

- All conceivable closure risk pathways were identified.
- Identified risks were evaluated to derive an inherent risk rating, prior to the application of management measures.
- Appropriate management measures were identified for each risk using the hierarchy of control:
 - Elimination: Physical removal of the risk.
 - Substitution: Replacing the risk with something that does not produce a risk or produces a lesser risk.
 - Engineering: Control risks via engineered means.
 - Administrative: Use of procedures and management plans to minimise associated risks.
- The resulting risk pathways were then re-evaluated to derive a residual risk rating and to ensure that all residual risks are as low as reasonably practicable. Key environmental risks and treatments associated with the Project were identified through:
 - Technical assessment of key closure and environmental features.
 - Internal workshops and review.
 - Experience with other comparable mine sites.

6.2 Defining Risk Assessment Criteria

Risk categories were determined using a five-by-five risk matrix (Table 6), with pre-defined closure criteria for “Likelihood” and “Consequence” categories (Table 7 and Table 8, respectively). Consequence definitions focus on environmental and safety impacts associated with closure while the likelihood definitions have been developed to cover a broad time scale. Identification of key issues specific to each closure domain is provided in the Closure Task Register (Appendix 6) along with domain-specific management measures.

Table 6: Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium

Table 7: Consequence Criteria

Consequence				
Insignificant	Minor	Moderate	Major	Severe
Environment No detectable impact to fauna/flora, habitat, soil, and land ecosystems and/or beneficial water uses. Requires very minor or no management.	Environment Detectable but minor impact to fauna/flora, habitat, and soil and land ecosystems and/or water uses. Requires some management.	Environment Change exceeds natural variation with moderate impact on fauna/flora, habitat, and soil and land ecosystems and/or water uses. Requires a moderate level of management.	Environment Change exceeds natural variation with major impact on fauna/flora, habitat, and soil and land ecosystems and/or water uses. Requires a significant level of management.	Environment Severe impact on fauna/flora, habitat, and soil & land ecosystems and/or water uses. Serious, irreversible long-term impact on valued ecosystem and its function. Requires major levels of ongoing management.
Stability Site is safe, stable a non-polluting. Post mining land use is not adversely affected.	Stability Site is safe, all major landforms are stable, and any stability or pollution issue are contained and require no residual management. Post mining land use is not adversely affected.	Stability Site is safe, and any stability or pollution issues require minor, ongoing maintenance by end land-user. Post mining land use cannot proceed without some management.	Stability Site cannot be considered safe, stable or non-polluting without long-term management or intervention. Post mining land use cannot proceed without ongoing management.	Stability Site is unsafe, unstable and/or causing pollution or contamination that will cause an ongoing residual affect. Post mining land use cannot be achieved.
Public Health and Safety and Community Minor Injury – typically first aid and no medical treatment. Isolated community complaint resolved via existing site procedures. No damage to reputation or relationships with stakeholders.	Public Health and Safety and Community Typically, a medical treatment injury. Unresolved low level community dissatisfaction. Short-term damage to relationship with one or more stakeholders.	Public Health and Safety and Community Reversible injury or moderate irreversible damage or impairment to one or more persons. Community dissatisfaction and/or social harm with business implications. Reversible damage to relationship with stakeholders and reputation.	Public Health and Safety and Community Fatality and/or severe irreversible disability or impairment to one or more persons. Significant social harm. Regional/state media interest. Significant damage to stakeholder relationships and reputation.	Public Health and Safety and Community Multiple fatalities or permanent health impacts to multiple persons. Permanent or irreversible social harm. National media interest. Irreversible damage to stakeholder relationships and reputation.

Table 8: Likelihood Criteria

Likelihood				
Almost Certain	Likely	Possible	Unlikely	Rare
The event is expected to occur in most circumstances. Frequency of one or more per year.	The event should occur and there is a higher percentage chance that it will occur. Frequency of once per decade.	The event could occur but there is a higher percentage chance that it will not occur. Frequency of once in 100 years.	The event could occur, but it is very improbable. Frequency of once in 250 years.	The event is extremely unlikely, only a slight chance of occurring. Frequency of once in 500 years.

6.3 Risk Assessment

The Comet Vale closure risk assessment is presented as

Table 9.

Table 9: Closure Risk Assessment

Phase	Event or Activity	Risk Pathway	Impact	Inherent Risk Assessment			Treatment and Key Knowledge	Residual Risk Assessment		
				Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Post Closure	Human or stock fall into shallow excavation.	<ul style="list-style-type: none"> Steep gradients and/or drop-offs not removed at closure. 	<ul style="list-style-type: none"> Potential injury or loss of stock. 	Possible	Moderate	MEDIUM	<ul style="list-style-type: none"> Pit wall angles reduced to between 12° and 15°. Limit access to pit areas by rehabilitating access roads and tracks. 	Rare	Minor	LOW
Post Closure	Failure of pit walls.	<ul style="list-style-type: none"> Poorly constructed pit walls. Pit walls not reduced to design angles. Poor drainage design. 	<ul style="list-style-type: none"> Potential injury or loss of stock. Reduced vegetation establishment. Failure to meet post mining land uses requirements. 	Possible	Moderate	MEDIUM	<ul style="list-style-type: none"> Pit wall angles reduced to between 12° and 15°. Appropriate drainage design and construction. Landform compliance audit following closure. 	Unlikely	Minor	LOW

Phase	Event or Activity	Risk Pathway	Impact	Inherent Risk Assessment			Treatment and Key Knowledge	Residual Risk Assessment		
				Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Closure	Rehabilitated areas have minimal vegetative growth.	<ul style="list-style-type: none"> Insufficient rainfall or heavy rainfall erodes seed and topsoil. Poor application of growth medium. Poor surface water management. 	<ul style="list-style-type: none"> Ponding in the pit base inhibits vegetation growth Visual impact (aesthetics). Erosion and sedimentation. 	Possible	Minor	MEDIUM	<ul style="list-style-type: none"> Appropriate landform design and drainage management. Sufficient, viable growth medium respread over landforms. Supervision and quality control over rehabilitation earthworks. Rehabilitation performance monitoring 	Unlikely	Minor	LOW
Operations / Post Closure	Spread of weeds or introduction of new weed species limits establishment of native species.	<ul style="list-style-type: none"> Lack of weed hygiene on incoming equipment / machinery. Lack of weed management practices on site. 	<ul style="list-style-type: none"> Reduction in germination and growth of native species. Increased erosion and sedimentation. Reduction in fauna habitat. 	Possible	Minor	MEDIUM	<ul style="list-style-type: none"> Adherence to vehicle equipment and plant hygiene guidelines to minimise potential for weed spread. Implement weed management and monitoring programs. 	Unlikely	Minor	LOW

Phase	Event or Activity	Risk Pathway	Impact	Inherent Risk Assessment			Treatment and Key Knowledge	Residual Risk Assessment		
				Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Operations / Post Closure	Interruption of surface water drainage.	<ul style="list-style-type: none"> Poor rehabilitation and landform design. 	<ul style="list-style-type: none"> Sedimentation. Interruption of water courses. Ponding. 	Unlikely	Minor	LOW	<ul style="list-style-type: none"> Appropriate drainage design and construction. Established rehabilitation methodology. Rehabilitation performance monitoring. 	Rare	Minor	LOW
Operations / Post Closure	Excessive dust generation.	<ul style="list-style-type: none"> Wind erosion 	<ul style="list-style-type: none"> Reduced air quality. Loss of surrounding vegetation. 	Possible	Minor	MEDIUM	<ul style="list-style-type: none"> Progressive rehabilitation. Rehabilitation performance monitoring. 	Rare	Minor	LOW
Post Closure	Roads permanently alter surface water flow patterns.	<ul style="list-style-type: none"> Haul and access roads not reprofiled to reinstate natural drainage paths. 	<ul style="list-style-type: none"> Ponding and erosion, downstream sedimentation. 	Possible	Minor	MEDIUM	<ul style="list-style-type: none"> Roads that are not retained by the pastoralist, Shire or other 3rd party will be reprofiled to reinstate drainage as far as practicable. 	Rare	Minor	LOW
Post Closure	Deep compaction of soils on haul and access roads.	<ul style="list-style-type: none"> Compaction of soils during operational phase, compaction due to heavy machinery used during rehabilitation. 	<ul style="list-style-type: none"> Insufficient revegetation and increased erosion. Increased runoff due to compaction. 	Possible	Minor	MEDIUM	<ul style="list-style-type: none"> Haul and access roads (not remaining) will be reprofiled and deep to increase infiltration and facilitate surface water drainage. 	Rare	Minor	LOW

Phase	Event or Activity	Risk Pathway	Impact	Inherent Risk Assessment			Treatment and Key Knowledge	Residual Risk Assessment		
				Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Operations / Post Closure	Changes to community expectations and post mining land use.	<ul style="list-style-type: none"> Inadequate community consultation. Conflict between stakeholders and MLG regarding closure and post mining land use. Not responding to community concerns and complaints. 	<ul style="list-style-type: none"> Changes to closure and rehabilitation expectations. Inadequate provisioning available to meet expectations. 	Possible	Major	HIGH	<ul style="list-style-type: none"> Ongoing consultation with the local community and pastoral owner. Consultation with stakeholders in accordance with stakeholder consultation strategy. 	Rare	Minor	LOW
Operations / Post Closure	Inadequate understanding of the existing environment and the impacts of the operations.	<ul style="list-style-type: none"> Negative community and statutory attitudes to the Project. Monitoring data not collected and or reviewed. Existing environment not understood. 	<ul style="list-style-type: none"> Poor rehabilitation success. 	Unlikely	Minor	LOW	<ul style="list-style-type: none"> Adequate monitoring data is in place. Regular review and assessment of monitoring. 	Rare	Minor	LOW

7. CLOSURE OUTCOMES AND COMPLETION CRITERIA

Completion criteria are agreed standards to be achieved on particular aspects of closure and rehabilitation. MLG has adopted guidelines published by ANZMEC/MCA (2000) and endorsed by DMIRS, asserting that completion criteria should be:

- Specific enough to reflect a unique set of environmental, social and economic circumstances.
- Measurable to demonstrate that rehabilitation is trending towards analogue indices.
- Achievable or realistic so that the criteria being measured are attainable.
- Relevant to the objectives that are being measured and the risks being managed and flexible enough to adapt to changing circumstances without compromising objectives.
- Time-bound so that the criteria can be monitored over an appropriate time frame to ensure the results are robust for ultimate relinquishment.

Five broad closure outcomes have been identified for Comet Vale (Table 10). These outcomes are based on legislative obligations and commitments (Section 2), stakeholder consultation (Section 3.3), baseline data (Section 4), the proposed post-closure land use (Section 5.1), closure objectives (Section 5.2), and the risk assessment (Section 6).

For each closure outcome, one or more performance criteria have been set to assess the level of success in meeting the outcome, together with the measurement tools and performance indicators that will be used to inform the criteria.

These outcomes and criteria represent MLG's position at this point in time and may change in future iterations of the MCP to accommodate changes to the Project, additional baseline and monitoring data, rehabilitation successes and failures and stakeholder input.

Table 10: Closure Objectives, Interim Completion Criteria and Assessment Tools

Closure Objective	Closure Outcomes	Completion Criteria Description	Measurement Tool
Safety Future land uses with access to hazardous areas restricted.	All excavation pits will be made safe by reducing pit slopes to have shallow gradients of between 12° and 15°.	All excavation pits have slope gradients of between 12° and 15°.	Geospatial assessment using a digital terrain model and/or survey.
	Access to pit areas will be restricted by rehabilitating access roads and tracks.	All accessways that are not retained by a 3 rd party will be rehabilitated to prevent vehicular access.	Audit by a competent person.
Stable Post-mining landforms resistant to failure and erosion, and downstream deposition minimised or contained.	All excavations will be constructed, or remediated as far as practicable, to minimise erosion over the long term, including significant gullying or movement, with slope angles at designed gradients.	<ul style="list-style-type: none"> Mine landforms constructed / remediated in accordance with the provisions detailed in the Closure Task Register (Section 8) (e.g., slope angles, soil cover). Rehabilitation performance monitoring shows no significant changes to erosion features over a five-year period. 	<ul style="list-style-type: none"> Audit of compliance with design parameters. Site specific rehabilitation performance monitoring program that includes remote sensing and a ground-based assessment.
Non-Polluting Adverse drainage from post-mining landforms prevented or contained and contaminated sites managed in accordance with current DWER guidelines.	Landforms will be non-polluting with no measurable impacts to surface water quality, soils or other receptors.	<ul style="list-style-type: none"> No residual or suspected contamination. No evidence of problematic mine drainage. 	<ul style="list-style-type: none"> Contaminated site investigation (if required). Site audits / observations.
Rehabilitated Soil profiles, drainage and other characteristics are reinstated as far as practicable, allowing a self-sustaining native vegetation cover to develop over time.	Landforms will be rehabilitated to have a self-sustaining ecosystem that, in time, will be comparable to the surrounding area with respect to vegetation density and diversity.	<ul style="list-style-type: none"> Vegetation Quadrat Criteria: <ul style="list-style-type: none"> Assessment area has a species richness that is comparable to the target ecosystem (60% or more of the total number of species identified in analogue site). Vegetation is in a condition that is comparable to the target ecosystem (analogue site). Comparable is defined as being within one level of the target ecosystem as determined using the vegetation condition scale outlined in Keighery (1994). 	Site specific rehabilitation performance monitoring program that incorporates a remote sensing assessment in combination with a field component that employs traditional flora survey methodologies.

Closure Objective	Closure Outcomes	Completion Criteria Description	Measurement Tool
		<ul style="list-style-type: none"> – Number of weed species and abundance is comparable to or less than the target ecosystem (analogue site). • Remote Sensing Criteria: <ul style="list-style-type: none"> – The overall vegetation index distribution of an assessment area is within the range of the broader, undisturbed tenement distribution at the time of the assessment. – The long-term vegetation density trend (i.e., positive, neutral, or negative) is comparable to, or better than, the surrounding vegetation (i.e., undisturbed vegetation). – Assessment area shows no isolated negative change in vegetation density between assessment periods. 	

8. CLOSURE IMPLEMENTATION

8.1 Closure Implementation Strategy

Closure planning should occur throughout the life of a mine and reflect the type of landforms, infrastructure and other features present on site at the end of mine life that were constructed during the operational phase of the project (planned closure). However, mining can often cease earlier than expected resulting in unplanned closure. Unplanned closure occurs when a mine is closed (e.g., for financial or operational reasons) and landforms and other features have not been finalised to an agreed closure design (e.g., smaller footprints, depths, volumes etc). Alternatively, a mine can be placed in a state of Care and Maintenance that can extend for months or years.

Closure strategies for each of these scenarios is accounted for in the following subsections.

8.1.1 Planned Closure

Site wide planned closure will occur once all ore reserves have been exhausted across the Project. This is currently anticipated to occur 20 years from commencement of operations (2043). Closure implementation will follow a project schedule outlined in a final Closure Implementation Plan that will be prepared at least six months prior to planned closure. Mine closure will be considered to be complete and successful once it can be demonstrated that all completion criteria have been met. A tenement relinquishment plan will be submitted to DMIRS in order to obtain final lease relinquishment once MLG can demonstrate that completion criteria have been achieved. Prior to these steps, preparation for planned closure will be undertaken in accordance with this MCP and its future revisions.

8.1.2 Unplanned Closure

The unforeseen and premature cessation of mining may occur due to a number of reasons including market forces, company business reasons and overestimation of mineral resources.

Unplanned permanent closure of the Project will be undertaken in accordance with the measures established for planned closure, however the shallow excavations may not have been constructed to final design (e.g., depth and footprint). The landforms will be rehabilitated using the same principles as for planned closure, notably surface water management measures, final slope angles and topsoil cover.

Residual sand and gravel is likely to remain should unplanned closure occur, and final pit/landform dimensions may be smaller than planned. Rehabilitation activities will not be impacted and will be undertaken in accordance with the measures outlined for planned closure.

8.1.3 Care and Maintenance

The Project may be temporarily suspended due to adverse economic or operational circumstances. A temporary shutdown of this nature is normally planned and assumes that the operation will recommence, although this may take months or years.

Should this eventuate for Comet Vale, a Care and Maintenance Plan will be developed in accordance with Section 42 of the *Mines Safety and Inspection Act 1994* and submitted to DMIRS prior to implementation.

The plan will address environmental hazards related to incomplete, un-rehabilitated and potentially unstable landforms, as well as site access tracks. Key environmental management criteria which need to be addressed by the care and maintenance plan are summarised as follows:

- Environmental audit of the site to determine the status (environmental risk) of all components of the site.
- Removal of certain mobile machinery / plant / equipment.

- Construction of fencing or bunding to prevent unauthorised access to mine workings.
- Removal of the remaining ore stockpiles.
- Maintenance of relevant roads and drainage systems.
- Continued monitoring. Where monitoring identifies any potential environmental or safety concerns, the necessary steps to rectify the issue should be undertaken.

8.2 Closure and Rehabilitation Tasks

For closure management purposes, the features or areas of a mine site may be broken down into groups or areas (commonly referred to as closure domains) based on the types of rehabilitation works required at closure. The closure domains at Comet Vale are divided between the pits and the access tracks.

The only mine landforms associated with the Project that will remain post-closure comprise the pits, which will be battered down to form shallow depressions in the landscape.

All other disturbed areas will be re-profiled to match the surrounding environment. Where possible, drainage patterns will be returned to pre-mining flow patterns, provided that they do not compromise the stability of the pits.

All landforms will be rehabilitated to provide long-term geochemical and geotechnical stability allowing the re-establishment of native vegetation over time.

Domain specific closure tasks are detailed within the Closure Task Register, provided in Appendix 6.

8.3 Progressive Rehabilitation

MLG recognises that the progressive rehabilitation of disturbed areas plays an important role in closure planning and is committed to progressive rehabilitation where practicable. Progressive rehabilitation offers a number of benefits in that it:

- May mitigate existing risk issues associated with the disturbed land (e.g., dust, sedimentation).
- Provides information, data, knowledge and experience that may assist in successfully rehabilitating land disturbed by mining activities in the future.
- Reduces the residual disturbance and therefore closure liability and Mine Rehabilitation Fund contribution.
- Provides evidence to stakeholders that MLG is committed to, and is capable of, successfully closing and rehabilitating the mining operation to achieve the stated post-closure land use.

The rehabilitation schedule will generally follow closely behind the mine schedule, with areas being rehabilitated once mining in those areas has ceased and as new areas are opened to mining.

Progressive rehabilitation will be undertaken at the Project and will include the following tasks:

- Battering the shallow pit walls to 12-15 degrees.
- Respreading topsoil on the pit floor to a typical depth of 300 mm.
- Respreading stockpiled vegetation to provide habitat and nutrients.
- Ripping pit surfaces to assist in the capture of windblown seed, infiltration of water and reduced erosion potential.

This is the same methodology used in progressive rehabilitation at other Projects that MLG operates in the Coolgardie region. The methodology has proven effective with a return of native flora species and an overall absence of erosion features such as gulying and rilling.

8.4 Research, Investigation and Trials

There are no data or knowledge gaps that could impede the successful closure and rehabilitation of the Project. The local environment is well understood and MLG has operated and rehabilitated comparable sites within the region. This has allowed MLG to refine the rehabilitation process with positive results as demonstrated by rehabilitation performance monitoring reports (Blueprint, 2021a, 2021b) and general site observations.

9. CLOSURE MONITORING AND MAINTENANCE

Rehabilitation and closure monitoring and maintenance programs will be initiated with the objective of ensuring the success of rehabilitation works, demonstrating achievement of completion criteria and identifying the need for maintenance works. Monitoring works will be undertaken on a regular basis post closure to assess the following:

- Compliance with closure design parameters.
- Physical stability of rehabilitated areas.
- Chemical stability of rehabilitated areas.
- Ecological function of rehabilitated areas.
- Impacts on final land use objectives.
- The requirement for maintenance or remedial work.

The specific components of the monitoring program are described in the following subsections.

9.1 Monitoring Procedures and Schedule

Closure and rehabilitation phases and monitoring components are summarised in Table 11. Specific outcomes are defined for each phase of monitoring.

Table 11: Monitoring Components and Outcomes

Timing	Monitoring Component	Proposed Frequency	Outcome
Operations	• Weed monitoring and control.	• Annually.	• Occurrence of weeds minimised.
	• Detailed survey pick-up / remote sensing for disturbance areas.	• Annually.	• Improvement and refinement of closure data.
	• Assessment of completed rehabilitation.	• Annually.	• Refinement of completion criteria. • Refined rehabilitation designs.
Rehabilitation	• Earthworks monitoring and supervision.	• Ongoing until complete.	• Design criteria achieved.
	• Audit of compliance with design parameters.	• Once per landform/area.	• Confidence in constructed landforms and likely rehabilitation performance.
	• Rehabilitation survey quality control.	• Once per landform/area.	• Landforms confirmed safe, stable and non-polluting.

Timing	Monitoring Component	Proposed Frequency	Outcome
	<ul style="list-style-type: none"> Site specific rehabilitation monitoring program. 	<ul style="list-style-type: none"> Annually. 	
Post-Closure	<ul style="list-style-type: none"> Site specific rehabilitation monitoring program using a combination of remote sensing and traditional flora survey methodologies. General site inspections and photo monitoring. 	<ul style="list-style-type: none"> Annually, until differences become negligible at which point the frequency will change to triennially. Annually 	<ul style="list-style-type: none"> Confidence in constructed landforms and confirmation that rehabilitated landforms are performing as expected. Landforms confirmed safe, stable, non-polluting and supportive of a self-sustaining native ecosystem. Demonstration of achieved completion criteria. Submission of completion report to DMIRS.

9.2 Rehabilitation Earthworks Monitoring and Supervision

Supervision of all rehabilitation earthworks is integral to ensuring final landforms achieve their intended design criteria. Earthworks will be supervised by a suitably qualified person who will ensure specifications, as detailed in the rehabilitation procedures and Closure Task Register, are met. An audit will be undertaken following completion of rehabilitation earthworks to ensure compliance with design parameters.

A quality assurance / quality control program will be developed and implemented during the rehabilitation phase to minimise the likelihood of construction errors.

9.3 Rehabilitation Monitoring

MLG Oz has developed a rehabilitation monitoring program that is applied across all MLG projects. The program uses a combination of qualitative data, derived from traditional flora survey methodologies (quadrat assessment), and quantitative data derived from remote sensing.

The methodology allows for the assessment of a number of key rehabilitation parameters over time. These include:

- Qualitative data:
 - Vegetation community (key species and abundance).
 - Weed species and abundance.
 - Erosion features (general observations for the purpose of ground truthing remote sensing data).
 - Cover material features (e.g. soil/cover types).
- Quantitative data:
 - Vegetation health and density (assessed via Normalised Difference Vegetation Index (NDVI)).
 - Erosion features (gully numbers and dimensions, if present).
 - Drainage (flow paths and catchments).

By comparing the progress of rehabilitated landforms over time, it is possible to assess whether the rehabilitated areas are progressing towards parameters identified at analogue sites. Monitoring over time will assist in ensuring

that if progress towards indices of analogue sites is not occurring then the reason is identified and the need for remedial work recognised and carried out where necessary.

It is anticipated that rehabilitation monitoring will be undertaken annually until differences between years are negligible, at which point the monitoring frequency will be reviewed and reduced (likely every three years).

9.4 Site Inspections

Annual inspections will be undertaken across all accessible areas of the Project for 10 years following closure. The inspections will support the rehabilitation performance monitoring program and help identify any issues requiring attention or management, particularly with respect to public and livestock safety.

This should include consideration to the following:

- Identification of potential safety issues or concerns before they arise.
- No new or unexpected areas of instability or subsidence have developed in the rehabilitated pits.
- Decommissioned roads and tracks remain unused.
- No unexpected drainage or hydrological issues have developed (e.g. ponding, concentrated stormwater flows).

The site inspection findings should be documented and include photographs of identified issues.

9.5 Maintenance

The rehabilitation performance will be the key factor in determining the need and scale of remedial actions at the Project. If the monitoring program indicated landscape dysfunction or loss of ecosystem health over time, direct intervention may be required.

Corrective measures will be considered should the rehabilitated profile not be achieved or is shown to be trending away from the completion criteria. Relevant stakeholders will be consulted to assist in determining the most appropriate corrective measures to apply. Potential corrective measures are described in Table 12.

Table 12: Corrective Actions

Aspect	Measure
Weeds	Increase weed control until target criteria are met.
Rehabilitation	Investigation as to reason behind rehabilitation issue. This may include geochemical testing to determine soil properties that are hostile to plant growth (e.g. nutrient deficiencies). Undertake soil amelioration and supplementary seeding where required.
Stability	Should areas of instability be identified, an investigation will be undertaken to identify the cause with subsequent remedial earthworks.
Public Safety	Should it be determined that access to the site is insufficiently restricted, or should safety hazards be identified, remedial earthworks will be undertaken.

9.6 Reporting

Rehabilitation performance will be reported in the Annual Environmental Report and Mining Rehabilitation Fund (MRF) submission to DMIRS.

10. FINANCIAL PROVISIONING FOR CLOSURE

A closure cost estimate has been developed for the Project and will be updated annually as part of corporate accounting and financial provisioning. The closure cost estimate has been largely developed using first principles, with the bill of quantities derived from survey data, remote sensing data, aerial imagery and experience with other MLG projects. In summary, the following components were taken into consideration when developing the closure cost estimate:

- Calculation of closure task areas: A surface area measurement of each closure task area was determined from analysis of recent aerial photography, survey data and spatial data associated with future developments.
- Calculation of closure task volumes: Volumes of rehabilitation material for each closure task were estimated using recent aerial photography, survey data and experience with other, similar operations.
- Application of closure task rates: Earthmoving rates for each closure task were multiplied by the corresponding quantity. MLG undertakes rehabilitation utilising MLG-owned equipment and earthmoving rates are derived on this basis.
- Provisional cost estimates for monitoring, management and consultation: Provision is made for the following items:
 - Closure monitoring.
 - Maintenance / remediation of rehabilitated areas.
 - Technical assistance, consultant advice during the closure and rehabilitation phase.
 - Consultation with stakeholders.

11. MANAGEMENT OF INFORMATION AND DATA

The information collected during the site inspection and monitoring activities will be used to assess the progress of the rehabilitated areas towards the completion criteria set out within this MCP.

MLG will retain the following information relating to closure and rehabilitation:

- Monitoring databases and analytical reports.
- Regulatory reports (e.g. Annual Audit Compliance Reports and AERs).
- Information regarding areas of disturbance, including mapping data.
- Availability and volumes of materials required for rehabilitation.
- Life of mine plans and production scheduling information.
- Layout diagrams.
- Significant spills and regulatory reportable incident records.
- Contaminated site investigations and reports, if any.
- Correspondence with regulators and other stakeholders.
- Lessons learned from previous site rehabilitation activities or at similar mine sites.

All documents and data associated with the operation and closure of the project will be stored on the corporate database.

12. REVIEWED MINE CLOSURE PLANS

This is the first Mine Closure Plan for the Comet Vale Sand Project.

13. REFERENCES

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APPENDICES

APPENDIX 1: SOILS ASSESSMENT

Reference: P-116573

RPM Ref: ADV-AU-00235

RPM Advisory Services Pty Ltd

Level 2, 131 St Georges Terrace
Perth WA 6000
Australia

3 March 2022

Phone: +61 8 9482 0700
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Murray Leahy
Managing Director
MLG Oz Limited
10 Yindi Way
Kalgoorlie WA 6430

Dear Murray,

Re: Soil Assessment – Comet Vale, Jonah Bore and Mt Keith Deposits

Blueprint Environmental Strategies Pty Ltd (“Blueprint”) (prior to its acquisition by RPMGlobal Holdings Limited, acting under its wholly-owned subsidiary, RPM Advisory Services Pty Ltd, together “RPM”) was commissioned by MLG Oz Limited (“MLG” or the “Client”) to complete a soil assessment for the Comet Vale, Jonah Bore and Mt Keith Deposits.

The following Memorandum is a deliverable as defined as part of the scope of work agreed on in P-116573.

Yours Sincerely,



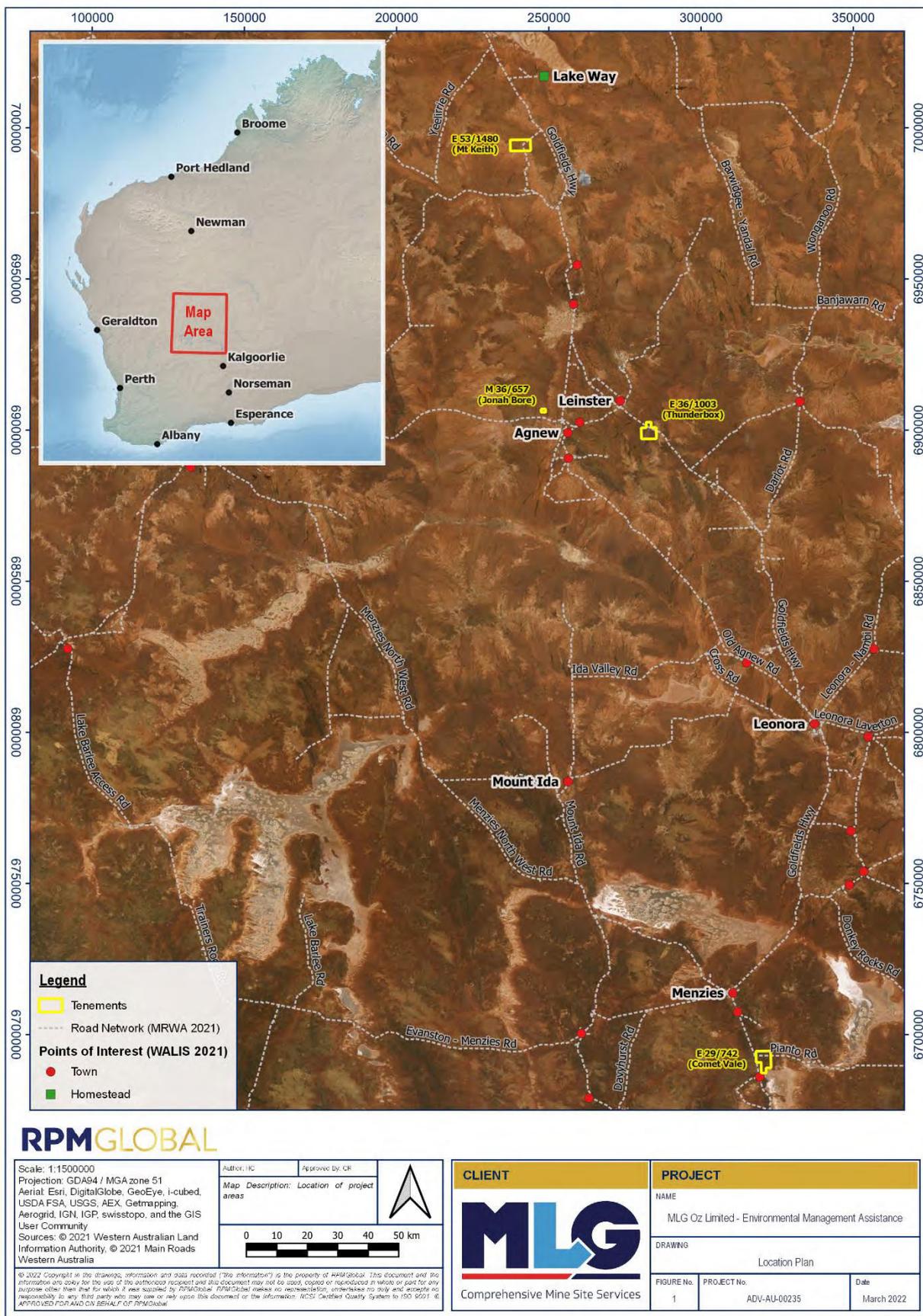
Siobhan Pelliccia
Manager – ESG West
RPM Advisory Services Pty Ltd

1. Introduction

MLG Oz Limited (“MLG”) was established in 2002 and currently operates 29 sites throughout Western Australia. MLG offers a range of value added services from bulk haulage, crushing and screening, aggregate and sand supplies. Its client base includes some of Australia’s largest resource companies in the gold, iron ore and nickel sectors.

MLG is seeking approval for developing sand supply operations at its Comet Value, Jonah Bore and Mt Keith deposits in the northeast Goldfields region of WA (**Figure 1**). This Memorandum provides an assessment of key physical and chemical properties of soil samples collected from each deposit, with a focus on the suitability of these materials for rehabilitation of the sites following mine closure.

Figure 1: Location Plan



This Memorandum has been prepared for MLG Oz Limited only for the purpose set out in and subject to the terms and conditions of its engagement with Blueprint Environmental Strategies Pty Ltd. This Memorandum must be read in its entirety and is subject to all limitations, assumptions and conditions as set out in its engagement and the body of the Memorandum. RPM does not authorise reliance on this Memorandum by any third party except for relevant government agencies, RPM and will not be liable for any loss or damage suffered by a third party relying on this Memorandum.
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2. Methodology

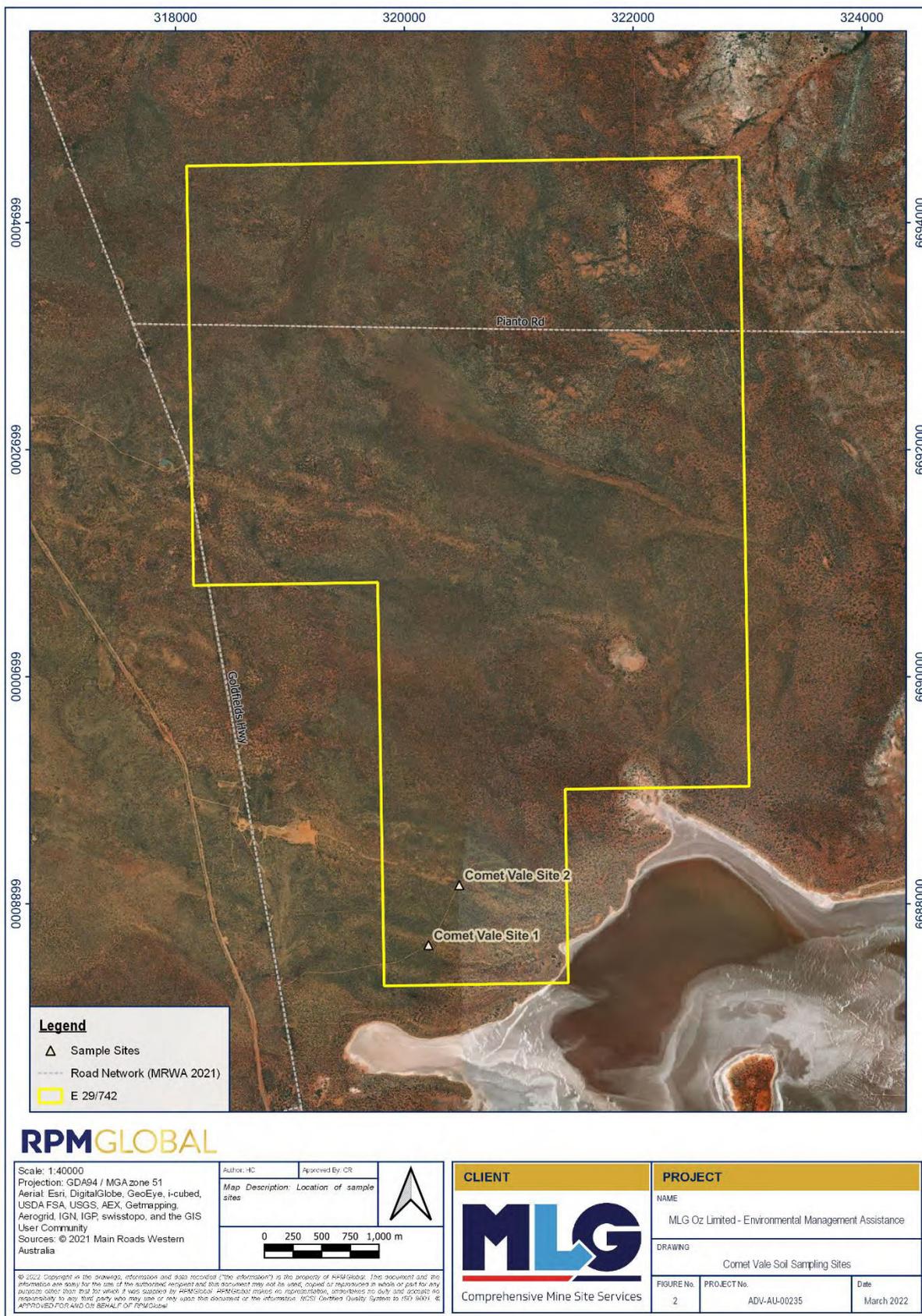
Representative samples of surface soil (0-20 cm) and subsoil (20-40 cm) were collected by MLG staff from the following locations:

- Two locations (Site 1 and Site 2) from Comet Vale (**Figure 2**);
- Two locations (Site 1 and Site 2) from Jonah Bore (**Figure 3**); and
- Two locations (Site 1 and Site 2) from Mt Keith (**Figure 4**).

The samples were submitted to Envirolab Services (WA) Pty Ltd (MPL Envirolabs), located in Myaree, WA, for analysis of the following parameters:

- pH of a 1:5 soil:water extract.
- Electrical conductivity (EC) of a 1:5 soil:water extract.
- Extractable sulfur by extraction with 0.25 M KCl solution at 40°C (KCL 40 test).
- Exchangeable cations (Ca, Mg, Na and K) by extraction with 1 M ammonium chloride, pH 7 solution.
- Extractable aluminium by extraction with 1 M KCl solution.
- Total nitrogen.
- Total phosphorus.
- Ammonium and nitrate nitrogen (by extraction with 1 M KCl).
- Extractable phosphorus (water extract).
- Phosphorus Buffer Index (PBI).
- Particle size distribution (PSD) by dry sieving through a stacked series of 150, 100, 75, 37.5, 19, 9.5, 4.75, 2.36, 1.18, 0.60, 0.425, 0.30, 0.15 and 0.075 mm sieves.
- Emerson Class Number using AS 1289.3.8.1 – 2017 (contracted to Western Geotechnical & Laboratory Services, Welshpool).
- Acid digestible metals and metalloids (As, B, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Zn).

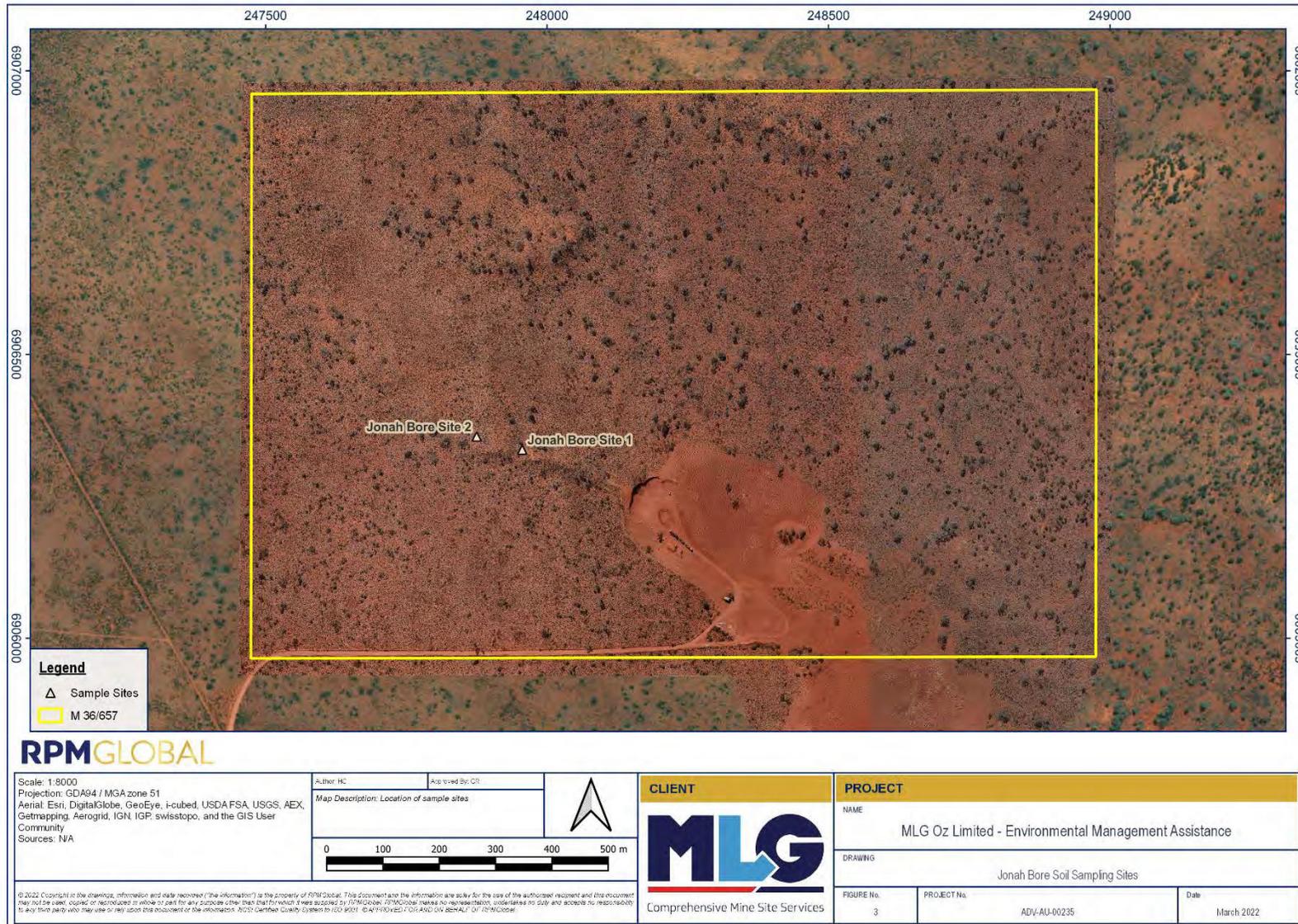
Figure 2: Comet Vale Soil Sampling Sites



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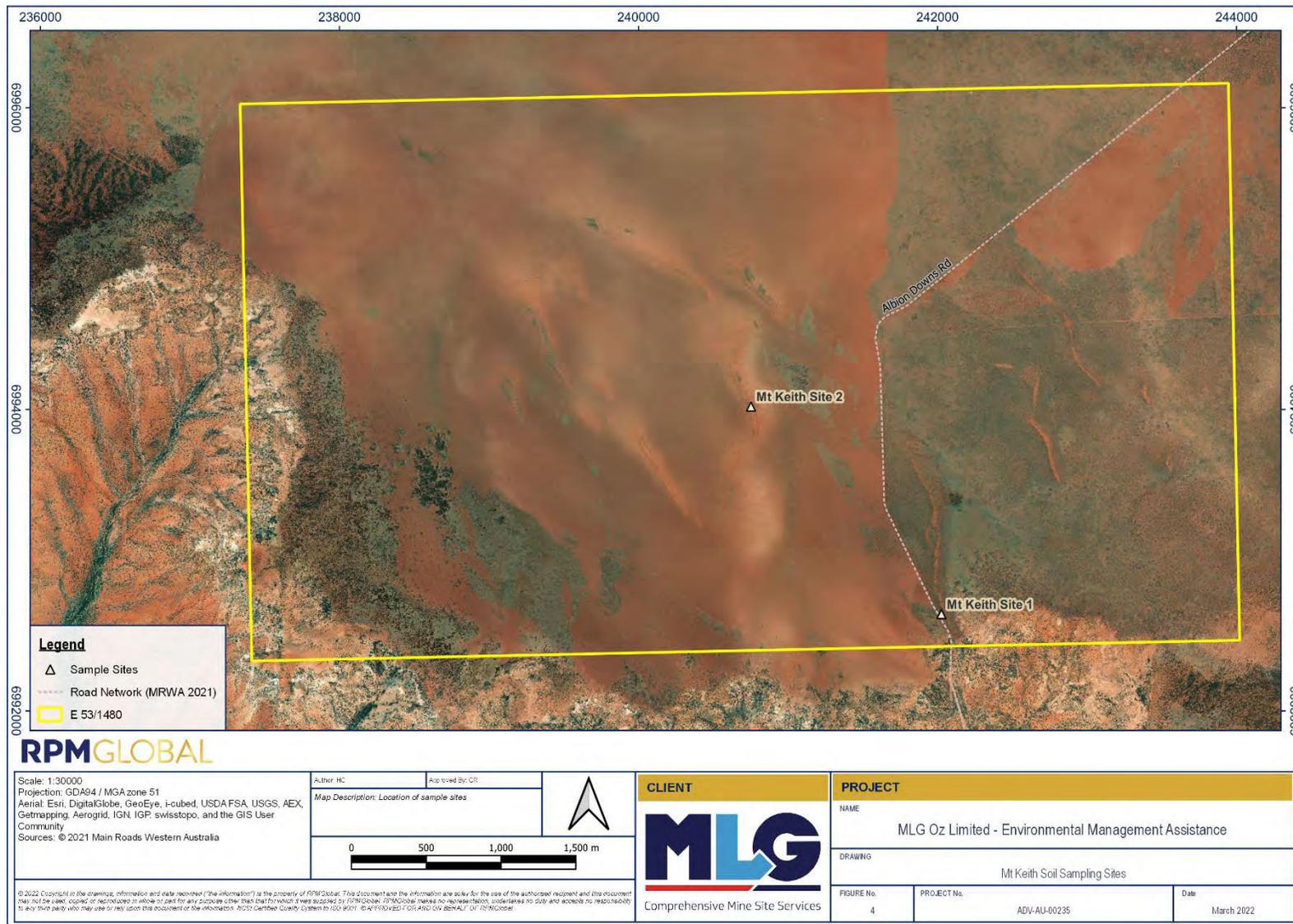
Figure 3: Jonah Bore Soil Sampling Sites



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Figure 4: Mt Keith Soil Sampling Sites



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3. Results and Discussion

3.1 Comet Vale Samples

Site information and results from laboratory analyses used to inform this assessment are presented in the following locations:

- **Plate 1** shows characteristics of the soil profile such as colour, texture and consistency.
- **Figure 5** presents particle size distribution data for four samples from Comet Vale.
- **Table 1** presents results for pH, EC and Emerson Class Number.
- **Table 2** presents results for plant nutrients and PBI.
- **Table 3** presents results for exchangeable cations (Ca, Mg, Na, K and Al) and calculated values for Cation Exchange Capacity (CEC) and Exchangeable Sodium Percentage (ESP).
- **Table 4** presents results for acid-digestible metals and metalloids. Results have been compared with concentration threshold values for clean fill under the DWER Landfill Waste and Classification Definitions 1996 (as amended 2019), where available. These threshold values are:
 - Arsenic 14 mg/kg
 - Barium 5%
 - Boron 5%
 - Beryllium 2 mg/kg
 - Cadmium 0.4 mg/kg
 - Cobalt 5%
 - Copper 5%
 - Manganese 5%
 - Mercury 0.2 mg/kg
 - Molybdenum 10 mg/kg
 - Lead 2 mg/kg
 - Nickel 4 mg/kg
 - Selenium 2 mg/kg

On the basis of this information, key findings relating to the characteristics of sand from Comet Vale are as follows:

- **Plate 1** shows that this soil is typical of pale reddish-brown sands from aeolian dune systems in the arid regions of Western Australia. The soil is uniform in colour and texture throughout the excavated profile, and apart from minor plant roots, is devoid of leaf litter and humus in the surface horizon.
- The particle size distributions of four samples tested (**Figure 5**) indicate very well sorted sand with a median particle diameter of approximately 0.3 mm. The fine fraction contents, which includes very fine sand (0.02 to 0.075 mm), silt (0.002 to 0.02 mm) and clay (<0.002 mm), are very low ($\leq 2\%$). The lack of fine material means that there is a low risk of dust generation, but also means the soil profile will be very well drained and have a low plant-available water holding capacity (PAWC).
- The samples are moderately acidic, as indicated by pH values between 5.4 and 5.6 (**Table 1**). These values are typical of leached siliceous sands, which are naturally acidic and have very little pH buffering capacity.
- The soil is non-saline, as indicated by low EC values ranging from 6.1 to 6.3 $\mu\text{S}\cdot\text{cm}$ (**Table 1**).
- Emerson Class Numbers of 5 indicate that the fine fraction materials have a low potential for dispersion. Spontaneous dispersion and hard-setting behaviours are not expected for this soil type.

- Nutrient contents of these samples are very low, as indicated by low concentrations of total N, total P, NH₄-N, NO₃-N, extractable S and extractable P presented in **Table 2**. PBI values, ranging from 27 to 29, are rated as very low, indicating the soil has very little capacity to retain nutrients supplied as soluble fertilisers or by mineralisation of organic matter.
- Exchangeable cation concentrations (**Table 3**) are very low, with all values except for calcium being below the laboratory reporting limits. These values indicate very low concentrations of calcium, magnesium and potassium (all essential plant nutrients) and confirm the limited capacity of the soil to retain other essential plant nutrients.
- The soils are classified as non-sodic, noting that soil sodicity is largely irrelevant to sandy sands.
- Concentrations of metals and metalloids (**Table 4**), with only nickel levels (4.3 to 4.9 mg/kg) exceeding the WA concentration threshold for clean fill (4 mg/kg). These values do not represent a risk to human health or the environment and remain well below the average global concentration of nickel in the Earth's crust (80 mg/kg, Smith and Huyck 1999).



Plate 1: Soil Profile at Comet Vale

Figure 5: Particle Size Distribution – Comet Vale Samples

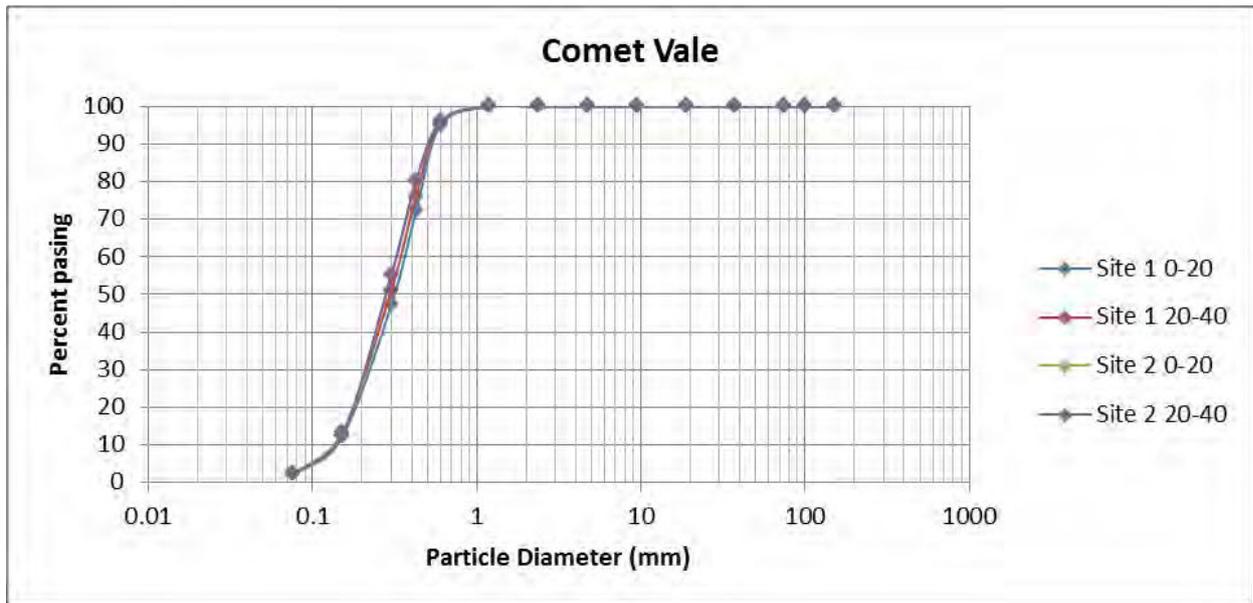


Table 1: pH, EC and Emerson Class – Comet Vale Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
pH	pH units	5.5	5.4	5.6	5.6
EC	µS/cm	6.1	6.3	6.3	6.1
Emerson Class	-	5	5	5	5

Table 2: Nutrients – Comet Vale Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Total N	mg/kg	79	87	45	57
Total P	mg/kg	14	14	15	14
Ammonium-N	mg/kg	5.0	6.2	4.4	5.1
Nitrate-N	mg/kg	0.36	0.34	0.26	0.32
Extractable S	mg/kg	3	3	3	3
Extractable P	mg/kg	<0.5	<0.5	<0.5	<0.5
PBI	-	28	29	28	27

Table 3: Exchangeable Cations – Comet Vale Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Calcium	cmol(+)/kg	0.3	0.3	0.3	0.4
Magnesium	cmol(+)/kg	<0.41	<0.41	<0.41	<0.41
Sodium	cmol(+)/kg	<0.22	<0.22	<0.22	<0.22
Potassium	cmol(+)/kg	<0.13	<0.13	<0.13	<0.13
Aluminium	cmol(+)/kg	<0.07	<0.07	<0.07	<0.07
CEC	cmol(+)/kg	<1	<1	<1	<1
ESP	%	<1	<1	<1	<1

Table 4: Metals and Metalloids – Comet Vale Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Arsenic	mg/kg	1.3	1.5	1.7	1.7
Boron	mg/kg	<1	<1	<1	<1
Barium	mg/kg	2.8	3.1	2.6	2.7
Beryllium	mg/kg	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg	1.0	1.2	1.3	1.2
Chromium	mg/kg	75	82	97	100
Copper	mg/kg	1.7	2.0	2.3	2.2
Mercury	mg/kg	<0.01	<0.01	<0.01	<0.01
Manganese	mg/kg	12	11	20	16
Molybdenum	mg/kg	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	4.3	4.7	4.9	4.8
Lead	mg/kg	1.3	1.4	1.6	1.7
Antimony	mg/kg	<0.5	<0.5	<0.5	<0.5
Selenium	mg/kg	0.1	0.1	0.2	0.2
Tin	mg/kg	<0.5	<0.5	<0.5	<0.5
Zinc	mg/kg	1.5	1.3	1.2	1.2

3.2 Jonah Bore Samples

Site information and results from laboratory analyses used to inform this assessment are presented in the following locations:

- **Plate 2** show characteristics of the soil profile such as colour, texture and consistency.
- **Figure 6** presents particle size distribution data for four samples from Comet Vale.
- **Table 5** presents results for pH, EC and Emerson Class Number.
- **Table 6** presents results for plant nutrients and PBI.
- **Table 7** presents results for exchangeable cations (Ca, Mg, Na, K and Al) and calculated values for Cation Exchange Capacity (CEC) and Exchangeable Sodium Percentage (ESP).
- **Table 8** presents results for acid-digestible metals and metalloids. Results have been compared with concentration threshold values for clean fill under the DWER Landfill Waste and Classification Definitions 1996 (as amended 2019), where available. These threshold values are:
 - Arsenic 14 mg/kg
 - Barium 5%
 - Boron 5%
 - Beryllium 2 mg/kg
 - Cadmium 0.4 mg/kg
 - Cobalt 5%
 - Copper 5%
 - Manganese 5%
 - Mercury 0.2 mg/kg
 - Molybdenum 10 mg/kg
 - Lead 2 mg/kg
 - Nickel 4 mg/kg
 - Selenium 2 mg/kg

On the basis of this information, key findings relating to the characteristics of sand from Jonah Bore are as follows:

- **Plate 2** shows that this soil is typical of pale reddish-brown sands from aeolian dune systems in the arid regions of Western Australia. The soil is uniform in colour and texture throughout the excavated profile, and apart from minor plant roots, is devoid of leaf litter and humus in the surface horizon.
- The particle size distributions of four samples tested (**Figure 6**) indicates very well sorted sand with a median particle diameter of approximately 0.25 mm. The fine fraction contents, which includes very fine sand (0.02 to 0.075 mm), silt (0.002 to 0.02 mm) and clay (<0.002 mm), are very low ($\leq 2\%$). The lack of fine material means that there is a low risk of dust generation, but also means the soil profile will be very well drained and have a low plant-available water holding capacity (PAWC).
- The samples are moderately acidic, as indicated by pH values of 5.3 (**Table 5**). These values are typical of leached siliceous sands, which are naturally acidic and have very little pH buffering capacity.
- The soil is non-saline, as indicated by low EC values ranging from 7.0 to 8.0 $\mu\text{S}\cdot\text{cm}$ (**Table 5**).
- Emerson Class Numbers of 5 indicate that the fine fraction materials have a low potential for dispersion. Spontaneous dispersion and hard-setting behaviours are not expected for this soil type.
- Nutrients contents of these samples are very low, as indicated by low concentrations of total N, total P, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, extractable S and extractable P presented in Table 6. PBI values, ranging from 17 to 29, are rated as very low, indicating the soil has very little capacity to retain nutrients supplied as soluble fertilisers or by mineralisation of organic matter.
- Exchangeable cation concentrations (**Table 7**) are very low, with all values except for calcium being below the laboratory reporting limits. These values indicate very low concentrations of calcium, magnesium and potassium (all essential plant nutrients) and confirm the limited capacity of the soil to retain other essential plant nutrients.
- The soils are classified as non-sodic, noting that soil sodicity is largely irrelevant to sandy sands.
- Concentrations of metals and metalloids (**Table 8**) were all below the WA concentration thresholds for clean fill. Chromium values were slightly elevated (16 – 190 mg/kg), but are considered to be of no environmental consequence as chromium is expected in to present in very stable minerals (such as chromite, FeCr_2O_4) in which it occurs as the almost insoluble trivalent form (Cr^{3+}).



Plate 2: Soil Profile at Jonah Bore

Figure 6: Particle Size Distribution – Jonah Bore Samples

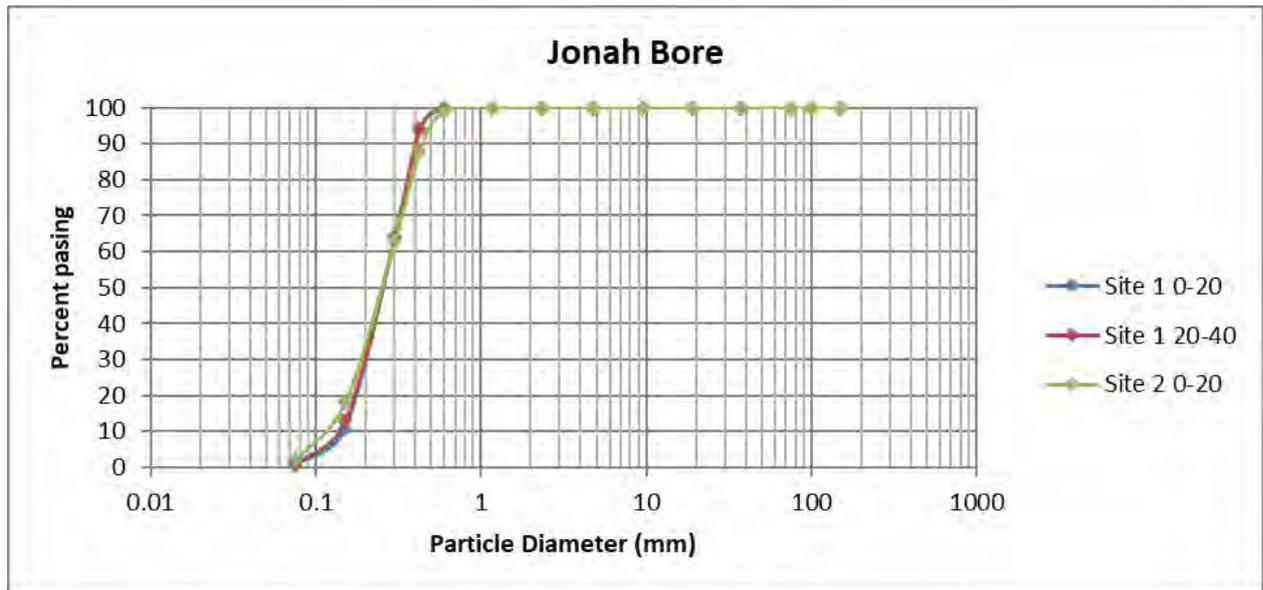


Table 5: pH, EC and Emerson Class – Jonah Bore Samples

Sample	Units	Sample 1	Sample 2	Sample 3
Location	-	Site 1	Site 1	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20
pH	pH units	5.3	5.3	5.3
EC	µS/cm	7.0	8.0	7.1
Emerson Class	-	5	5	5

Table 6: Nutrients – Jonah Bore Samples

Sample	Units	Sample 1	Sample 2	Sample 3
Location	-	Site 1	Site 1	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20
Total N	mg/kg	54	46	65
Total P	mg/kg	31	28	34
Ammonium-N	mg/kg	6.5	6.1	4.7
Nitrate-N	mg/kg	0.19	0.21	0.32
Extractable S	mg/kg	3	4	3
Extractable P	mg/kg	<0.5	<0.5	<0.5
PBI	-	26	29	17

Table 7: Exchangeable Cations – Jonah Bore Samples

Sample	Units	Sample 1	Sample 2	Sample 3
Location	-	Site 1	Site 1	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20
Calcium	cmol(+)/kg	<0.25	<0.25	0.4
Magnesium	cmol(+)/kg	<0.41	<0.41	<0.41
Sodium	cmol(+)/kg	<0.22	<0.22	<0.22
Potassium	cmol(+)/kg	<0.13	<0.13	<0.13
Aluminium	cmol(+)/kg	<0.07	<0.07	<0.07
CEC	cmol(+)/kg	<1	<1	<1
ESP	%	<1	<1	<1

Table 8: Metals and Metalloids – Jonah Bore Samples

Sample	Units	Sample 1	Sample 2	Sample 3
Location	-	Site 1	Site 1	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20
Arsenic	mg/kg	1.8	1.9	
Boron	mg/kg	<1	<1	<1
Barium	mg/kg	1.8	1.9	2.0
Beryllium	mg/kg	<0.5	<0.5	<0.5
Cadmium	mg/kg	<0.1	<0.1	<0.1
Cobalt	mg/kg	0.9	0.7	0.9
Chromium	mg/kg	190	160	160
Copper	mg/kg	2.7	2.4	3.1
Mercury	mg/kg	<0.01	<0.01	<0.01
Manganese	mg/kg	17	15	20
Molybdenum	mg/kg	<0.5	<0.5	<0.5
Nickel	mg/kg	3.9	3.2	3.8
Lead	mg/kg	2.8	2.5	2.8
Antimony	mg/kg	<0.5	<0.5	<0.5
Selenium	mg/kg	0.3	0.3	0.3
Tin	mg/kg	<0.5	<0.5	<0.5
Zinc	mg/kg	2.4	2.0	4.4

3.3 Mt Keith Samples

Site information and results from laboratory analyses used to inform this assessment are presented in the following locations:

- **Plate 3** show characteristics of the soil profile such as colour, texture and consistency.
- **Figure 7** presents particle size distribution data for four samples from Comet Vale.
- **Table 9** presents results for pH, EC and Emerson Class Number.
- **Table 10** presents results for plant nutrients and PBI.
- **Table 11** presents results for exchangeable cations (Ca, Mg, Na, K and Al) and calculated values for Cation Exchange Capacity (CEC) and Exchangeable Sodium Percentage (ESP).
- **Table 12** presents results for acid-digestible metals and metalloids. Results have been compared with concentration threshold values for clean fill under the DWER Landfill Waste and Classification Definitions 1996 (as amended 2019), where available. These threshold values are:
 - Arsenic 14 mg/kg
 - Barium 5%
 - Boron 5%
 - Beryllium 2 mg/kg
 - Cadmium 0.4 mg/kg
 - Cobalt 5%
 - Copper 5%
 - Manganese 5%
 - Mercury 0.2 mg/kg
 - Molybdenum 10 mg/kg
 - Lead 2 mg/kg
 - Nickel 4 mg/kg
 - Selenium 2 mg/kg

On the basis of this information, key findings relating to the characteristics of sand from Jonah Bore are as follows:

- **Plate 3** shows that this soil is typical of pale reddish-brown sands from aeolian dune systems in the arid regions of Western Australia. The soil is uniform in colour and texture throughout the excavated profile, and apart from minor plant roots, is devoid of leave litter and humus in the surface horizon.
- The particle size distributions of four samples tested (**Figure 7**) indicates very well sorted sand with a median particle diameter of approximately 0.3 mm. The fine fraction contents, which includes very fine sand (0.02 to 0.075 mm), silt (0.002 to 0.02 mm) and clay (<0.002 mm), are very low ($\leq 2\%$). The lack of fine material means that there is a low risk of dust generation, but also means the soil profile will be very well drained and have a low plant –available water holding capacity (PAWC).
- The samples are moderately acidic, as indicated by pH values of 5.3 to 5.6 (**Table 9**). These values are typical of leached siliceous sands, which are naturally acidic and have very little pH buffering capacity.
- The soil is non-saline, as indicated by low EC values ranging from 4.6 to 7.0 $\mu\text{S}\cdot\text{cm}$ (**Table 9**).
- Emerson Class Numbers of 5 indicate that the fine fraction materials have a low potential for dispersion. Spontaneous dispersion and hard-setting behaviours are not expected for this soil type.
- Nutrients contents of these samples are very low, as indicated by low concentrations of total N, total P, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, extractable S and extractable P presented in Table 10. PBI values, ranging from 13 to 23, are rated as very low, indicating the soil has very little capacity to retain nutrients supplied as soluble fertilisers or by mineralisation of organic matter.
- Exchangeable cation concentrations (**Table 11**) are very low, with all values being below the laboratory reporting limits. These values indicate very low concentrations of calcium, magnesium and potassium (all essential plant nutrients) and confirm the limited capacity of the soil to retain other essential plant nutrients.
- The soils are classified as non-sodic, noting that soil sodicity is largely irrelevant to sandy sands.
- Concentrations of metals and metalloids (**Table 8**) were all below the WA concentration thresholds for clean fill.



Plate 3: Soil Profile at Mt Keith

Figure 7: Particle Size Distribution – Mt Keith Samples

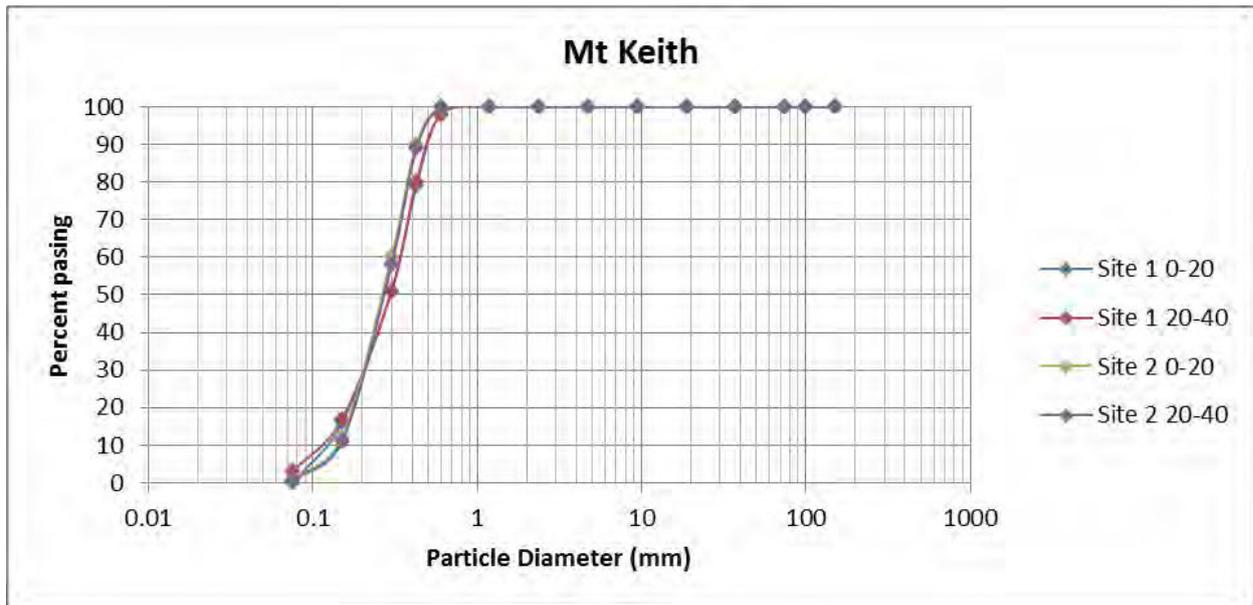


Table 9: pH, EC and Emerson Class – Mt Keith Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
pH	pH units	5.5	5.6	5.3	5.3
EC	µS/cm	4.6	4.9	7.0	6.7
Emerson Class	-	5	5	5	5

Table 10: Nutrients – Mt Keith Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Total N	mg/kg	70	59	19	19
Total P	mg/kg	30	34	21	19
Ammonium-N	mg/kg	3.9	5.1	6.1	6.1
Nitrate-N	mg/kg	0.23	0.31	0.11	0.12
Extractable S	mg/kg	<2	<2	5	4
Extractable P	mg/kg	<0.5	<0.5	<0.5	<0.5
PBI	-	23	22	13	22

Table 11: Exchangeable Cations – Mt Keith Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Calcium	cmol(+)/kg	<0.25	<0.25	<0.25	<0.25
Magnesium	cmol(+)/kg	<0.41	<0.41	<0.41	<0.41
Sodium	cmol(+)/kg	<0.22	<0.22	<0.22	<0.22
Potassium	cmol(+)/kg	<0.13	<0.13	<0.13	<0.13
Aluminium	cmol(+)/kg	<0.07	<0.07	<0.07	<0.07
CEC	cmol(+)/kg	<1	<1	<1	<1
ESP	%	<1	<1	<1	<1

Table 12: Metals and Metalloids – Mt Keith Samples

Sample	Units	Sample 1	Sample 2	Sample 3	Sample 4
Location	-	Site 1	Site 1	Site 2	Site 2
Depth	cm	0 - 20	20 - 40	0 - 20	20 - 40
Arsenic	mg/kg	1.8	1.9	1.3	1.3
Boron	mg/kg	<1	<1	<1	<1
Barium	mg/kg	2.5	2.7	3.0	3.0
Beryllium	mg/kg	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1
Cobalt	mg/kg	0.7	0.7	<0.5	<0.5
Chromium	mg/kg	75	77	64	59
Copper	mg/kg	2.4	2.6	1.5	1.6
Mercury	mg/kg	<0.01	<0.01	<0.01	<0.01
Manganese	mg/kg	18	22	13	12
Molybdenum	mg/kg	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	2.1	2.6	1.3	1.4
Lead	mg/kg	2.2	2.2	1.4	1.3
Antimony	mg/kg	<0.5	<0.5	<0.5	<0.5
Selenium	mg/kg	0.2	0.2	0.2	0.2
Tin	mg/kg	<0.5	<0.5	<0.5	<0.5
Zinc	mg/kg	2.1	2.2	1.5	1.2

4. Conclusions

The physical and chemical properties of sands from Comet Vale (Section 3.1), Jonah Bore (Section 3.2) and Mt Keith (Section 3.3) are sufficiently similar for the same rehabilitation strategies to be applied at each deposit. Characteristics that need to be considered when implementing site rehabilitation include:

- The materials are loose, pale red-brown aeolian sands with very low plant available water capacity.
- Although the sands have a low risk of generating significant amounts of dust, they contain substantial amounts of fine to medium sand-sized particles that are easily mobilised by moderate to strong wind gusts. The growth of emerging seedlings may be impacted by the associated sand blasting if the area is not thoroughly ripped.
- The sands are moderately acidic, with pH values ranging from 5.3 to 5.6. As the soils are comprised mainly of silica particles with very low concentrations of exchangeable aluminium, the acidity levels are unlikely to be a problem for common sand dune species (notably *Spinifex triodia*) in the arid regions of WA.
- The sands are non-saline and non-sodic.
- Nutrients contents and soil organic matter contents are extremely low. Low PBI and CEC values indicate they have very little capacity to retain soluble nutrients applied as soluble fertilisers or mineralised organic materials. The very low nutrient status is unlikely to support high densities of plant species, and application of slow-release, balanced fertilisers may be beneficial for revegetation of each site.
- Heavy metal and metalloid concentrations are exceptionally low and, with the exception of slightly elevated nickel (when compared to DWER contamination threshold values) in the Comet Vale sample, comply with “clean fill” criteria in WA (DWER 2019).

In summary, the soils from all sites have comparable properties, comprising stable, geochemically benign aeolian sands with limited nutritional value for plant growth. Given that local, native plant species are adapted to these conditions, revegetation of disturbed surfaces is expected to occur over time. This is reinforced by the positive performance of areas that have already been rehabilitated by MLG, as demonstrated by rehabilitation performance monitoring reports (Blueprint 2021a, Blueprint 2021b) and general site observations.

5. References

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APPENDIX 2: FLORA AND VEGETATION SURVEY (2018)

RECONNAISSANCE FLORA AND VEGETATION SURVEY

of the

Comet Vale Project

Prepared for

MLG Oz Pty. Ltd.



Prepared by

Goldfields Landcare Services

August 2018

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APPENDICES

- A1: Conservation Codes for Western Australian Flora and Fauna (Department of Parks and Wildlife, 2015)
- A2: Definition of Threatened Flora Species (Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth))

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- A3: Definitions and Criteria of Threatened Ecological Communities (Department of Environment and Conservation 2013)
- A4: Definitions and Criteria for Priority Ecological Communities (Department of Environment and Conservation 2013)
- B: Vegetation Condition Scale (Kieghery 1994, Trudgen 1998))
- C: Vegetation Classification System (Modified Muir 1977)
- D: Species of Conservation Significance recorded from the Department of Biodiversity, Conservation and Attractions data search. July 2017
- E: Plant Species List by Vegetation Type

1. SUMMARY

Goldfields Landcare Services was initially contracted by MLG Oz Pty. Ltd. to conduct a Level 1 Flora and Vegetation Survey over two areas, (Area 1 and Area 2), covering approximately 374 Ha on their Exploration Lease E 29/742, located approximately 21 kilometres southeast of Menzies. Subsequently an additional 138 Ha was surveyed within Unoccupied Crown Land adjacent to Area 1 for a total surveyed area of 512 Ha.

The field survey was carried out between 20.05.17 and 29.07.18.

One hundred and seventy-four vascular plant species have been recorded from within the survey areas. The most prevalent family was *Fabaceae* with 31 species.

No plant species gazetted as “Threatened” pursuant to Part 2 of the Biodiversity Conservation Act 2016 Western Australia (W A) (The Conservation Codes for Western Australian Flora and Fauna) and no plant species listed as “Critically Endangered” under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999, Commonwealth) have been recorded within the surveyed areas.

Seven plant species of conservation significance were recorded within the survey areas: *Persoonia leucopogon* (P1); *Newcastelia insignis* (P2); *Acacia eremophila* var. *variabilis* (P3); *Alyxia tetanifolia* (P3); *Homalocalyx grandiflorus* (P3); *Eucalyptus jutsonii* subsp. *jutsonii* (P4) and *Grevillea secunda* (P4).

Two more species of conservation significance were located just outside one of the survey areas: *Thryptomene eremaea* (P2) and *Hysterobaeckea ochropetala* subsp. *cometes* (P3).

No Threatened Ecological Communities (TEC) or Priority Environmental Communities (PEC) were encountered during the survey.

One area of potential ecological significance was recorded.

No non-native introduced species were recorded within the survey areas.

Six vegetation types were recorded and described within the survey area.

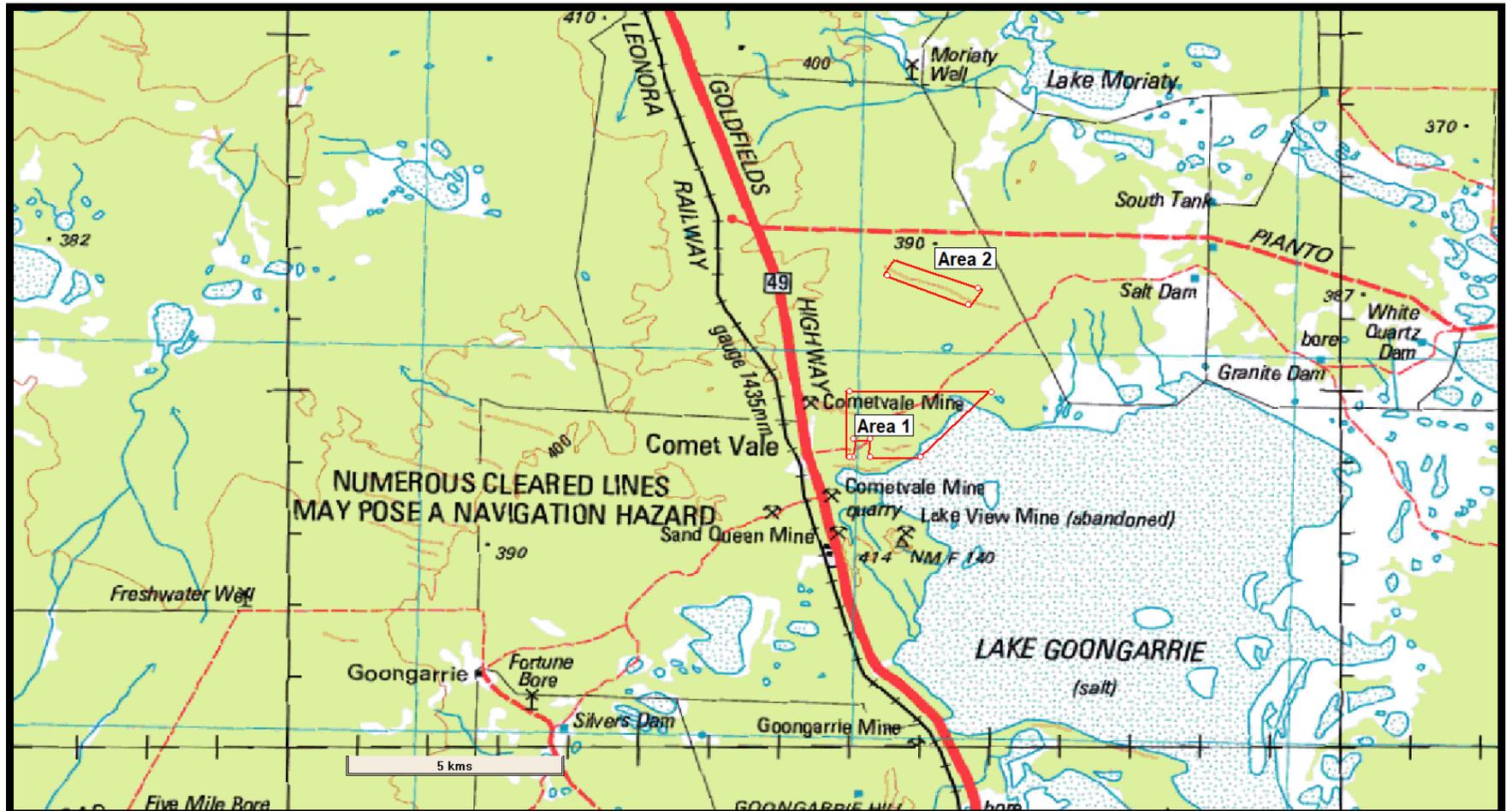
The vegetation condition was rated as “Good” based on the Vegetation Condition Scale adapted from Keighery (1994) and Trudgen (1998) (Appendix B).

2. INTRODUCTION

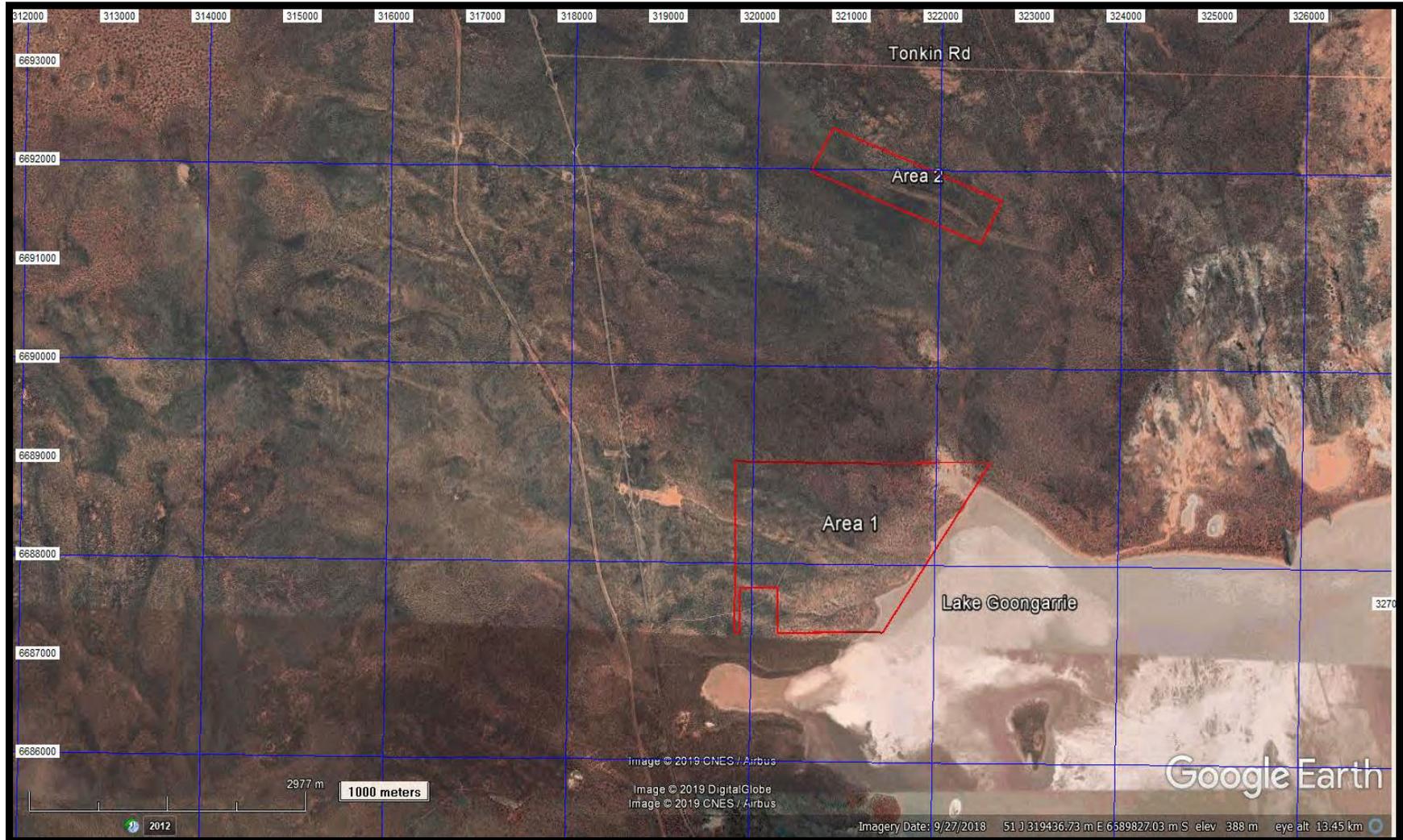
2.1 Location

The two areas surveyed are located approximately 24 and 27 kilometres south-east of Menzies; 1.3 kilometres north-east of the old Comet Vale townsite and 0.9 kilometres east of the Goldfields Highway. Approximately 73% of the areas lie within Exploration Lease E 29/742 and 23% within Unoccupied Crown Land.

Map 1: Location Map



Map 2: Comet Vale Survey Areas



2.2 Climate

Beard described the climate of the Murchison Region, (Austin Botanical District) in Plant Life of Western Australia, within which the survey area lies, as “Arid with summer and winter rains; annual precipitation 200 mm”. (Beard 1990, p. 186)

The nearest Bureau of Meteorology weather station is located at Menzies which lies approximately 23 kilometres north-north-west of the survey area.

Records from the station for 104 years from 1896 to 2017 show that the mean annual rainfall is 254 mm with almost 80% of that normally falling within the eight months of January to August. The wettest month is February with a mean of 32.2 mm, while the means for the remaining seven months range from 19.7 to 27.6 mm.

The four months of September to December receive a combined total of just 52 mm constituting 20% of the annual total.

For 94 years from 1898 to 1995 the mean annual maximum temperature was 26.3° C and the mean annual minimum temperature was 12.6° C (Bureau of Meteorology 2017).

2.3 Land Systems

The surveyed areas lie within the Eastern Murchison (MUR01) sub-region of the Murchison (MUR) region as classified under the Interim Biogeographic Regionalisation of Australia (IBRA) Version 7.

In the WA Department of Agriculture’s Technical Bulletin, No 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia, authors H. Pringle *et.al.* describe land systems according to their topography, soils and vegetation. The 1: 250 000 scale map of the land systems accompanying the report shows the areas surveyed for this project lie almost entirely within the Marmion Land System with a portion of lake edge lying within the Carnegie Land System.

These land systems are described as follows:

“**Marmion Land System:** Extensive gently undulating sand plains (mixed spinifex, acacia, heath and mallees).

“**Carnegie Land System:** Salt lakes with fringing saline flats and dunes.”

2.4 Vegetation

Technical Bulletin No. 87 identifies six different landform units which may exist within the Marmion Land System and ten within the Carnegie Land System.

Each landform unit hosts a number of different vegetation types.

2.5 Rare and Priority Flora

In WA, under the *Wildlife Conservation Act 1950* all plants are protected. Some, which are under threat of extinction, are classified as Threatened Species. Others which are either under consideration to be declared as Threatened Species or still require monitoring are classified as Priority Flora species. The definitions of the five different classifications of Priority Species and that of Threatened Species and Presumed Extinct Species are shown in Appendix A1.

2.6 Threatened Flora Species and Ecological Communities

Listed threatened species and ecological communities are recognized as a matter of national environmental significance. Consequently, any action that is likely to have a significant impact on listed threatened species and ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) must be referred to the Minister and undergo an environmental assessment and approval process. (Department of the Environment and Energy) The different categories of threatened species and threatened ecological communities and their respective definitions are shown in Appendices A2 and A3.

3. OBJECTIVES

Goldfields Landcare Services was contracted by MLG Oz Pty. Ltd. to conduct a Level 1 Flora and Vegetation Survey over two areas covering approximately 512 Ha on their Exploration Lease E 29/742, located approximately 21 kilometres southeast of Menzies at its closest point, as part of the company's assessment of a potential sand mining operation.

The Flora and Vegetation survey was conducted in compliance with EPA Technical Guidance Statement, December 2016, guidelines.

3.1 Background Research

The purpose is to gather background information on the target area (usually at the locality scale). This involves a search of available sources of literature, data and map-based information.

Threatened and Priority Flora

- A database search for Rare and Priority Flora possibly occurring within 40 kilometres of the survey area was carried out by the W.A. Department of Biodiversity, Conservation and Attractions (DBCA) on 16.10.2017, (Ref. No. 31-1017FL). Thirty-three plant species classified as Threatened or Priority species were recorded from the DBCA search.

The W.A. DBCA Threatened and Priority Flora Database (TPFL) contained five species, the WA Herbarium Database (WAHerb) contained 18 and the Threatened and Priority Flora Species List (TPList) contained 26, however some species occurred in more than one of the searches resulting in a total of 33 Threatened or Priority species being recorded:

One species was listed as Declared Rare Flora (Threatened).

Seven species were listed as Priority 1.

Five species were listed as Priority 2.

Seventeen species were listed as Priority 3.

Three species were listed as Priority 4.

- The search results were crosschecked against the results of a search of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) List of Threatened Flora.

One species (*Eucalyptus crucis* subsp. *crucis*) is listed as Declared Rare Flora in the W.A. Department of Biodiversity, Conservation and Attractions (DBCA) search and is listed as Vulnerable in the EPBC list.

One species (*Tecticornia flabelliformis*) listed as P1 in the DBCA list is listed as Vulnerable in the EPBC list.

One species (*Eliocharis papillosa*) listed as P3 in the DBCA list is listed as Vulnerable in the EPBC list.

- A DBCA NatureMap Species Report was created online on 15.05.2017 covering an area with a 40-km radius from the centre of the survey area which revealed 17 priority plant species occurring within it.

One species were listed as Priority 1

Three species were listed as Priority 2

Seven species were listed as Priority 3

Three species were listed as Priority 4: (See Appendix D)

All of these species also appeared in the DBCA searches resulting in a total of 33 Priority species identified from four searches, potentially occurring in the area.

- A Protected Matters Report was generated from the Department of Environment and Energy's online search facility on 19.03.18. The report provides general guidance on matters of national environmental significance and other matters protected by the Environment Protection and Biodiversity Conservation Act (EPBC). The search covered an area of approximately 945 square kilometres surrounding the two areas surveyed and listed three plant species as Threatened, which may occur within that area or whose habitat may occur in that area, they are:

Eliocharis papillosa listed as Vulnerable - species or species habitat known to occur within area.

Gastrolobium graniticum listed as Endangered - species or species habitat likely to occur within area.

Ricinocarpos brevis listed as Endangered – species or species habitat may occur within area.

Detailed EPBC Act conservation category definitions are shown in appendix A2.

The above report also lists two invasive plant species that may occur within the search area:

Carrichtera annua (Ward's Weed) – species or species habitat may occur within area.

Cenchrus ciliaris (Buffel-grass) – species or species habitat may occur within area.

- One additional Priority species sampled on site, *Grevillea secunda*, was subsequently identified as a Priority 4 species from the Florabase website although it did not appear on any of the above lists.

Threatened and Priority Communities

A search on DBCA’s online list of Threatened Ecological Communities (TEC) revealed that none were listed within 300 kilometres of the survey area.

DBCA’s list of Priority Ecological Communities (PEC) shows the nearest PEC is the Priority 1 classified area which is described as “Banded Ironstone Hills with *Dryandra arborea* on Unallocated Crown Land in excellent condition north west Menzies area.” This PEC is over 60 kilometres north west of the survey area at its nearest point.

The Australian Government Department of Environment and Energy’s List of Threatened Ecological Communities viewed online, shows that the TEC nearest the survey area is that of the “Eucalypt Woodlands of the Western Australian Wheatbelt” which is classified as Critically Endangered.

At its nearest point, the boundary of this TEC lies approximately 200 kilometres south west of the survey area.

Table 1: TEC And PEC Nearest The Survey Area

Community Name	Status
Eucalypt Woodlands of the Western Australian Wheatbelt (TEC)	Critically Endangered
Banded Ironstone Hills with <i>Dryandra arborea</i> (PEC)	P1

3.2 Reconnaissance survey

The purposes of a Level 1 Flora and Vegetation Survey are:

- i) to verify the accuracy of the background study;
- ii) to further delineate and characterize the flora and the range of vegetation units present in the target area; and
- iii) to identify potential impacts.

This involves a target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the flora and vegetation, and to produce maps of vegetation units and vegetation condition at an appropriate scale. (Environmental Protection Authority Technical Guidance Statement, Dec. 2016)

4. METHODS

Fieldwork was undertaken between the 4th October 2017 and 29 July 2018 to conduct quadrat surveys at selected locations which were identified on the Google Earth image of the area as being representative of the different vegetation types, and to record and collect plant samples.

Landform units and their component elements were identified from the WA Department of Agriculture's Technical Bulletin, No 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia, Pringle *et.al.* Vegetation types were interpreted from quadrat surveys and defined on a Google Earth image.

The survey areas were accessed from an existing track running north east from the Goldfields Highway to Pianto/Tonkin road and from fence line tracks. Traverses were conducted on foot within the survey areas.

Twenty quadrat surveys were conducted within the survey areas.

Each 20m x 20m quadrat survey recorded descriptions of: Landscape, Surface, Rock Type, Soils, Overall Vegetation Type, Fire Age, Condition/Disturbances, Vegetation Stratum Height, Total Percentage Cover and Dominant Species from which a vegetation description was deduced using the Vegetation Classification System shown at Appendix C. A list of species together with their height and percentage cover was also recorded.

Plant species were recorded or sampled, and locations were recorded using a Garmin GPSmap76csx device. Photographs were taken in each of the four cardinal directions and of the ground from the centre of the quadrat +/- 2m. Opportunistic samples, notes, photographs and GPS coordinates were also taken to aid the mapping and reporting.

Specimens collected in the field were subsequently identified using appropriate text references, plant keys and web sites.

Nine specimens were sent to the WA Herbarium for identification, four of which were confirmed to be Priority species, namely, *Persoonia leucopogon* (P1), *Thryptomene eremaea* (P2), *Acacia eremophila* var *variabilis* (P3), and *Grevillea secunda* (P4).

4.1 Definitions of Survey Limitations

According to the EPA Guidance Statement June 2016 for Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, flora and vegetation surveys may be limited by the following:

- sources of information and availability of contextual information (i.e. pre-existing background versus new material);
- the scope (i.e. what life forms, etc., were sampled);
- Proportion of flora collected and identified (based on sampling, timing and intensity);
- completeness and further work which might be needed (e.g. was the relevant area fully surveyed);
- mapping reliability;
- timing, weather, season, cycle;
- disturbances (fire, flood, accidental human intervention etc.);
- intensity (in retrospect, was the intensity adequate);
- resources;
- access problems; and
- experience levels (e.g. degree of expertise in plant identification to taxon level).

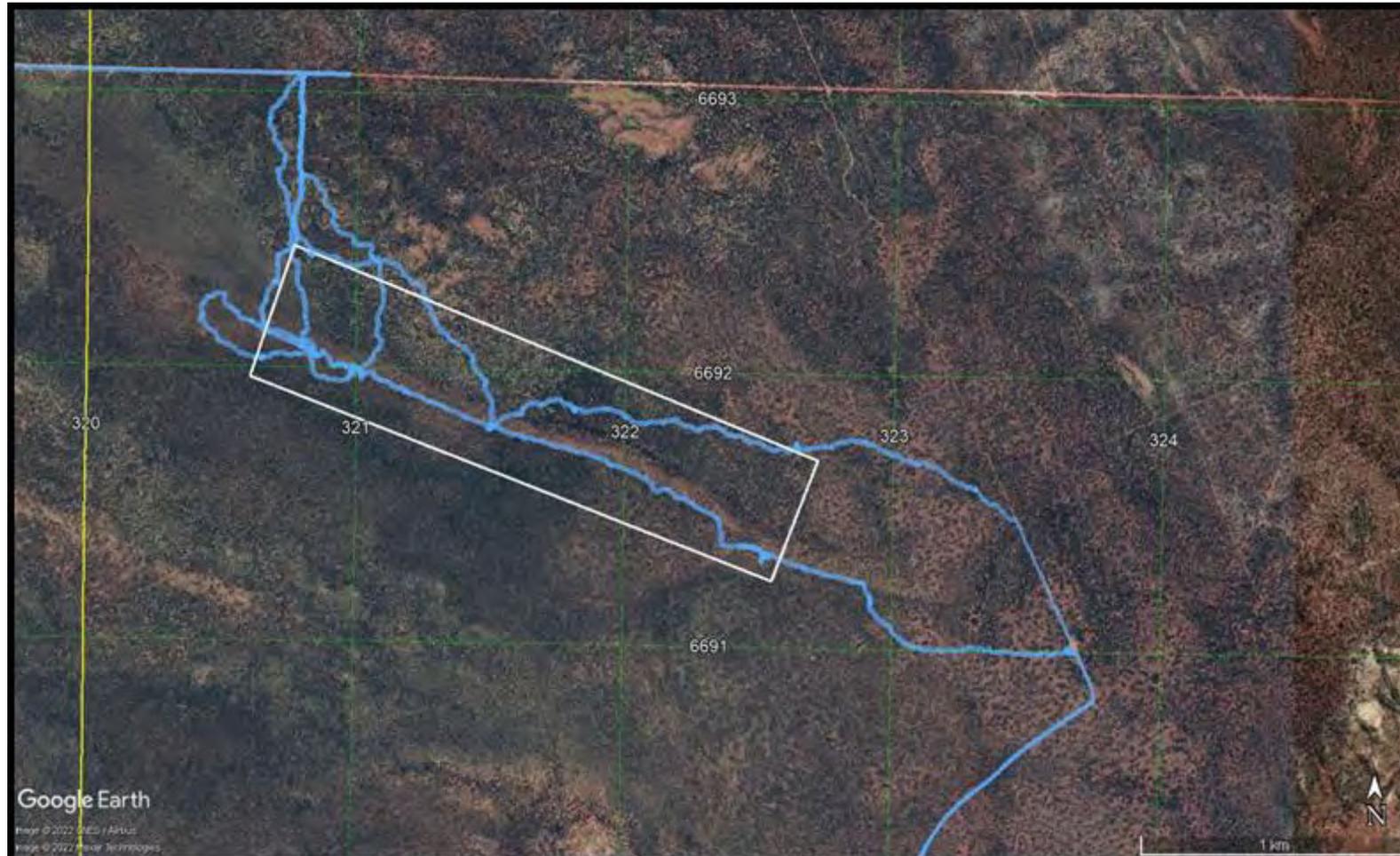
An assessment of these aspects is detailed in the table below:

4.2 Survey Limitations

TABLE 2: Survey Limitations

ASPECT	CONSTRAINT	COMMENT
Sources and availability of contextual information	No	The WA Department of Agriculture's <u>Technical Bulletin, No. 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia</u> , provides extensive reference material for the area.
Scope	No	The survey was detailed and covered all aspects of flora and vegetation assessment.
Proportion of flora collected and identified	No	Traverses covered the six vegetation types encountered. Sampling was detailed and identification to species level was 100% complete.
Completeness	No	Twenty quadrat surveys and extensive foot traverses deemed sufficient.
Mapping reliability	No	Detail considered adequate for this level of survey in this region.
Timing	No	September -November is recommended timing for this region. Oct-Jan deemed adequate.
Disturbances	No	No impediments encountered.
Intensity	No	Survey intensity considered to be adequate.
Resources	No	Resources were adequate with 19-person days devoted to botanical survey work.
Access Problems	Yes	Project completion was delayed by five months being the time taken by Dept of Planning Lands and Heritage to issue permit to conduct survey on 136 Ha of Unoccupied Crown Land. Physical access was via 4WD on existing tracks and by foot.
Experience Levels	No	Personnel have extensive field experience in the Eastern and North-Eastern Goldfields and Murchison Region.

Map 4: Survey Tracks, Northern area



Key:  tracks

5. RESULTS

5.1 Flora

Twenty quadrats, each 20m x 20m were surveyed.

A total of 161 separate plant specimens (including duplicates) were collected from within the survey areas.

One hundred and seventy-four different species, including sub-species and varieties have been identified from 31 families and 87 genera.

The most abundant genera were *Acacia* with 23 species followed by *Eremophila* with 10, and *Eucalyptus* and *Grevillea* with ten species each. A complete list of species recorded is shown in the attached Appendix E.

No non-native introduced species were recorded within the survey areas.

Seven plant species of conservation significance were recorded within the two survey areas and two species from just outside the northern area. They are: *Persoonia leucopogon* (P1); *Newcastelia insignis* (P2); *Thryptomene eremaea* (P2); *Acacia eremophila* var. *variabilis* (P3); *Alyxia tetanifolia* (P3); *Homalocalyx grandiflorus* (P3) *Hysterobaeckea ochropetala* subsp. *cometes* (P3); *Eucalyptus jutsonii* subsp. *jutsonii* (P4) and *Grevillea secunda* (P4). (See Maps 5-16)

5.2 Conservation Status of the Flora

No plant species gazetted as Declared Rare Flora pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* (WA) and no species listed as Threatened pursuant to the List of Threatened Flora of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (Department of Environment and Energy) were recorded from within the survey area.

A search was carried out of DBCA's Threatened and Priority Ecological Communities online database and revealed that there are no known occurrences of Threatened Ecological Communities (TEC's) recorded within 300 kilometres of the survey area.

The list of Priority Ecological Communities (PEC) was viewed online in the DBCA's database with the nearest recorded being the Banded Ironstone Formations located approximately 60 kilometres north west of the survey area.

No TEC or PEC were encountered during the survey.

5.3 Vegetation

The Vegetation types described below occur within different landforms, which, in turn, occur within different land systems as described below:

Land Systems

As mentioned in Section 2.4 above, two land systems were identified during the background research from the Department of Agriculture's Technical Bulletin 87 which covered the survey areas:

“**Marmion Land System**: Extensive gently undulating sand plains (mixed spinifex, acacia, heath and mallees).”

“**Carnegie Land System**: Salt lakes with fringing saline flats and dunes.”

An additional land system, “Yilgangi”, was found during the survey to be represented in a relatively small area (< 8 Ha), fringing the north western corner of Lake Goongarrie, which was not identified on the 1:250 000 scale map accompanying the bulletin, possibly due to the fact that it would have been too small to depict at that scale.

The **Yilgangi Land System** is described as: “Low breakaways with saline, gravelly lower plains, supporting predominantly halophytic low shrublands.”

Landforms

Six different **landform units** may occur within the Marmion Land System, eight within the Yilgangi Land System and ten within the Carnegie Land System.

Marmion Land System Landforms:

Three of the six Landform units were identified within the Marmion Land System:

Unit 1-Sand sheet – gently undulating sandplain. The vegetation was described as: “Scattered to moderately close acacia tall shrubland with occasional small mallees, a heath stratum, and spinifex and wanderrie grasses, each occasionally dominant.”

Unit 5-Dunes – occasional low (<10m) dunes occurring in the more extensive areas of Unit 1. The vegetation was described as: “Variable, often moderately close tall shrublands consisting of acacias, mallees, *Callitris collumularis* (native pine), *Grevillea* spp. *Hakea* spp. with a heath stratum and spinifex.”

Unit 6 – Narrow drainage tracts- occasional narrow (<500 m wide), linear zones receiving concentrated run-on from Unit 2. The vegetation was described as: “Close *Acacia aneura* tall shrublands, understory may contain heath species, hardpan low shrubs, and wanderrie grasses.”

Although Unit 2, referred to above, barely encroached into the survey area, its influence in providing run-off, together with a lower elevation in the landscape, provide the conditions and vegetation consistent with that described in Unit 6.

Unit 2 was described as, “Stripped surfaces – exfoliating low (5 m) outcrops of granite with narrow fringing plains.”

Carnegie Land System Landforms

Of the ten different Landform units which may occur in the Carnegie Land System, two were identified:

Unit 1- Lake beds – lake floors. Unvegetated.

Unit 3- Saline plains- level to gently undulating highly saline lower plains and drainage zones. The vegetation was described as: “Scattered to moderately close low shrublands, usually *Halosarcia* spp. (samphire) but also *Frankenia* spp. (frankenian).”

Yilgangi Land System Landforms

One of the eight Landform units possibly occurring within the Yilgangi Land System was mapped:

Unit 1- Breakaways – narrow, stripped, lateritised surfaces above escarpments (generally < 10 m high), with stony scree slopes. The vegetation was described as:

“Scattered eucalypt woodland in the south... [of the Technical Bulletin No 87-survey area] Scattered mixed shrublands... elsewhere.”

Vegetation Types

Marmion Land System Vegetation Types

Occurring within the **Sand sheet landform**, the Vegetation Type classification of **Sandplain spinifex hummock grassland (SASP)** described in Technical Bulletin No.87 covers a number of different sub-types; typically determined by the depth of the underlying sand and the dominance of Spinifex and represented by their upper strata, including Mallees and Mulga

Two of these sub-types were identified and mapped within both surveyed areas:

- **Sandplain -gum stratum – SAGS** (Variety A and Variety B)
- **Sand dune shrubland – SDSH**

One other vegetation type occurring within the **Sand sheet landform** was also prominent in both areas;

- **Sandplain acacia shrublands - SACS**

This vegetation type differed from the first two mentioned above most notably by the absence of Spinifex.

- **Mulga grassy wanderrie shrublands – MUWA**

Carnegie Land System Vegetation Types

The south-eastern corner of survey Area 1 encroaches on a salt lake, Lake Goongarrie.

One Vegetation Type was mapped within this land system: **Frankenia low shrublands – FRAN**. Although it is recognised that a similar vegetation type, Samphire low shrublands (SAMP) predominated in some sections of the lake edge it was not differentiated in the mapping at the scale of approximately 1:8000.

Yilgangi Land System Vegetation Type

A small area of breakaways with stony foot slopes occurs on the north-western corner of Lake Goongarrie which is considered to be a landform described as

occurring within the Yilgangi Land System. It appears to be an extension of the Yilgangi Land System that has been shown on the 1:250 000 map accompanying Technical Bulletin 87 as occurring approximately 2.5 kilometres to the east.

The Landform unit is described in Technical Bulletin 87 as:” Breakaways-narrow stripped, lateritised surfaces above escarpments (generally < 10 m high), with stony scree slopes.”

Within this Landform unit, one Vegetation Type was identified and mapped:

- **Greenstone hill (non - halophytic) eucalypt woodlands- GNEW**

Area of Potential Ecological Significance

At one point in Survey Area 1 (51J 322017 m E; 6688833 m S) the three different Land Systems described above, converge.



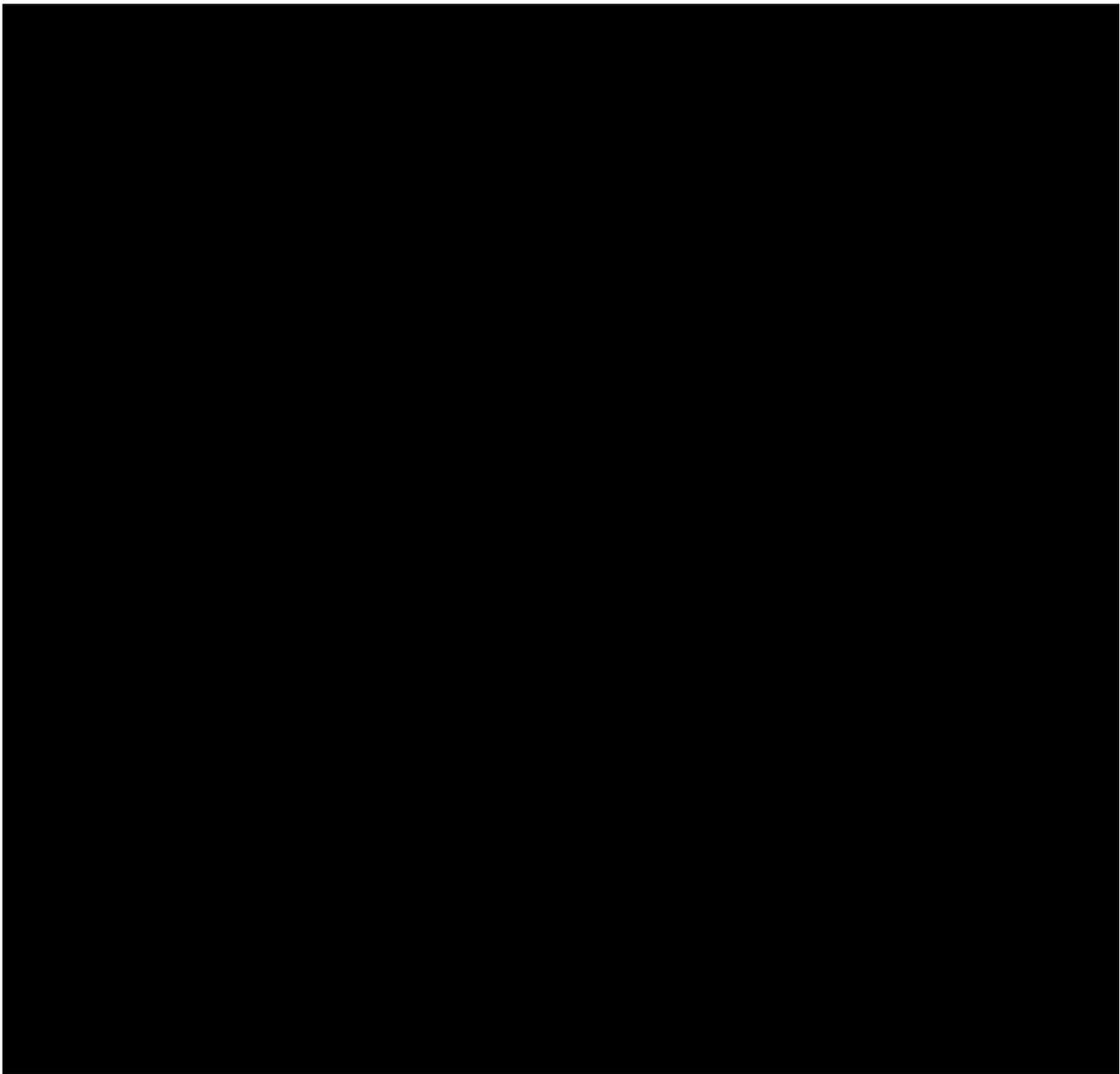
Plate 1: Showing confluence of sand sheet shrubs within the Marmion Land System, with blackbutt gums on breakaways within Yilgangi Land System and samphire on lake edge within Carnegie Land System.

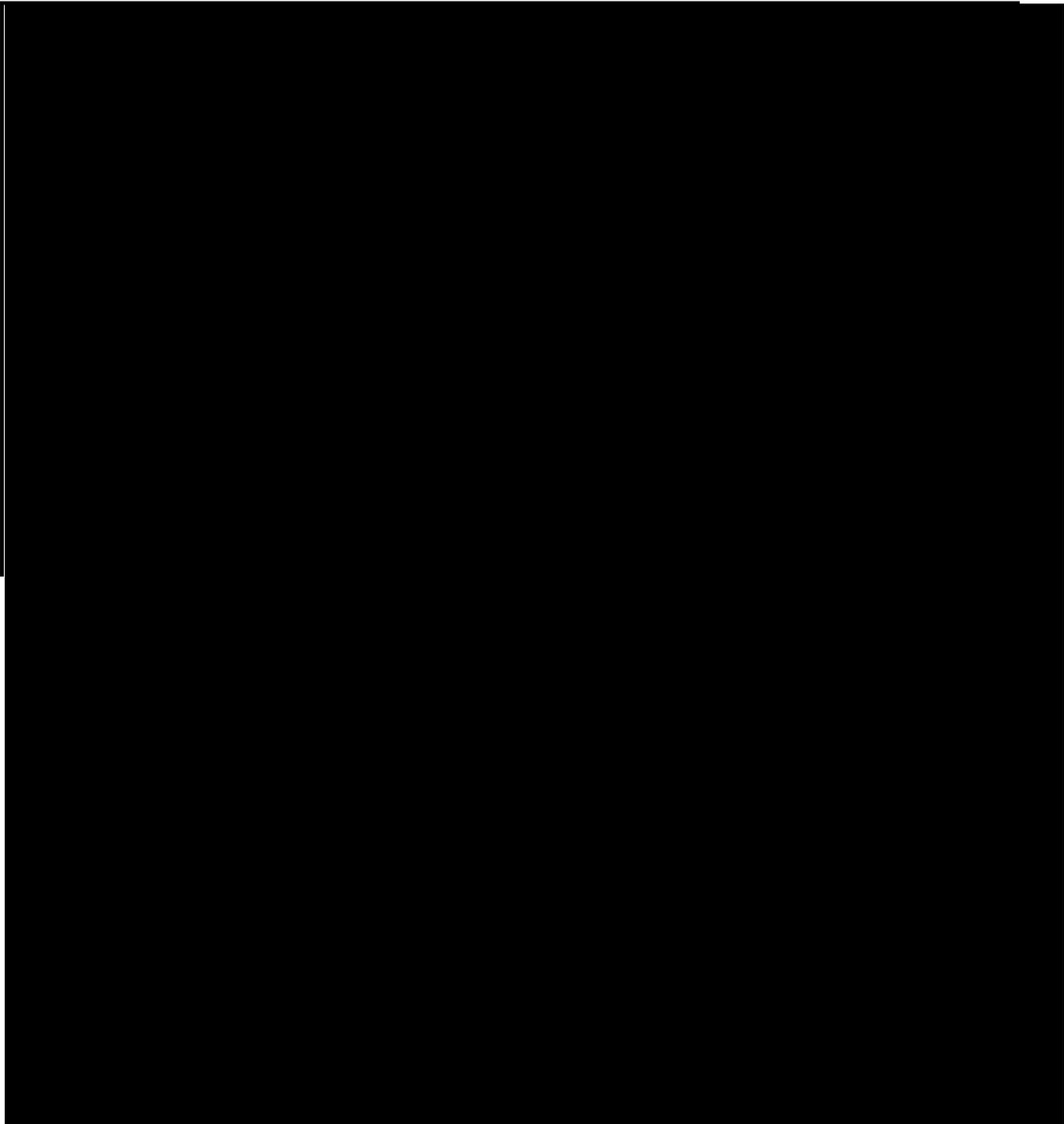
Although relatively small this portion of the Yilgangi Land System designated as Greenstone hill (non - halophytic) eucalypt woodlands, GNEW is of ecological significance. By virtue of its convergence at one point with the other two much larger land systems identified, it creates an area rich in species and relatively high biological diversity.

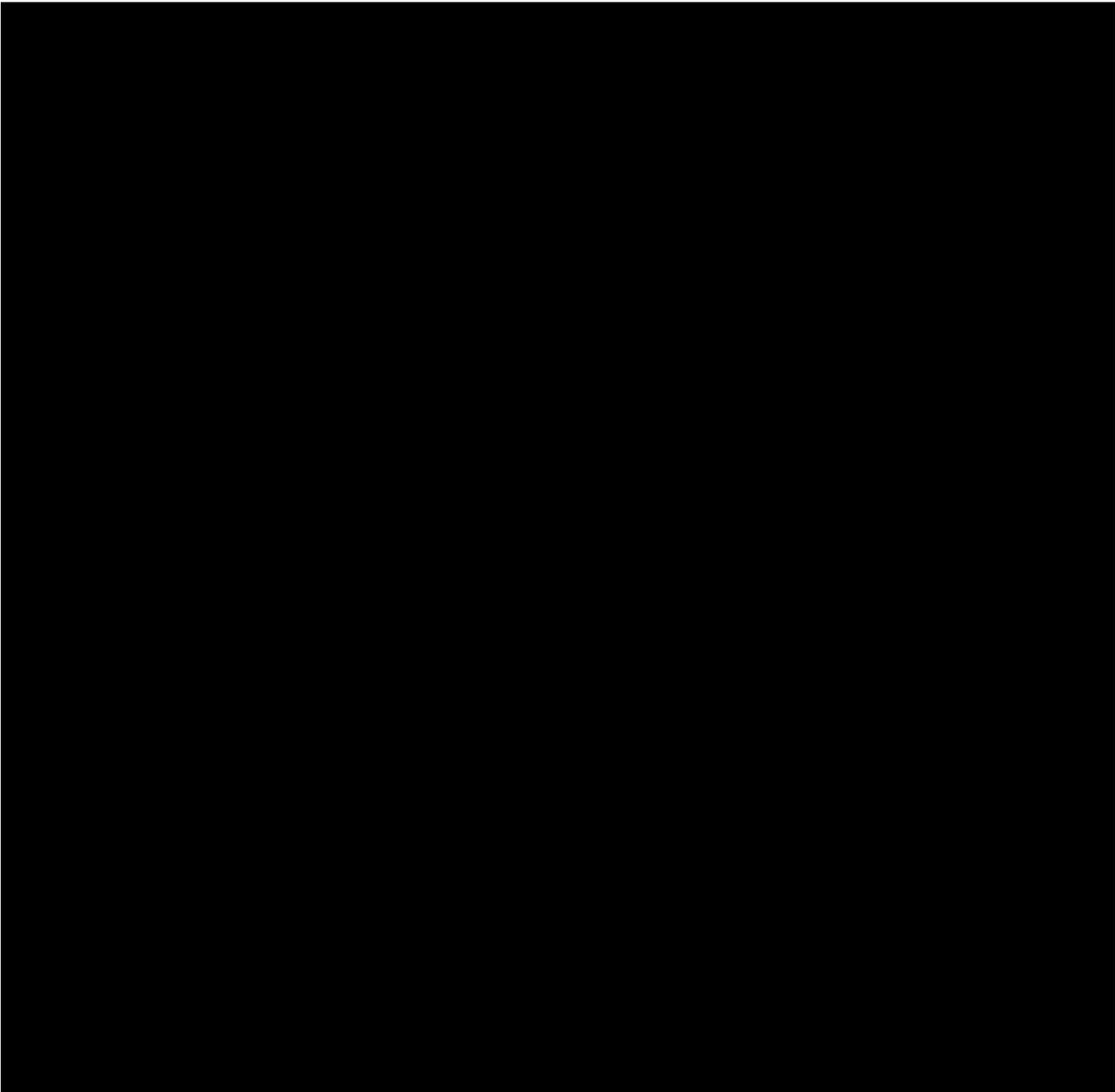
Examples of the various vegetation types identified and mapped within the two survey areas follow.

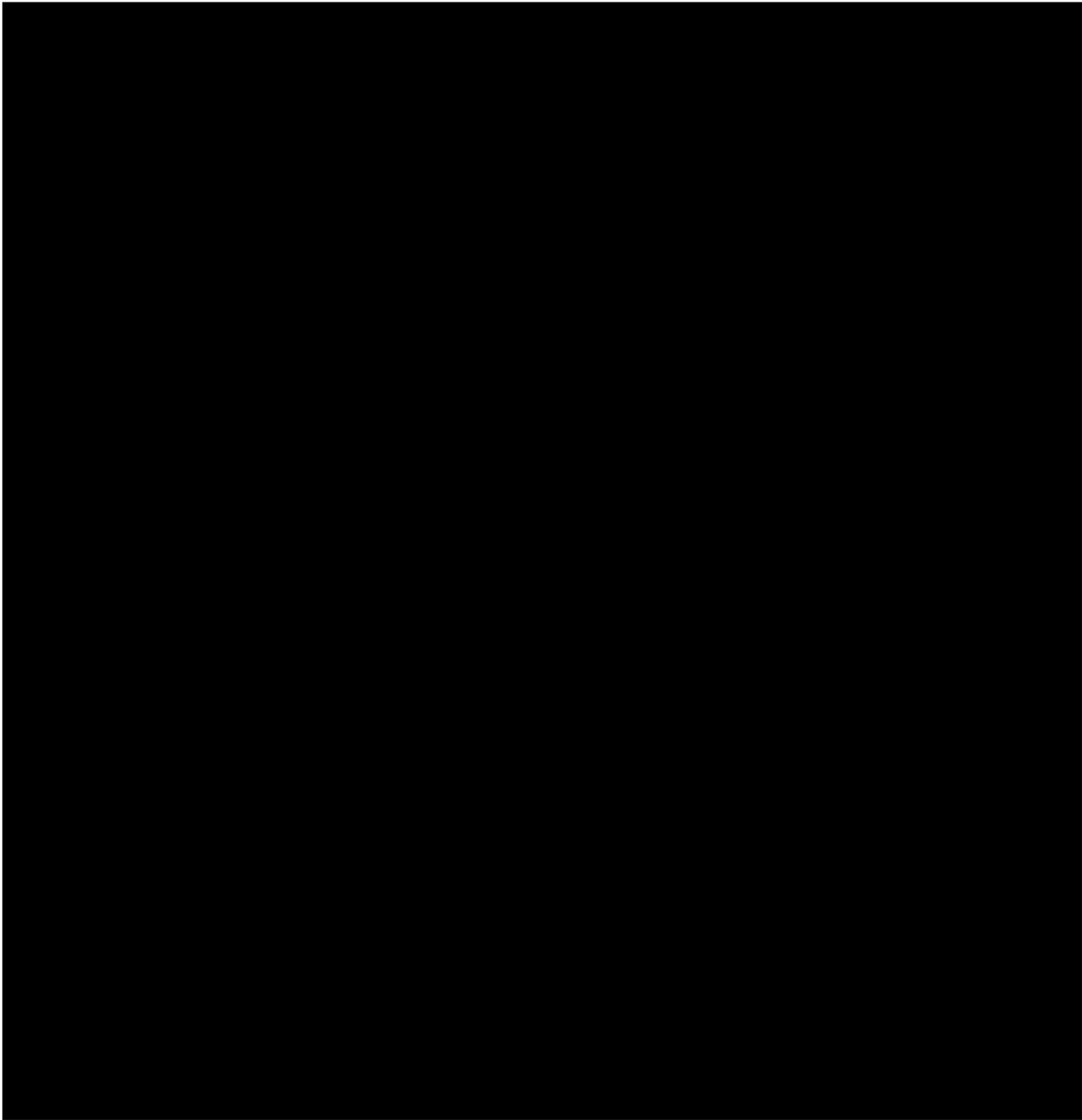
Map 5: Comet Vale Project Area 1 Vegetation Map

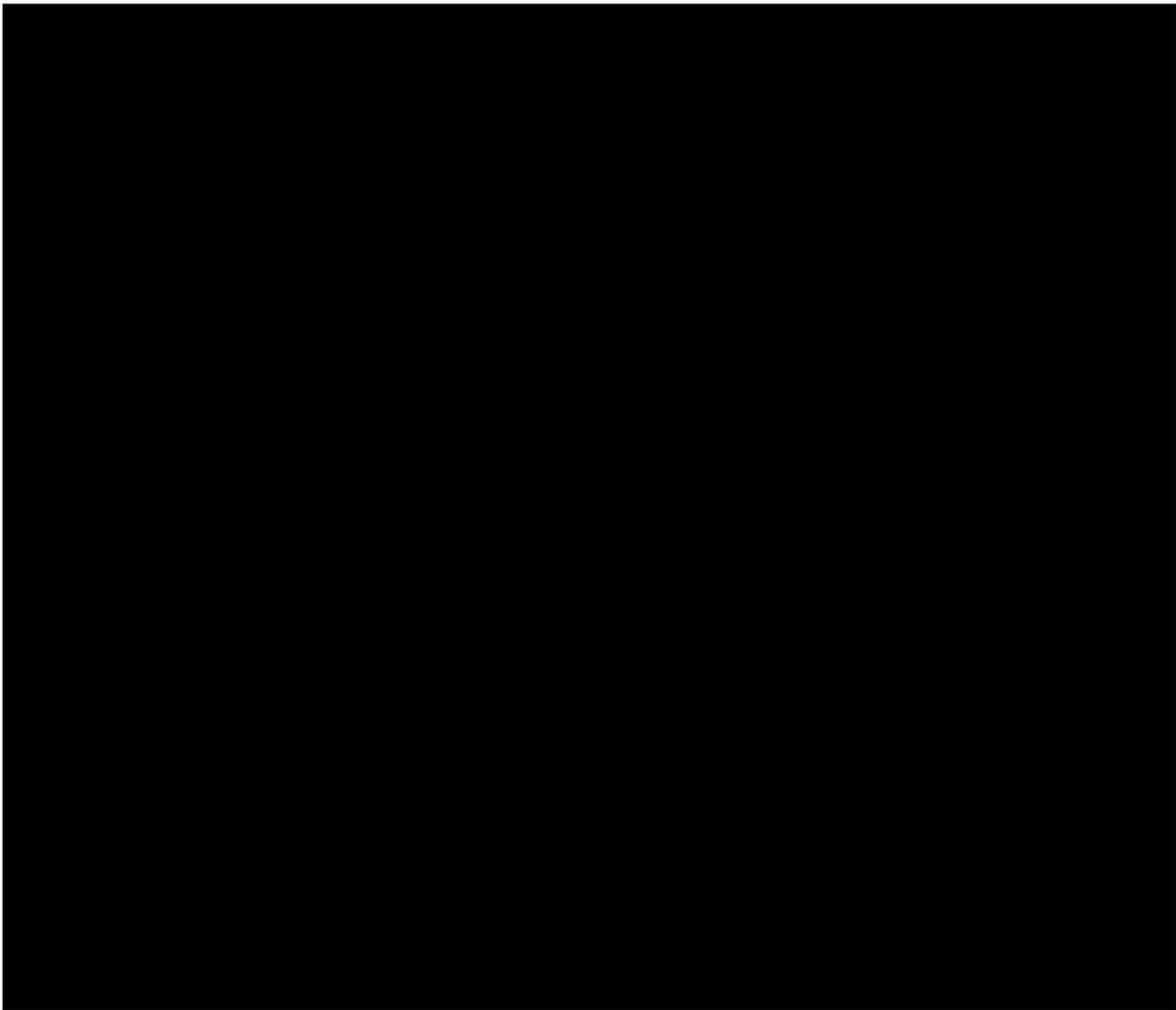


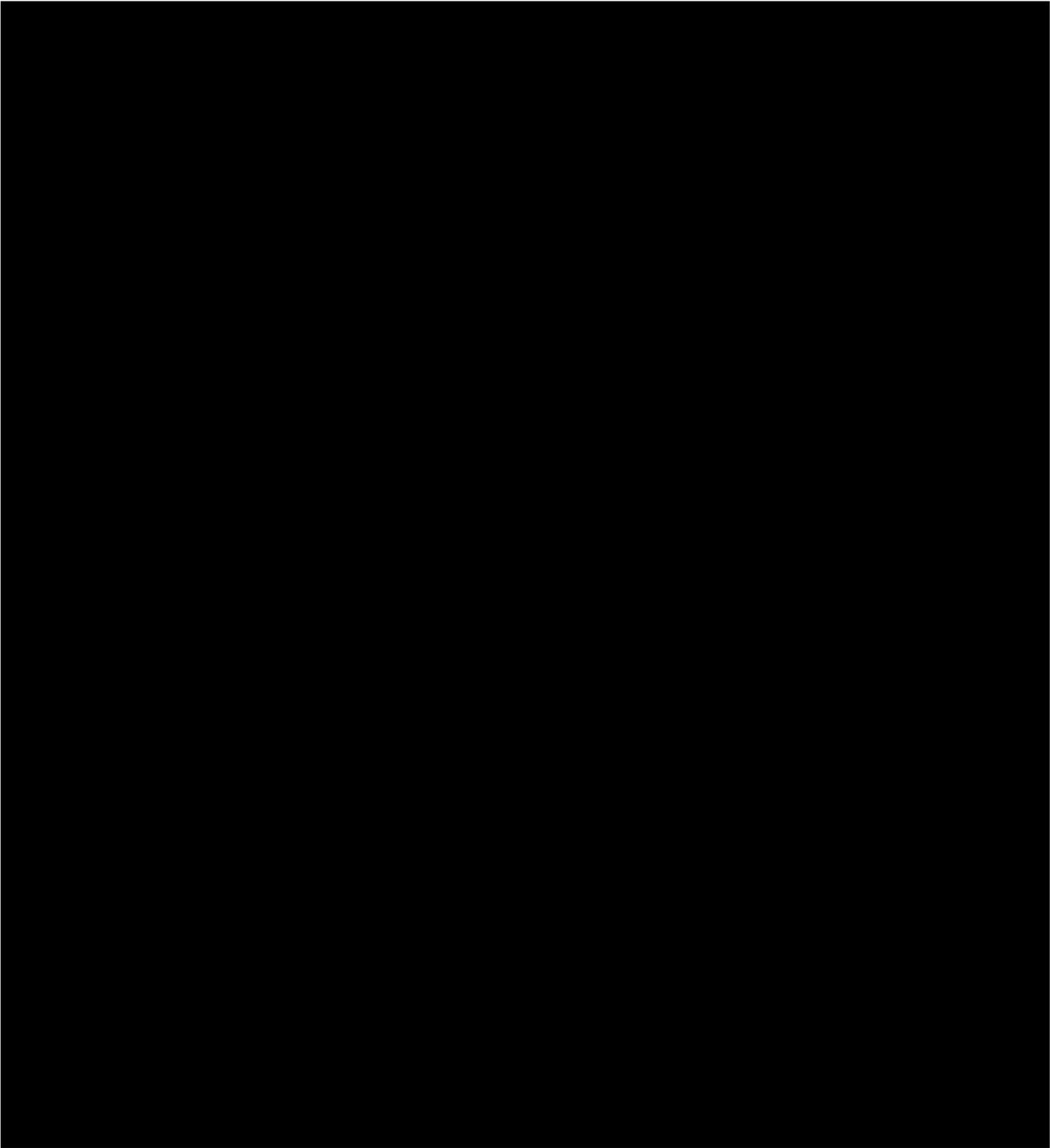


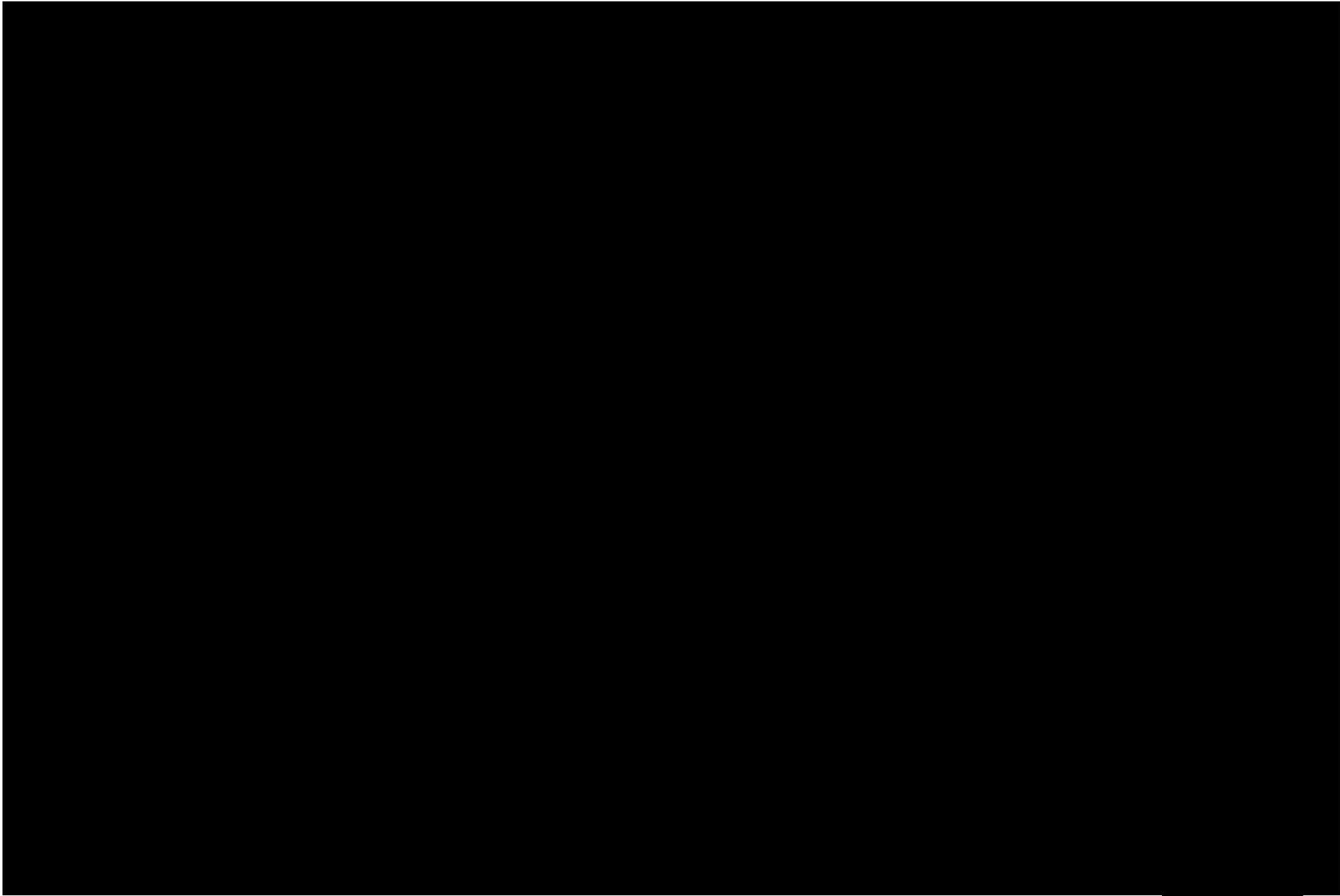


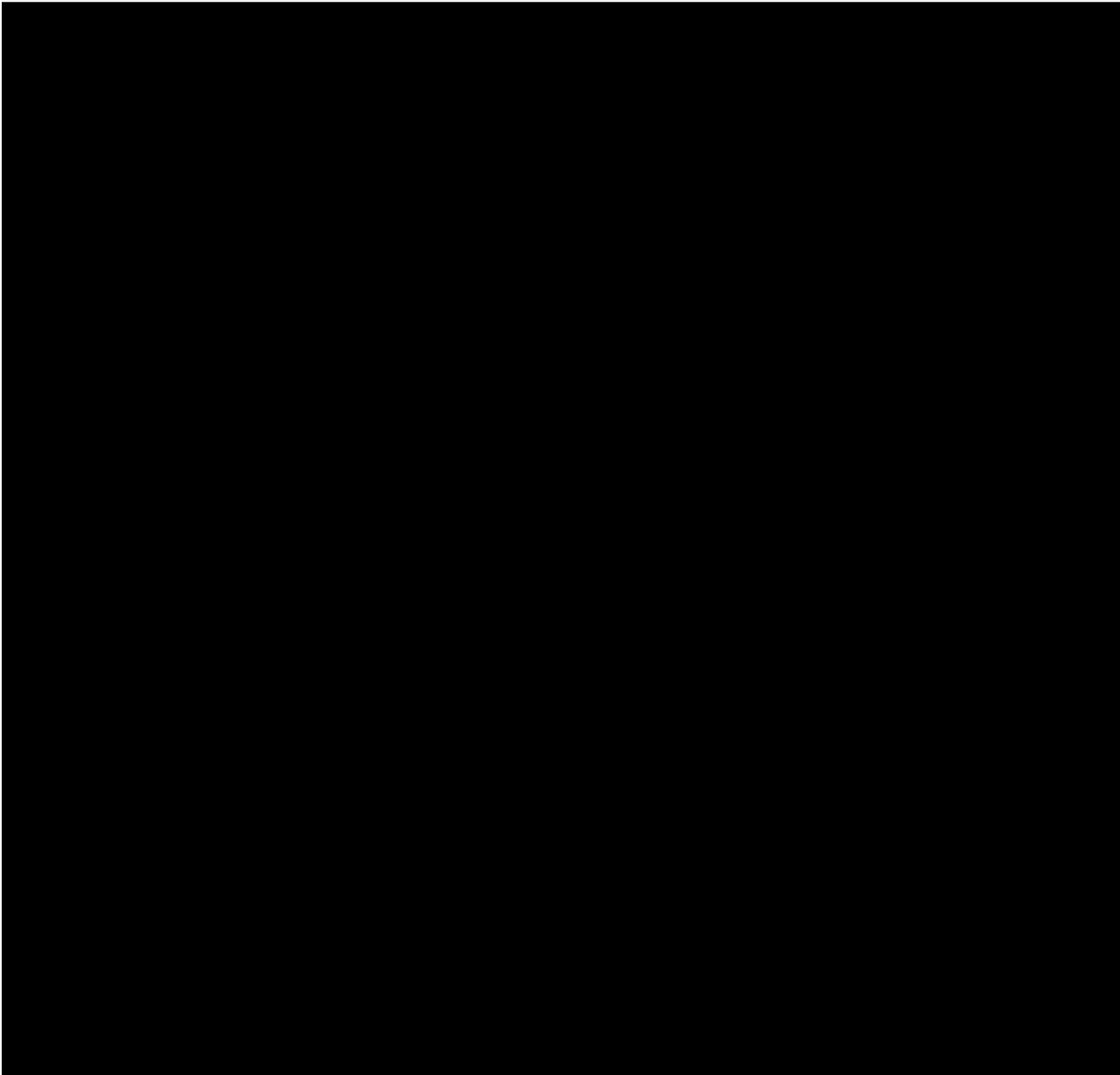


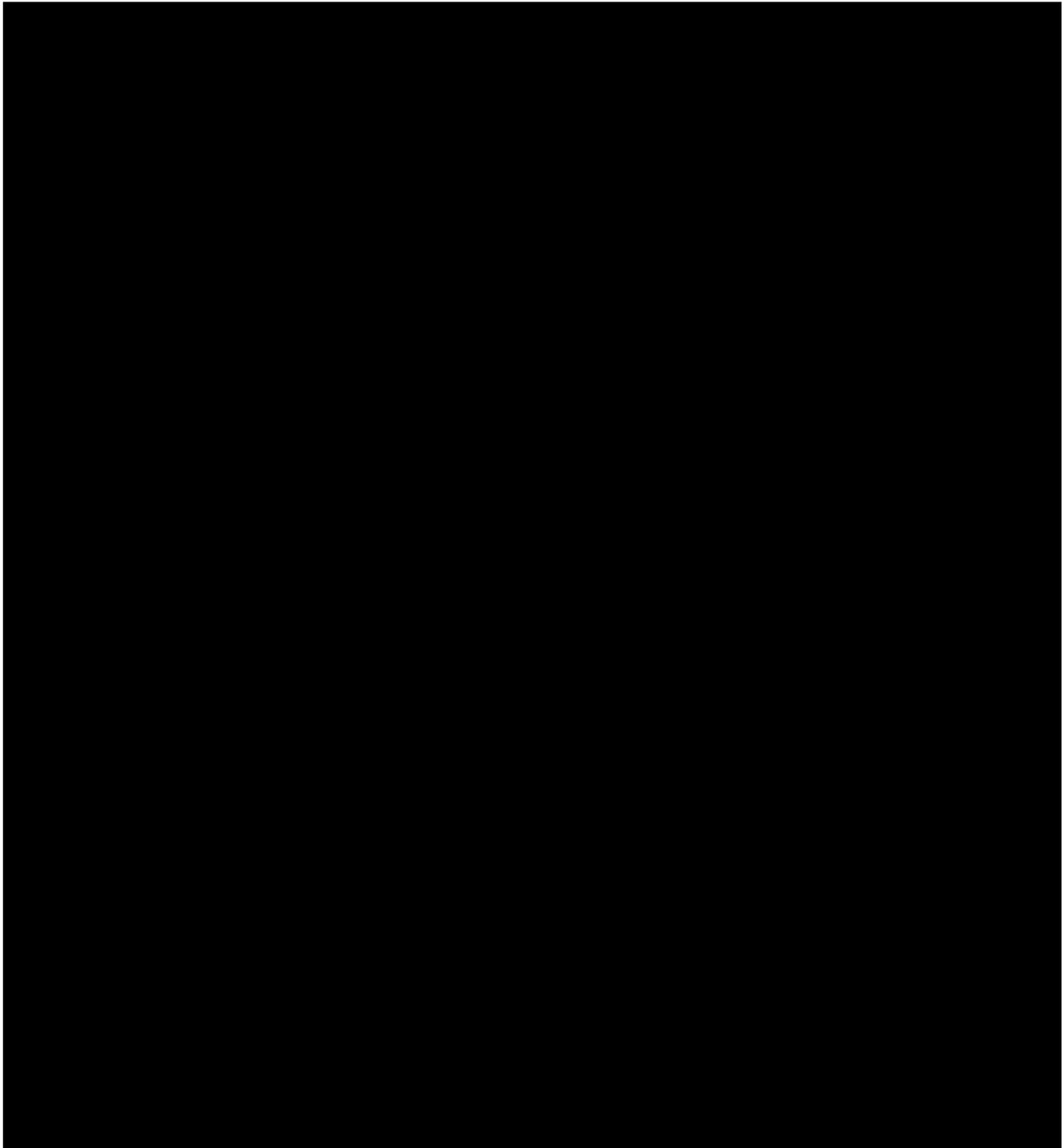


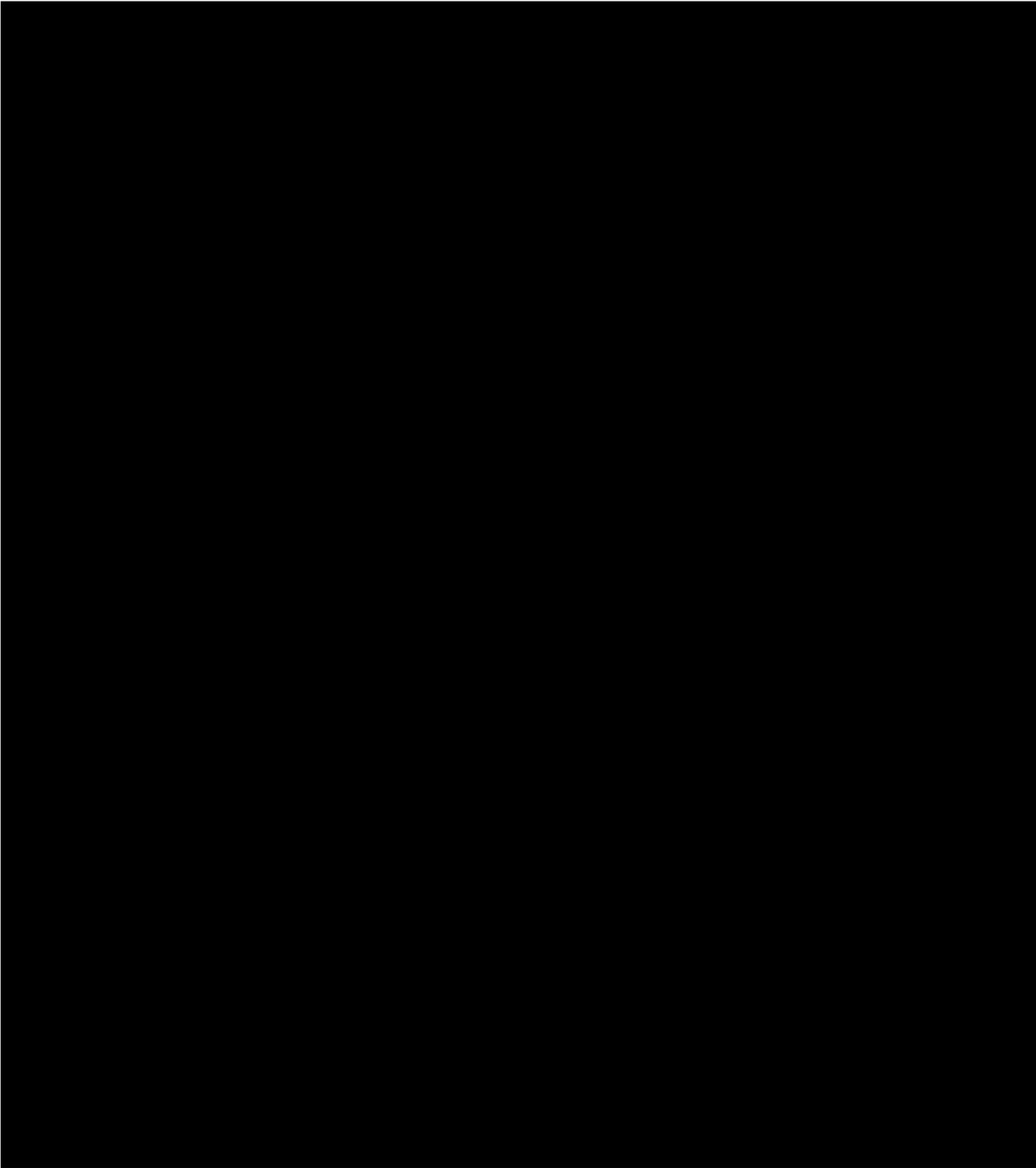


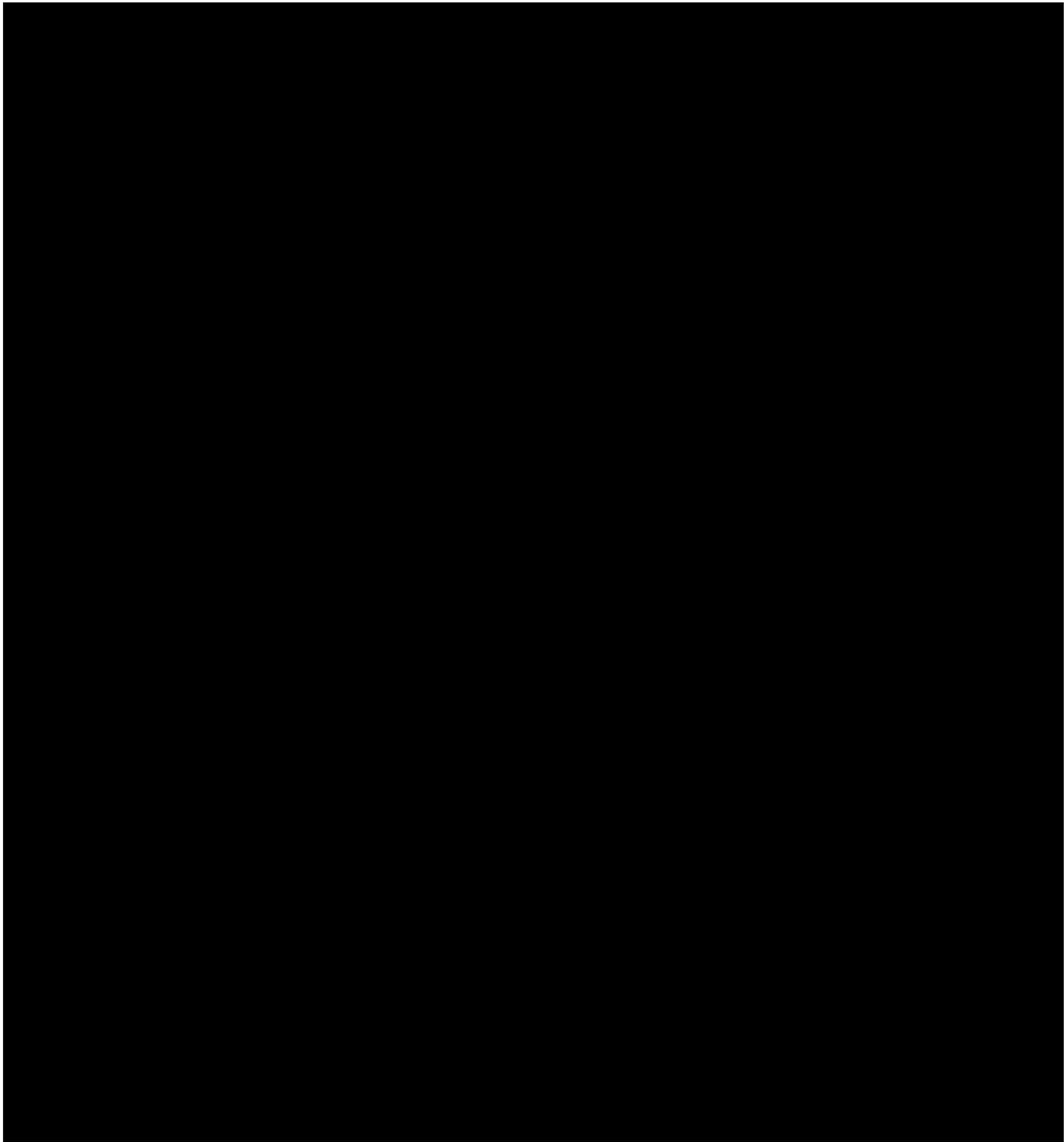




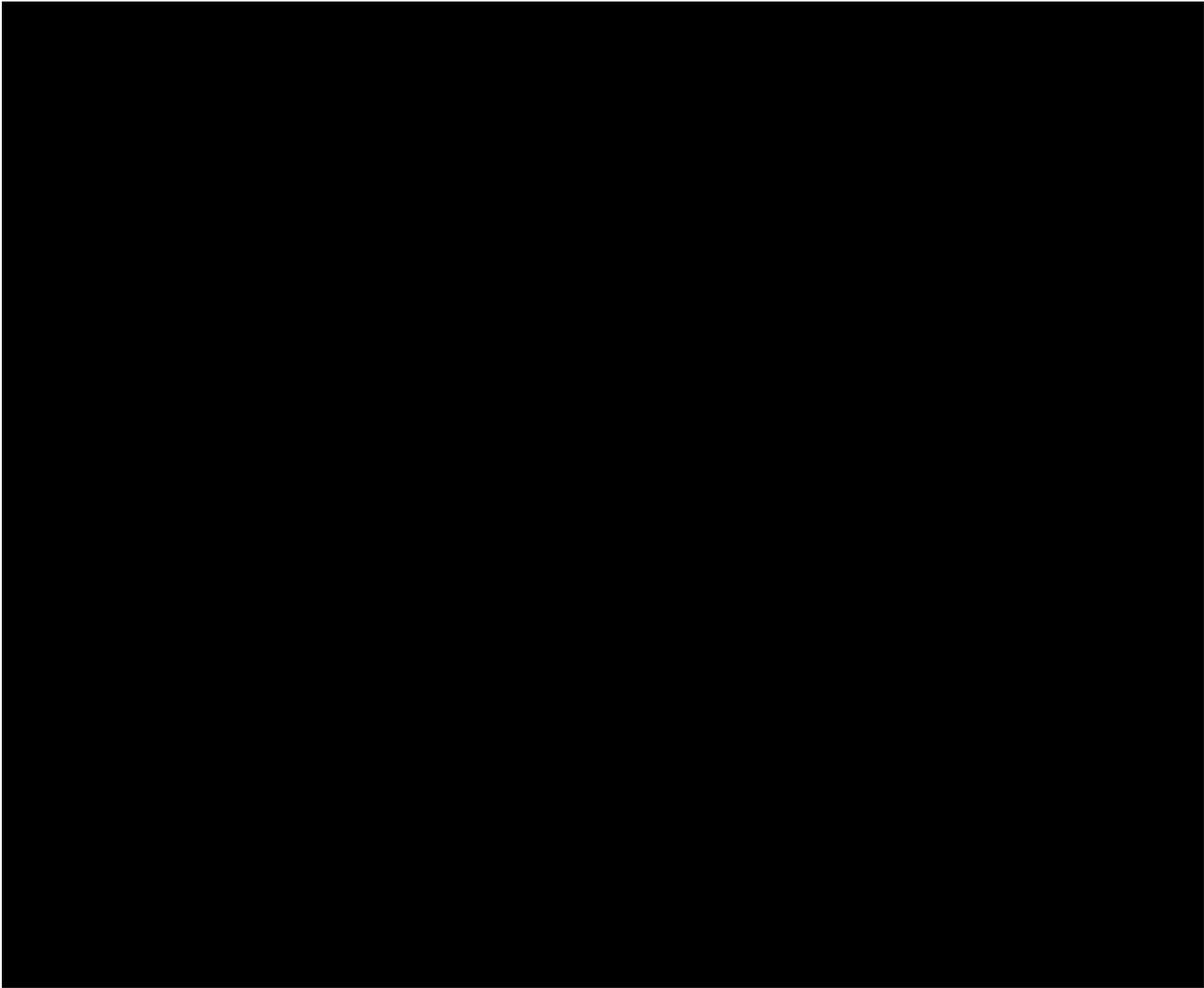








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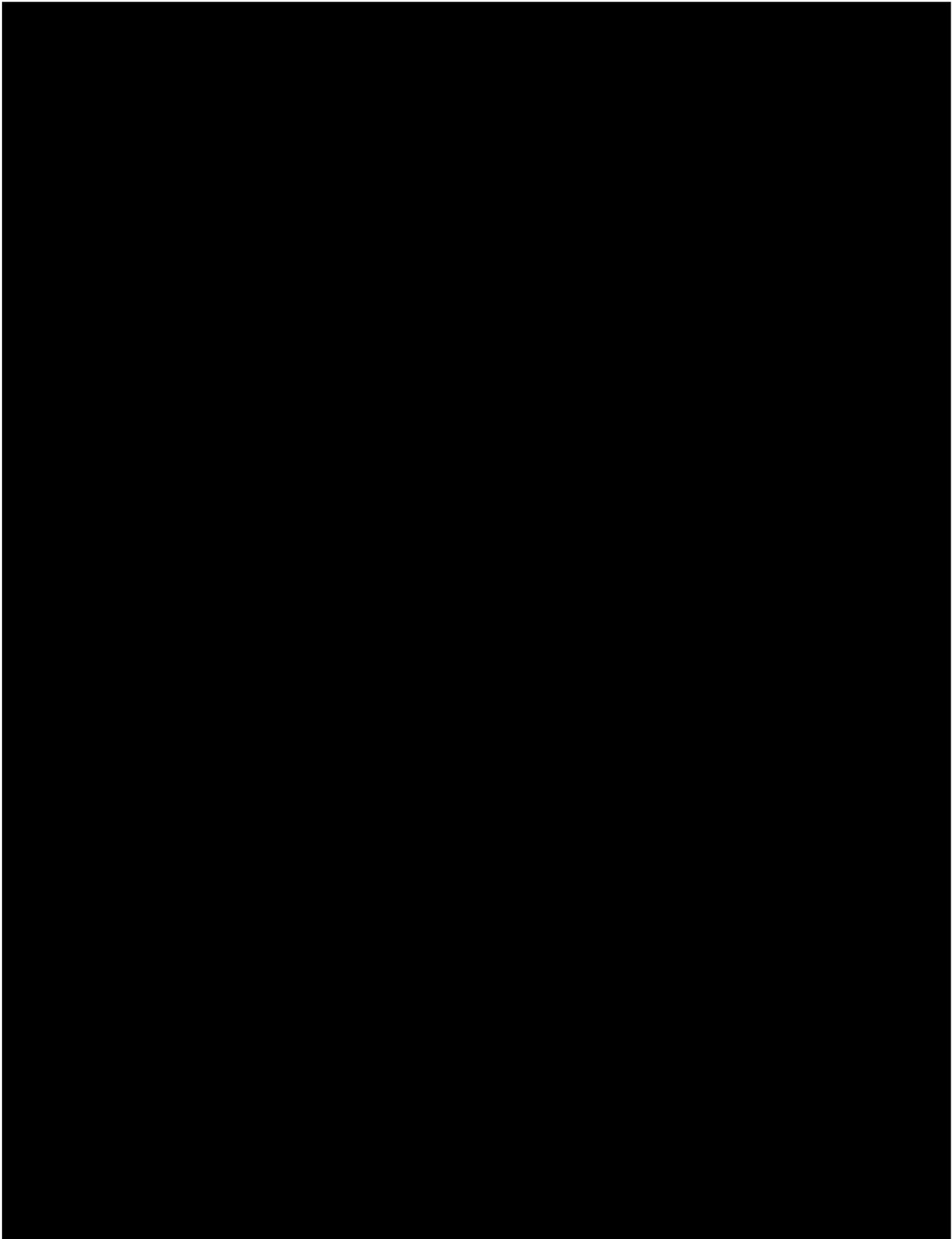


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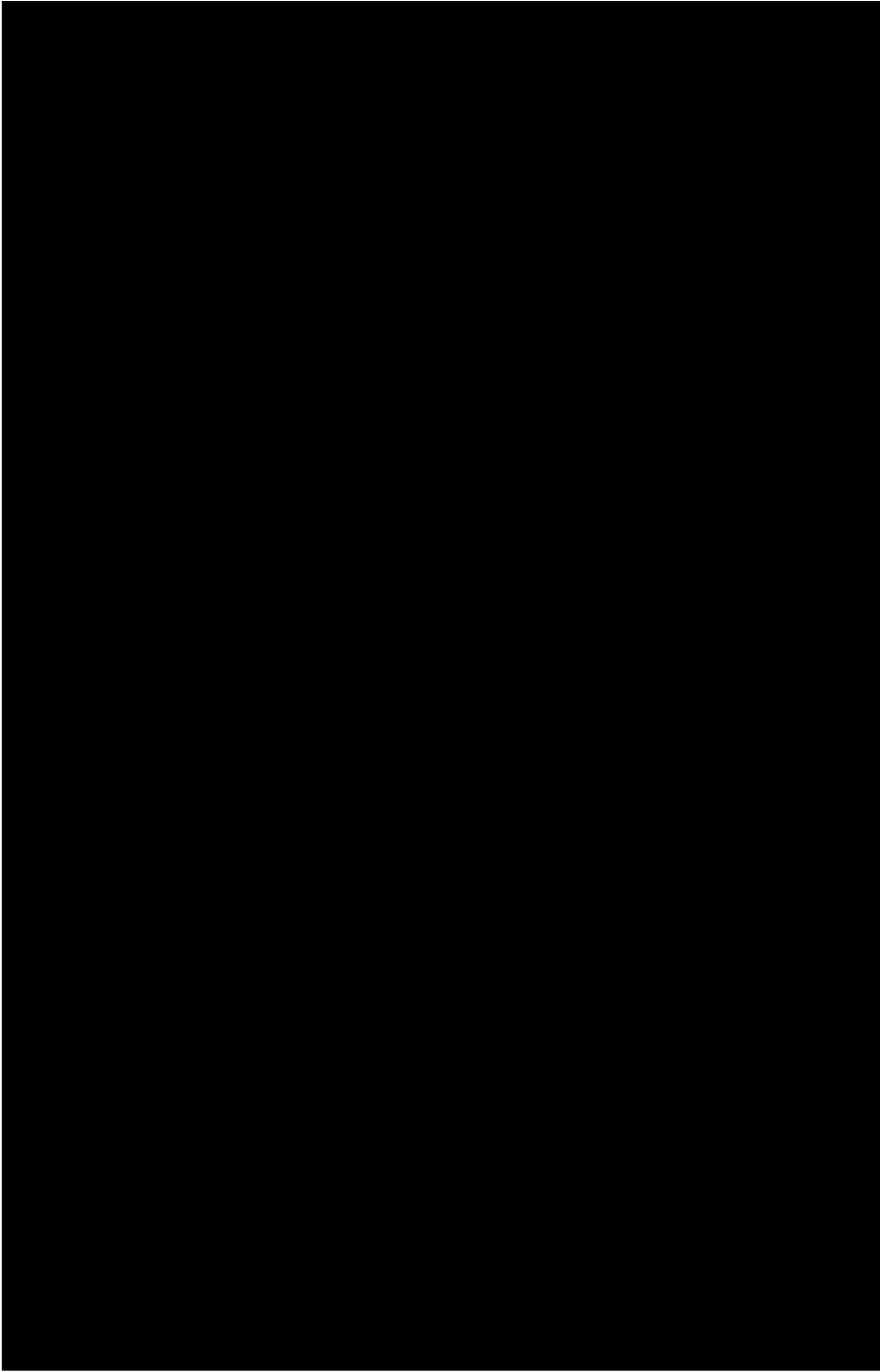
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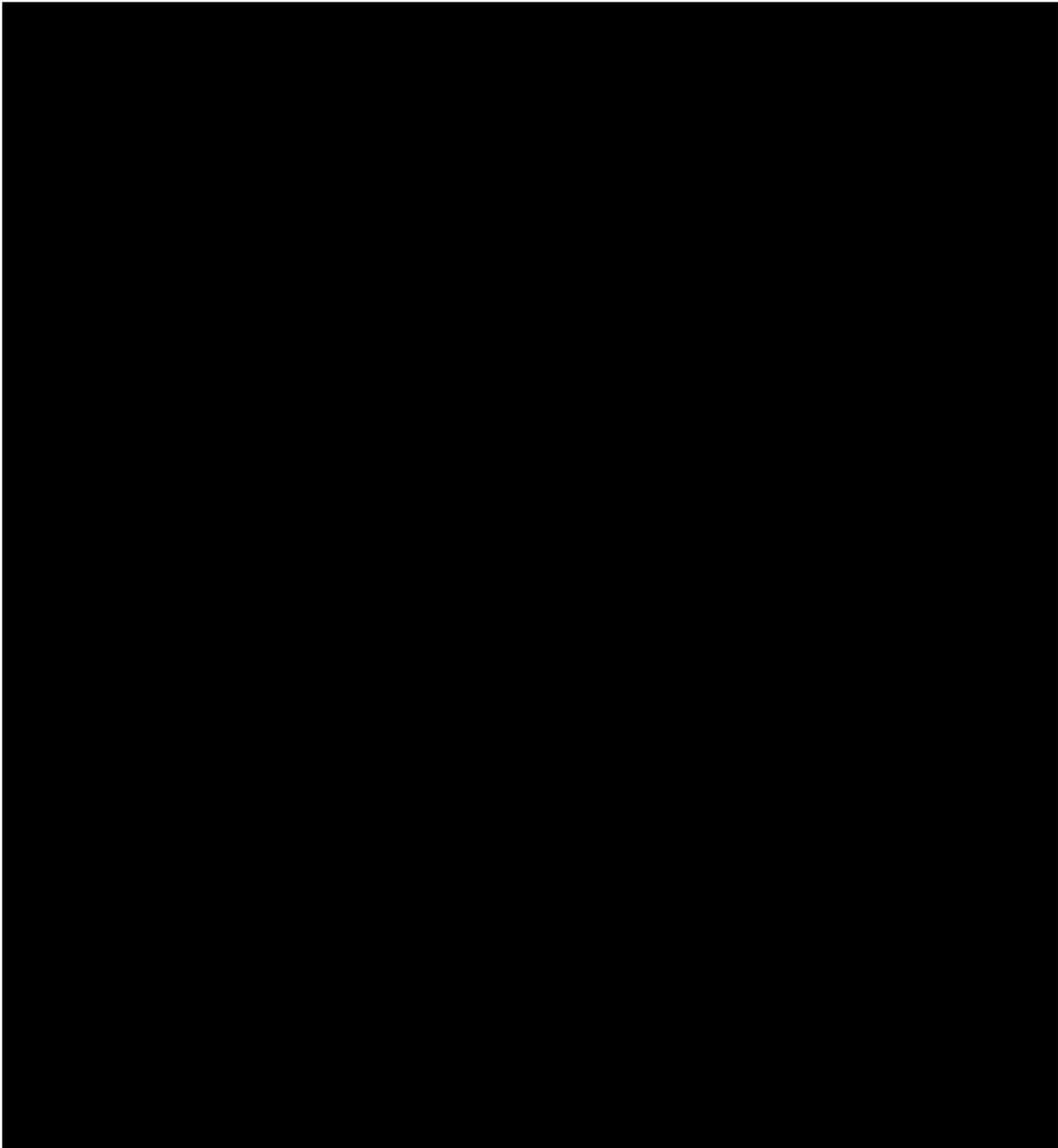
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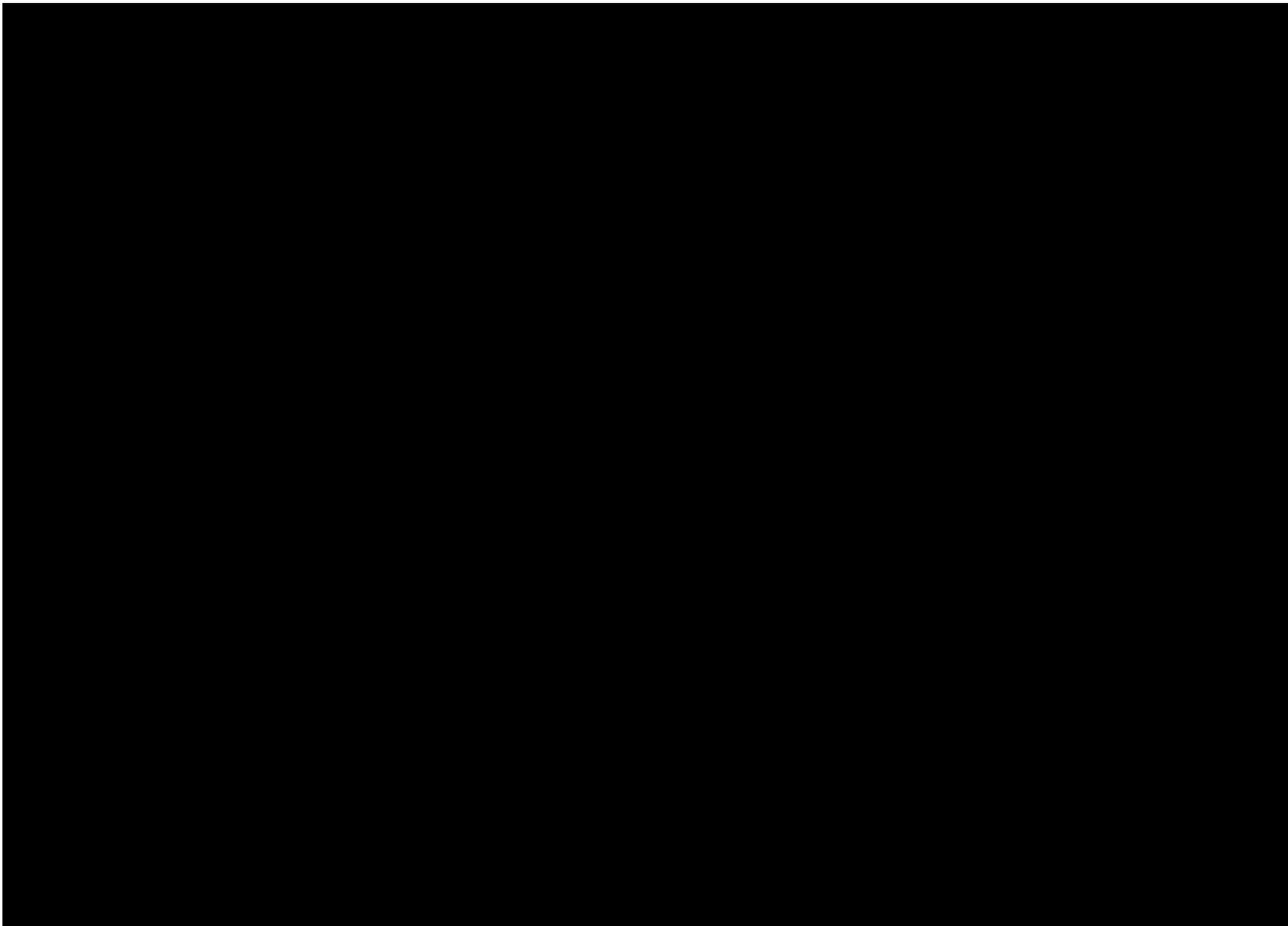


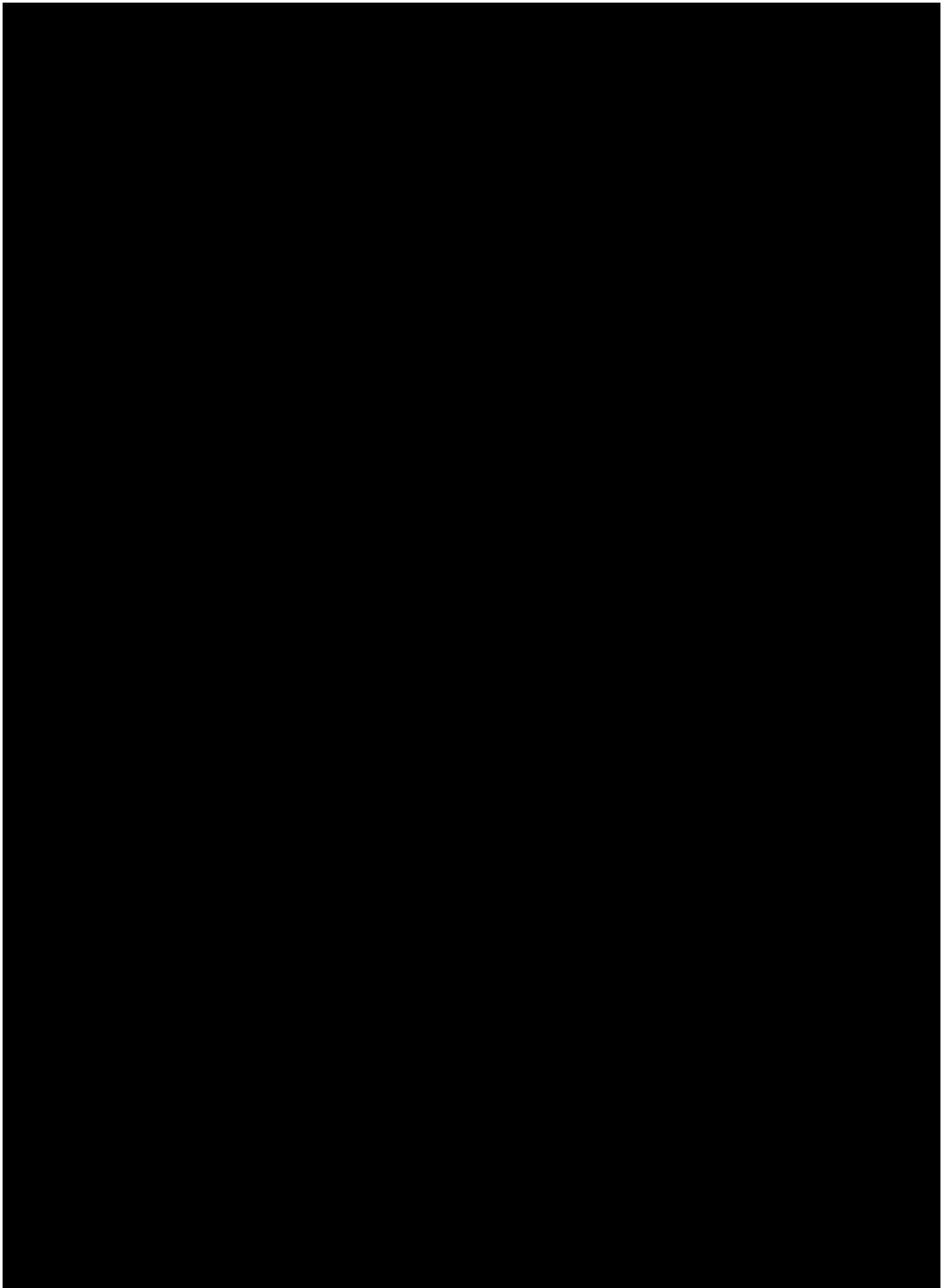


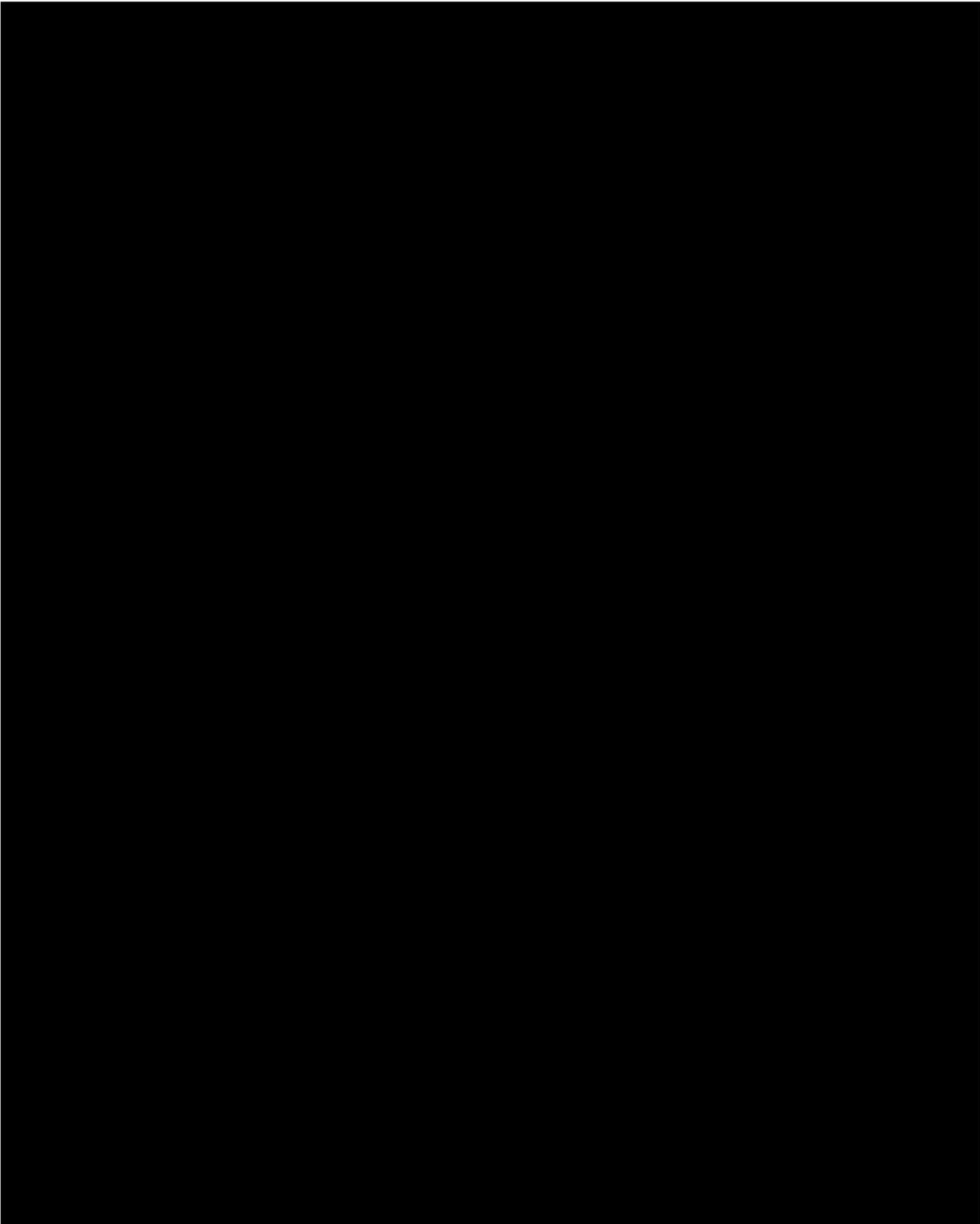


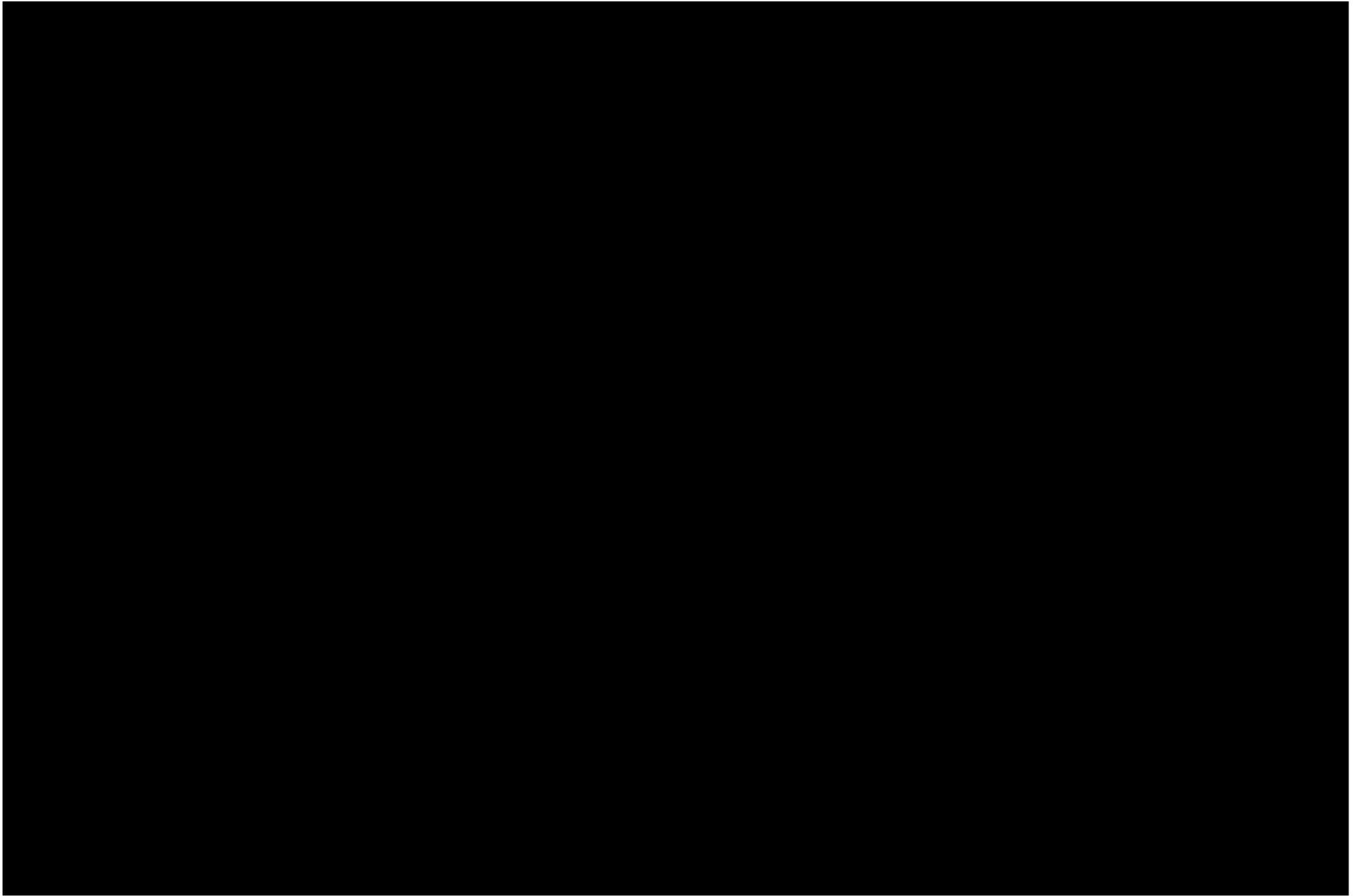


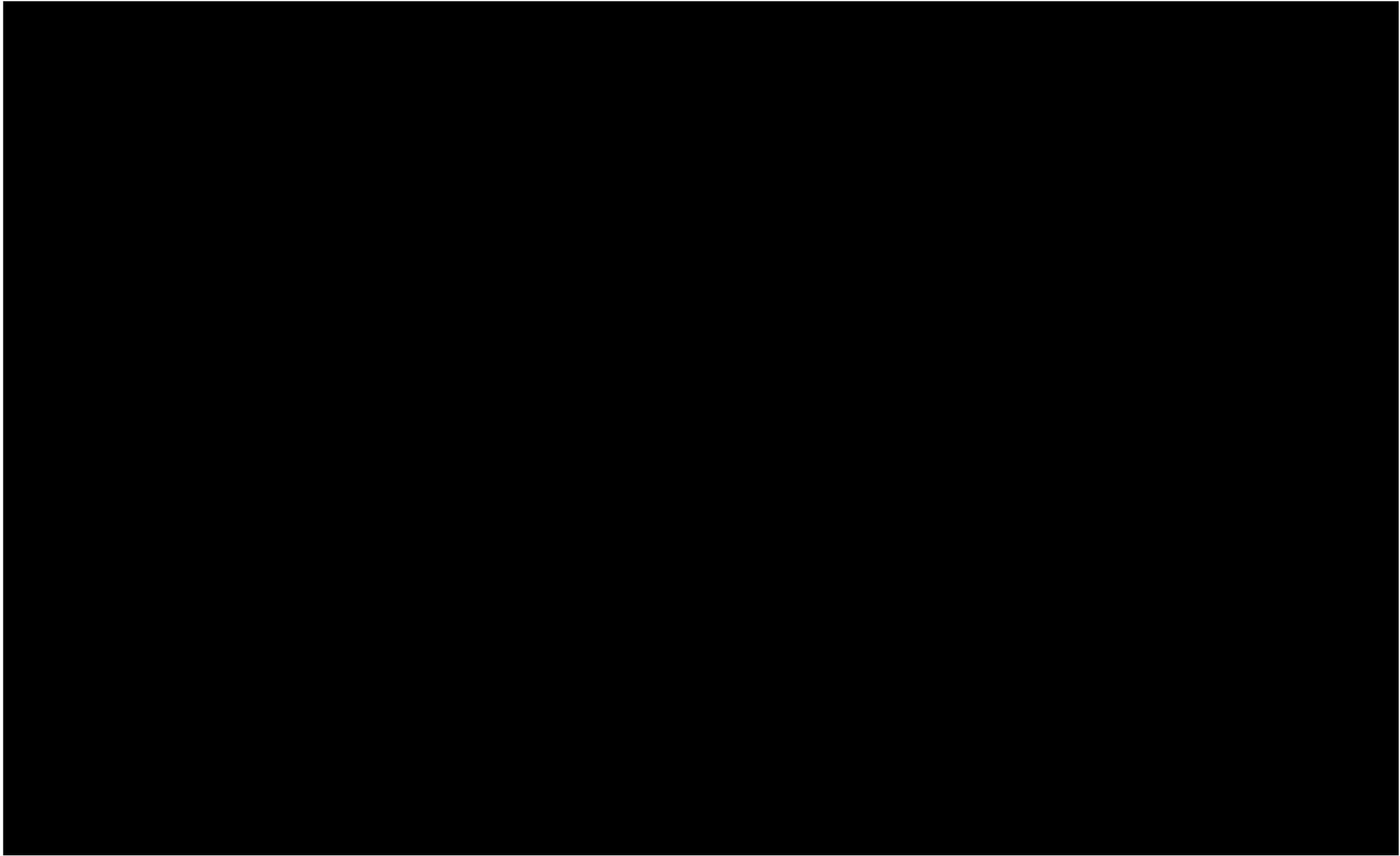




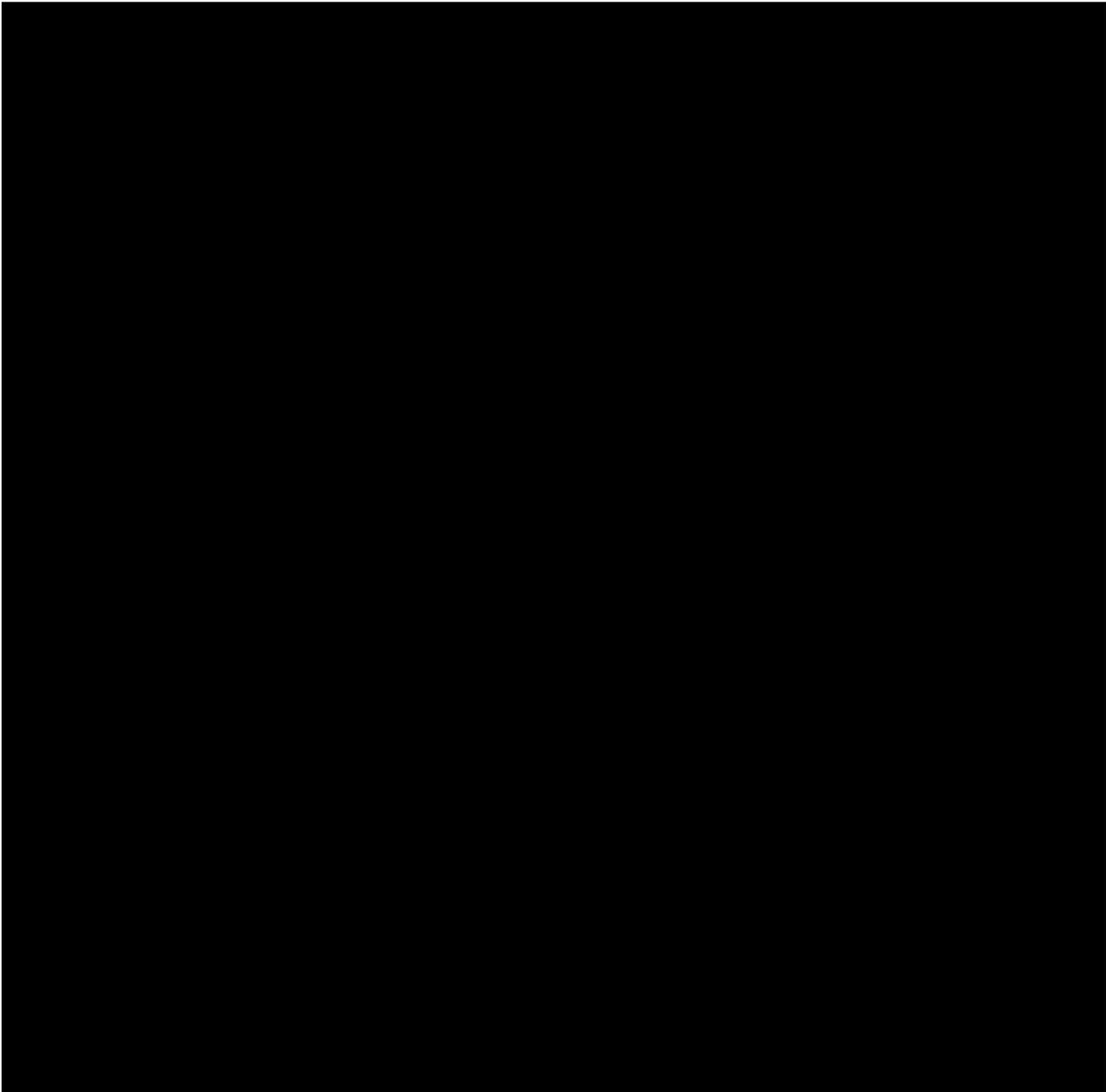




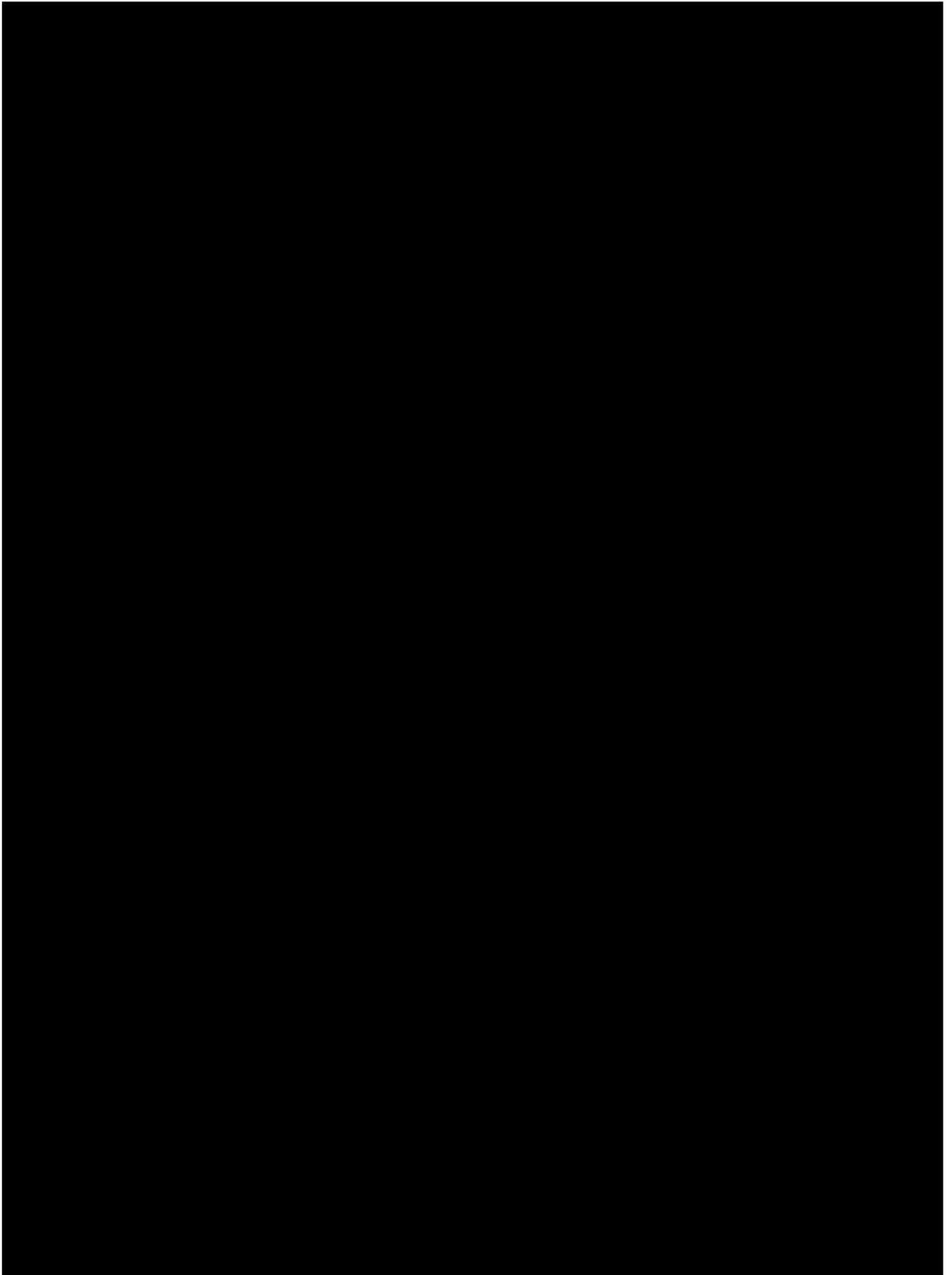


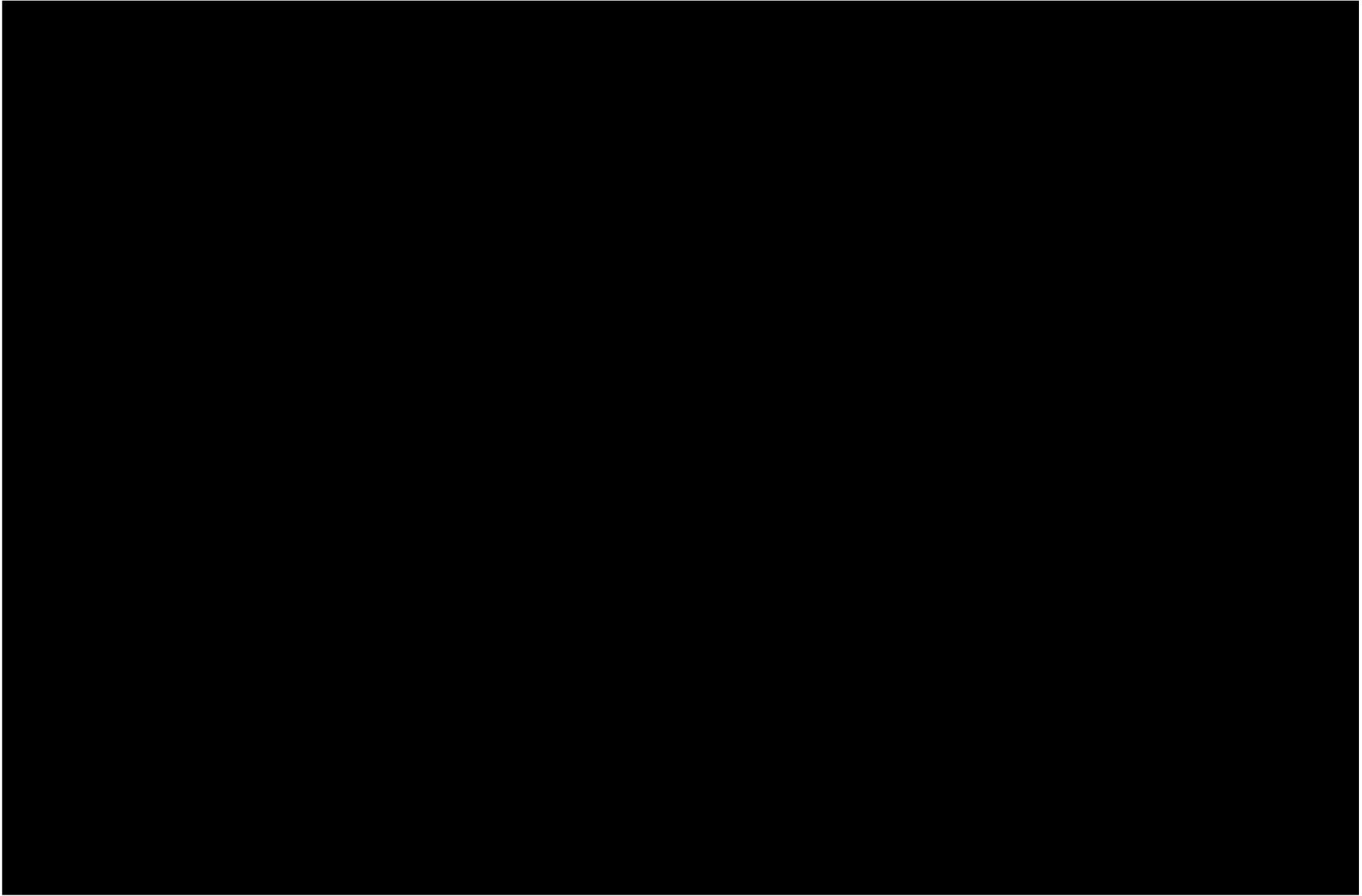


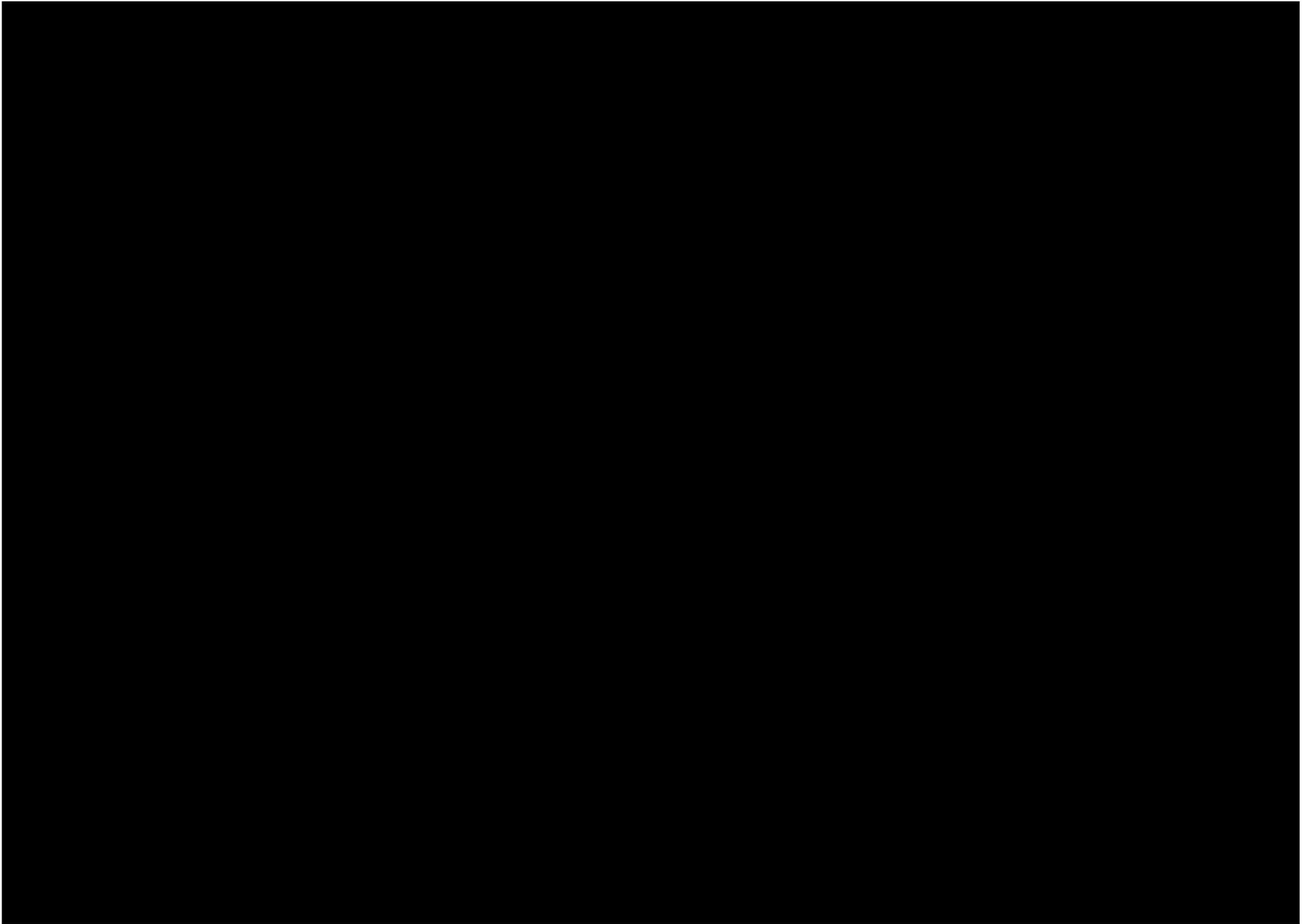


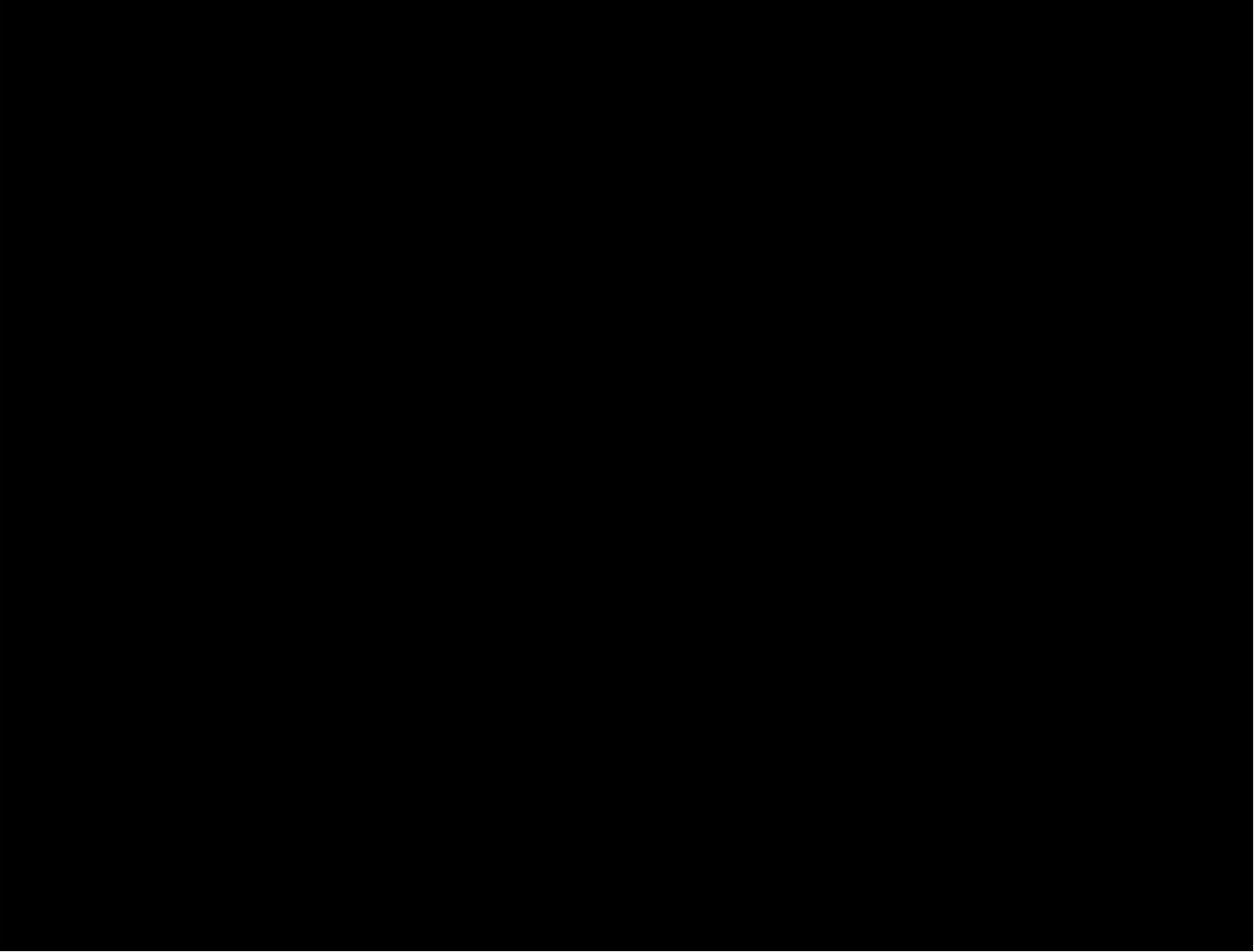


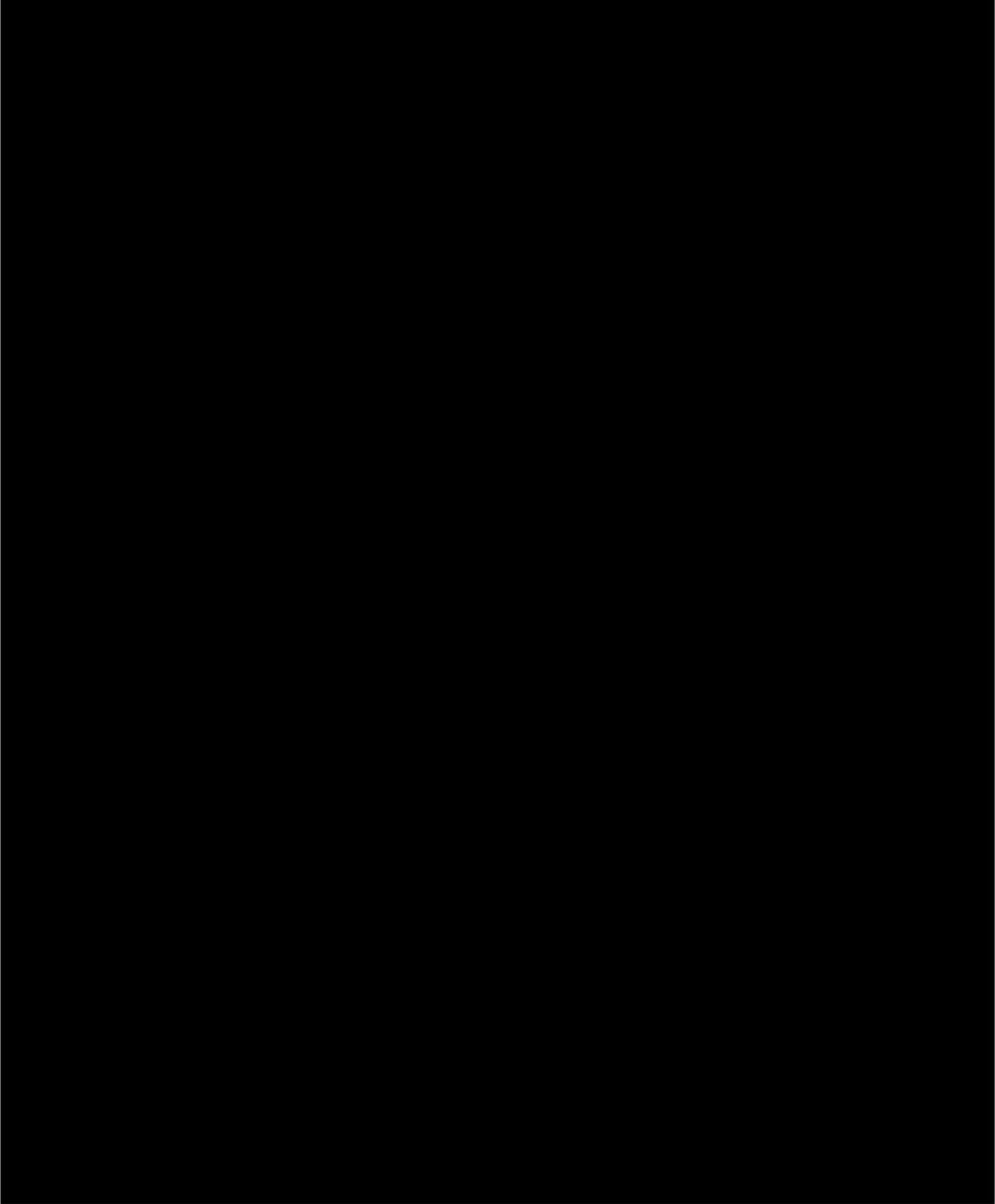






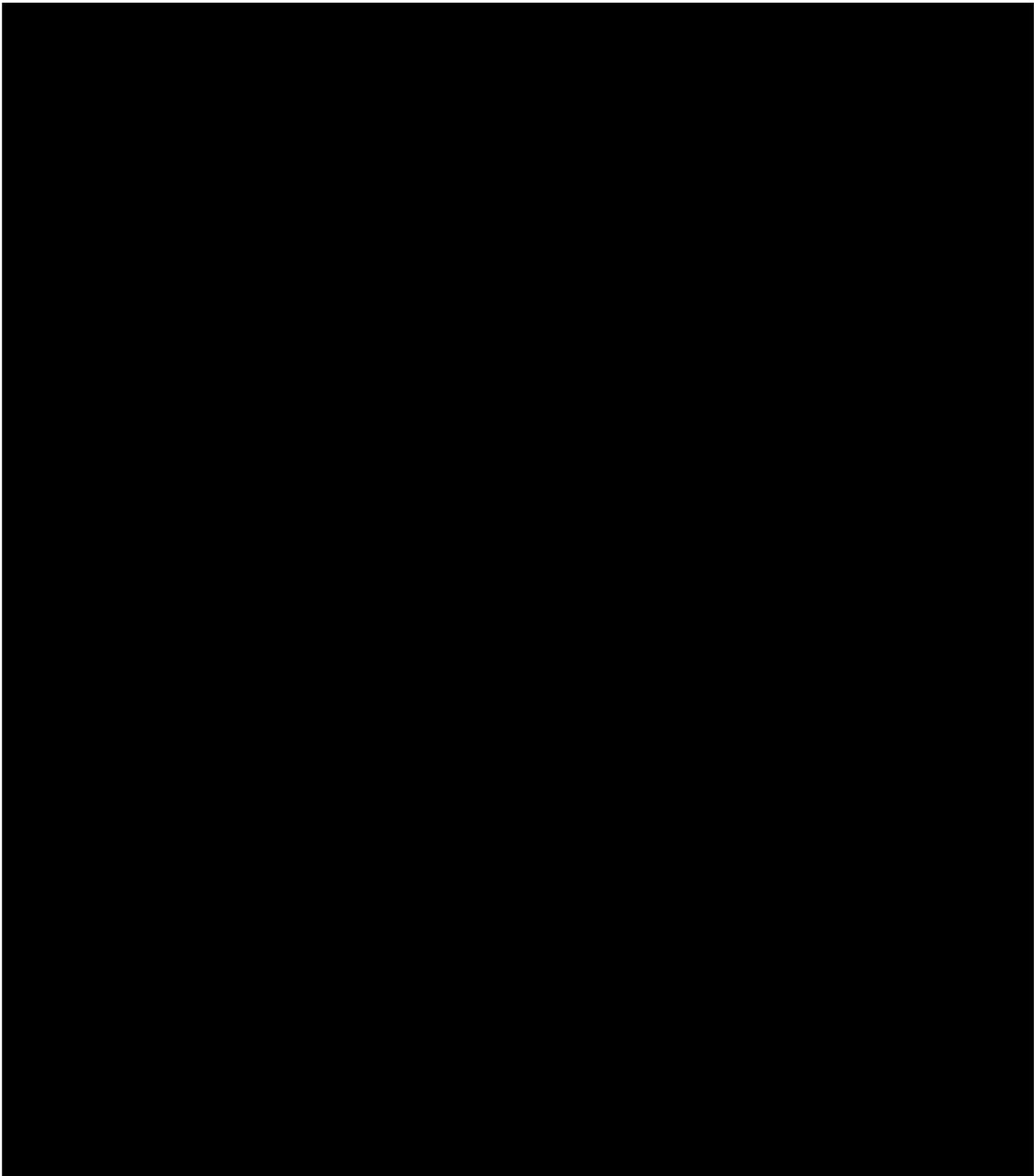


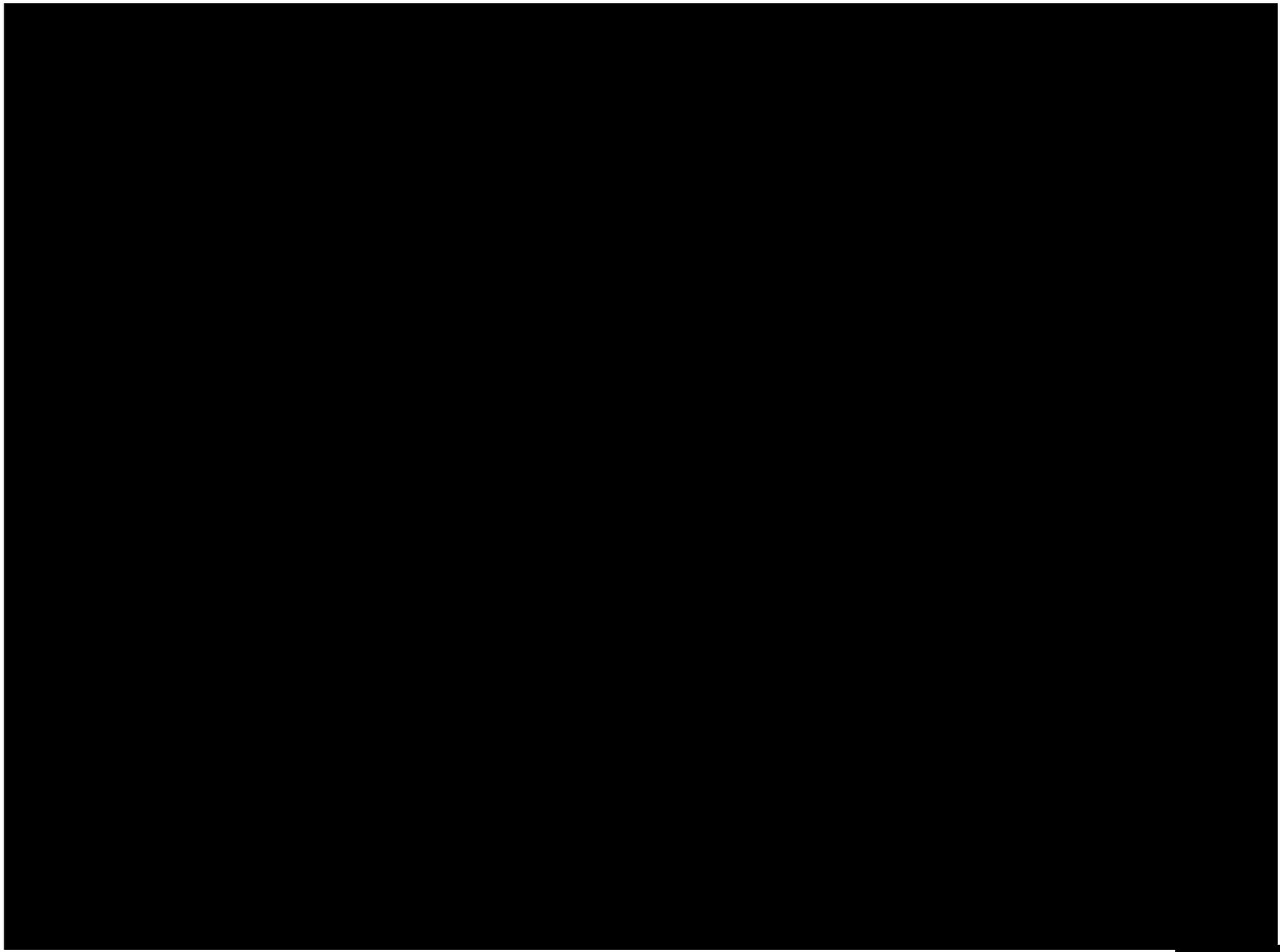




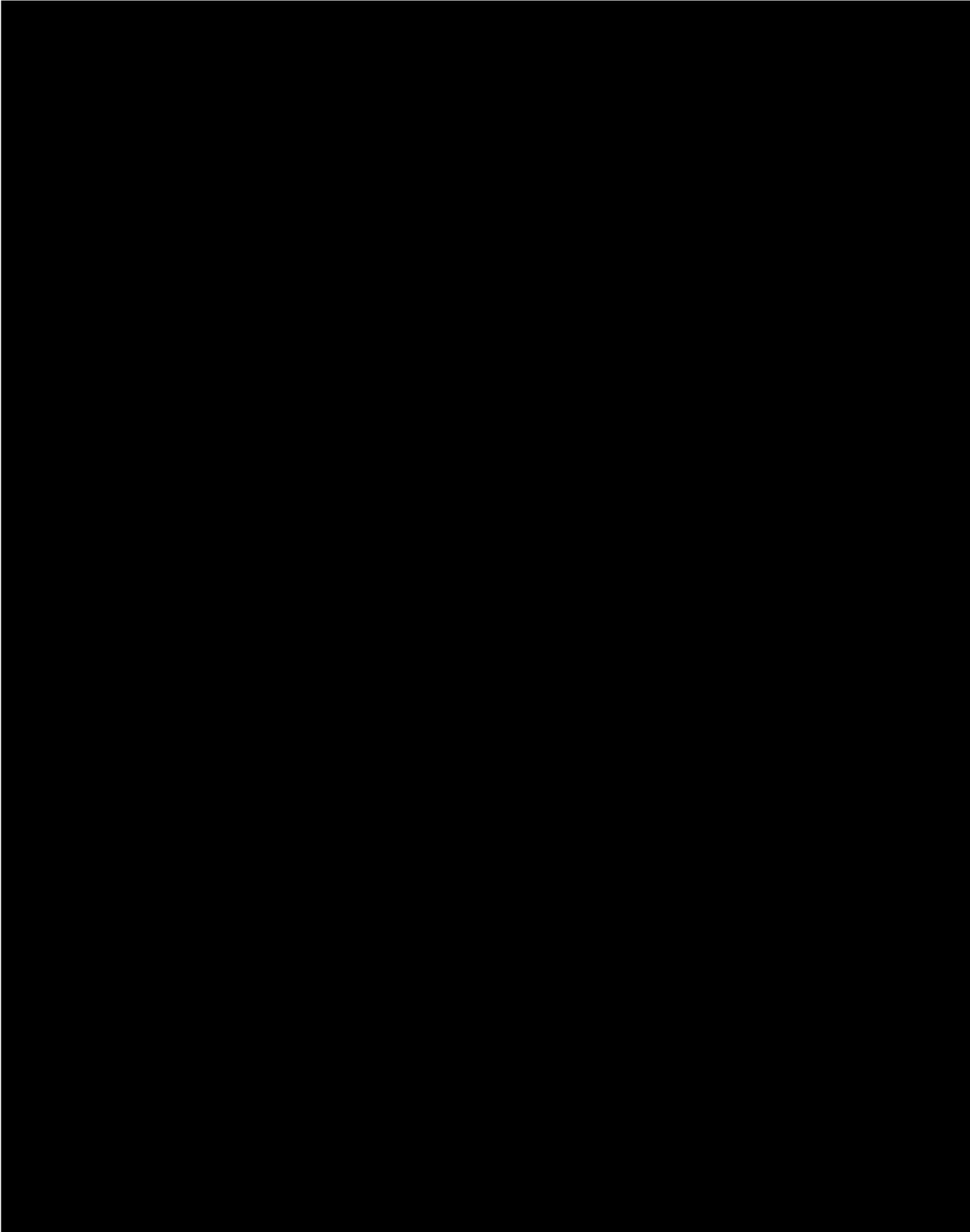
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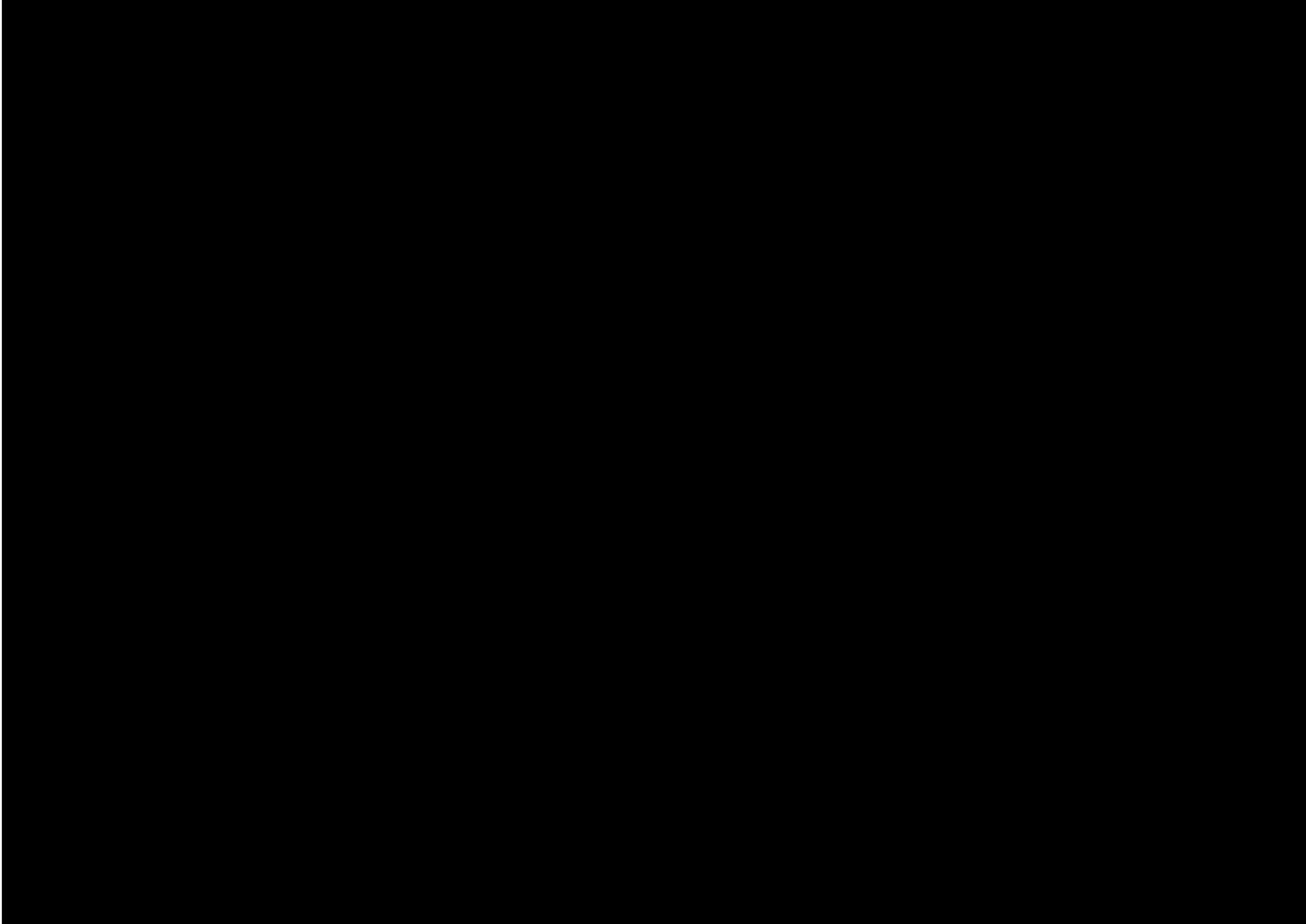


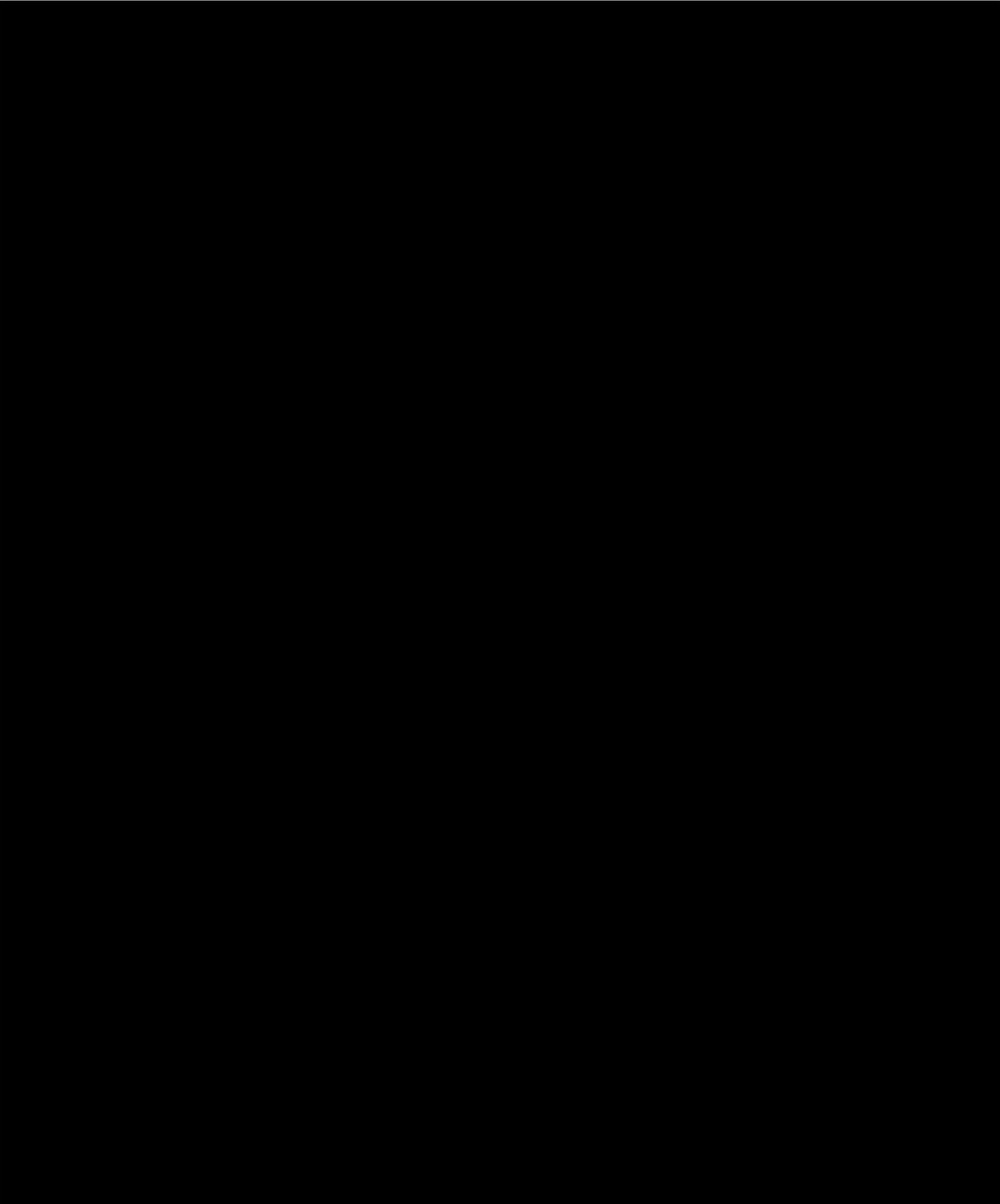


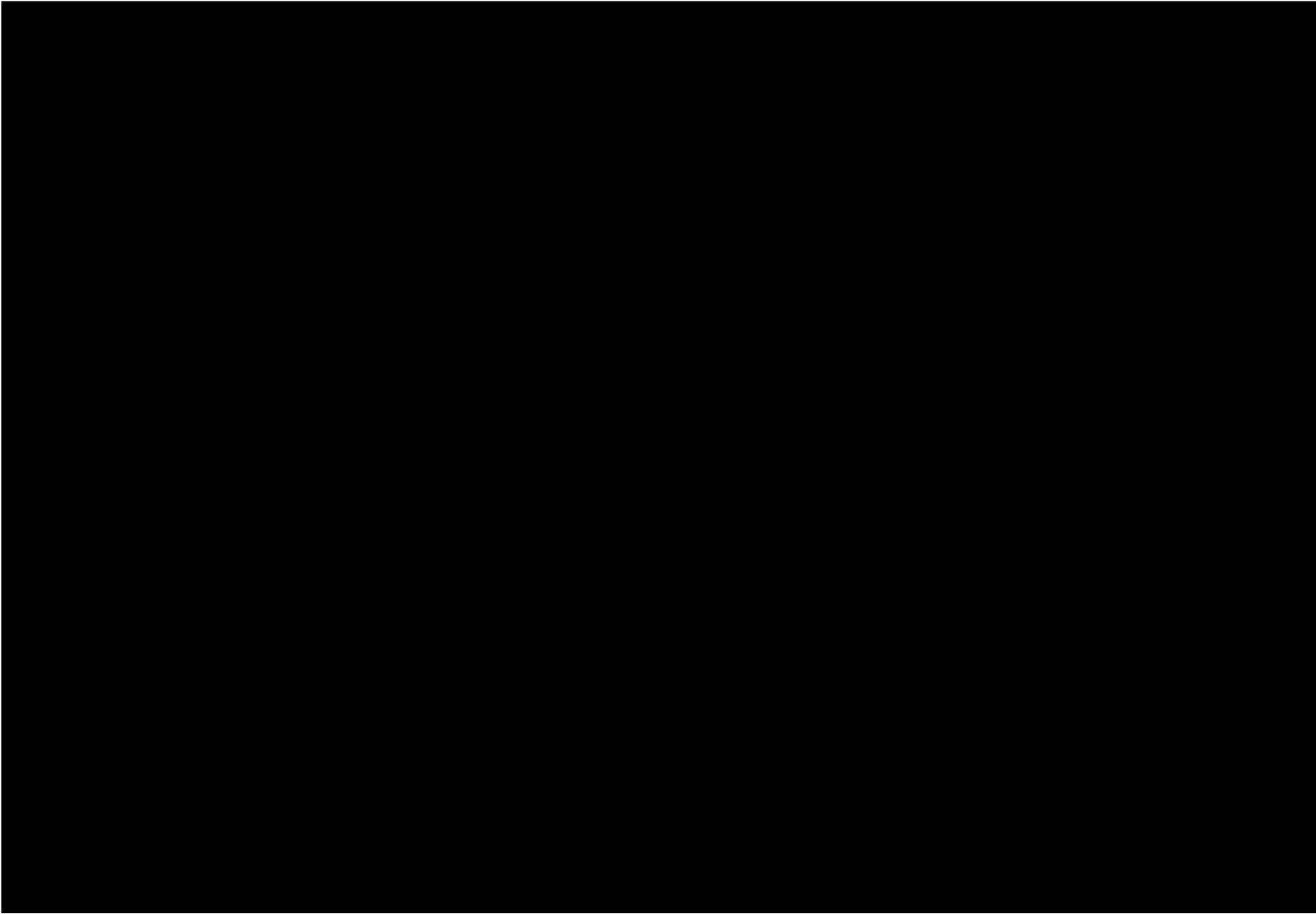


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5.4 Condition of the Plant Communities

Based on the vegetation condition scale adapted from Kieghery (1994) and Trudgen (1998) (Appendix B) the condition of the vegetation within the areas surveyed was “Good”.

6. DISCUSSION

A total of 174 species (including sub-species and varieties) from 31 families and 87 genera were recorded in the survey area. The most prevalent families recorded were *Fabaceae* with 31 species, *Myrtaceae* with 24 and *Proteaceae* with 14 species. (Appendix E)

In the area surveyed:

- No plant species gazetted as Threatened or Declared Rare Flora pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* (WA) was recorded.
- No plant species listed as Threatened pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (Department of Sustainability, Water, Population and Community) was recorded.
- Nine species listed as a Priority species by the Department of Biodiversity Conservation and Attractions (2018) were recorded: *Persoonia leucopogon* (P1), *Newcastelia insignis* (P2), *Thryptomene eremaea* (P2), *Acacia eremophila* var. *variabilis* (P3), *Alyxia tetanifolia* (P3), *Homalocalyx grandiflorus* (P3), *Hysterobaeckea ochropetala* subsp. *cometes* (P3), *Eucalyptus jutsonii* subsp. *jutsonii* (P4) and *Grevillea secunda* (P4).
- No Threatened Ecological Communities listed by the Department of Parks and Wildlife (2017) were recorded.
- No Priority Ecological Communities listed by the Department of Parks and Wildlife (2017) were recorded.
- No Threatened Ecological Communities listed by the Australian Government Department of Environment and Energy were identified.
- One area of potentially high ecological significance was located as described in Section 5.3 of this report.

7. RECOMMENDATIONS

The following recommendations are made to protect and enhance the conservation and botanical values in the Comet Vale Project area:

- Ground disturbance and clearing of vegetation should be limited to that which is essential for the development of the project.
- If this project is to proceed and disturbance to the Priority Flora identified is unavoidable, an application to impact Priority Flora should be submitted to the Regional DBCA office.
- Retain and stockpile cleared vegetation for use in the later rehabilitation of disturbed areas.
- Where possible, maintain existing drainage systems, e.g. do not allow roads etc. to disrupt or divert historic flow patterns.
- Apply weed control measures.

8. PARTICIPANTS

Mr Phil Stanley Dip Cart; Dip Hort and Ms Paula Pavlovic BA, MA of Goldfields Landcare Services carried out the survey work, plant identification, mapping and report preparation for this project. Licenses for Scientific or Other Prescribed Purposes Numbers: SL012108 and SL012109.

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Appendix A1: Conservation Codes for Western Australian Flora and Fauna (Department of Biodiversity, Conservation and Attractions, 2016)

Specially protected fauna and flora Code	Description
T	<p>Threatened species</p> <p>Published as Specially Protected under the Wildlife Conservation Act 1950, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora). Threatened fauna is that subset of ‘Specially Protected Fauna’ declared to be ‘likely to become extinct’ pursuant to section 14(4) of the Wildlife Conservation Act. Threatened flora is flora that has been declared to be ‘likely to become extinct or is rare, or otherwise in need of special protection’, pursuant to section 23F(2) of the Wildlife Conservation Act. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
CR	<p>Critically endangered species</p> <p>Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
EN	<p>Endangered species</p> <p>Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
VU	<p>Vulnerable species</p> <p>Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
EX	<p>Presumed extinct species</p> <p>Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.</p>

Appendix A1: Conservation Codes for Western Australian Flora and Fauna (Department of Biodiversity, Conservation and Attractions, 2016) *continued*

Specially protected fauna and flora Code	Description
<p style="text-align: center;">IA</p>	<p>Migratory birds protected under an international agreement</p> <p>Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.</p>
<p style="text-align: center;">CD</p>	<p>Conservation dependent fauna</p> <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.</p>
<p style="text-align: center;">OS</p>	<p>Other specially protected fauna</p> <p>Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.</p>

Appendix A1: Conservation Codes for Western Australian Flora and Fauna
(Department of Biodiversity, Conservation and Attractions, 2016) *continued*

Priority Species Codes	Description
P1	<p>Priority 1: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey</p>
P2	<p>Priority 2: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
P3	<p>Priority 3: Poorly-known species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
P4	<p>Priority 4: Rare, Near Threatened and other species in need of monitoring</p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

Appendix A2: Definition of Threatened Flora Species (Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth))

Category Code	Category
Ex	<p>Extinct</p> <p>Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.</p>
ExW	<p>Extinct in the Wild</p> <p>Species which is known only to survive in cultivation, in captivity or as a naturalized population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.</p>
CE	<p>Critically Endangered</p> <p>Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.</p>
E	<p>Endangered</p> <p>Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.</p>
V	<p>Vulnerable</p> <p>Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</p>
CD	<p>Conservation Dependent</p> <p>Species which at a particular time if, at that time: a) the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximized; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.</p>

Appendix A3: Definitions and Criteria of Threatened Ecological Communities
(Department of Environment and Conservation 2013)

Category Code	Category
<p align="center">PD</p>	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:</p> <p>(i) Records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or;</p> <p>(ii) All occurrences recorded within the last 50 years have since been destroyed.</p>
<p align="center">CE</p>	<p>Critically Endangered</p> <p>A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.</p> <p>B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).</p>
<p align="center">EN</p>	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):</p> <p>A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):</p> <p>i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);</p> <p>ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.</p> <p>B) Current distribution is limited, and one or more of the following apply (i, ii or iii):</p> <p>i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);</p> <p>ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;</p> <p>iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.</p> <p>C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).</p>
<p align="center">VU</p>	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):</p> <p>A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.</p> <p>B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.</p> <p>C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.</p>

Appendix A4: Definitions and Criteria for Priority Ecological Communities
(Department of Environment and Conservation 2013)

Category Code	Category
P1	<p>Poorly-known ecological communities:</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2	<p>Poorly-known ecological communities:</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3	<p>Poorly known ecological communities:</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(iii) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Appendix B: Vegetation Condition Scale for Eremaean and Northern Botanical Provinces
(Keighery 1994, Trudgen 1988)

Excellent - Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.

Very Good - Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.

Good- More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.

Poor - Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.

Degraded – Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.

Completely Degraded – Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or ‘parkland cleared’ with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix C: Vegetation Classification System

Form/Height	Canopy Cover				
	Dense 70-100%	Mid-Dense 30-70%	Sparse 10-30%	Very Sparse 2-10%	Scattered <2%
Trees >30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland	Scattered Tall Trees
Trees 15-30m	Dense Forest	Forest	Woodland	Open woodland	Scattered Trees
Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A	Scattered Low Trees A
Trees <5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B	Scattered Low Trees B
Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee	Scattered Tree Mallees
Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee	Scattered Shrub Mallees
Shrubs >2m	Dense Thicket	Thicket	Scrub	Open Scrub	Scattered Tall Shrubs
Shrubs 1-2m	Dense Heath	Heath	Low Scrub	Open Low Scrub	Scattered Shrubs
Shrubs <1m	Dense Low Heath	Low Heath	Dwarf Scrub	Open Dwarf Scrub	Scattered Low Shrubs
Mat plants, Bunch	Dense Mat Plants/	Mat Plants/Grass/	Open Mat Plants/	Very Open Mat Plants/	Scattered Mat Plants/
Grass, Hummock	Grass/Hummock	Hummock Grass/	Grass/Hummock	Grass/Hummock Grass/	Grasses/Hummock
Grass, Sedges, Herbs	Grass/Sedges/Herbs	Sedges/Herbs	Grass/Sedges/Herbs	Sedges/Herbs	Grasses/Sedges/Herbs

Appendix D: Species of Conservation Significance (T: Threatened; P1, P2, P3, & P4: Priority ratings) recorded from Dept. of Biodiversity Conservation and Attractions data searches. Oct. 2017.

Taxon	ConsStatus	TPFL	TPList	WAHerb	NatureMap
<i>Acacia eremophila</i> var. <i>variabilis</i>	P3			X	X
<i>Alyxia tetanifolia</i>	P3	X		X	X
<i>Calandrinia</i> sp. Goongarrie (F. Obbens, F. Hort & J. Hort FO 18/13)	P1		X	X	X
<i>Calandrinia</i> sp. Menzies (F. Hort et al. FH 4100)	P3		X		
<i>Calytrix creswellii</i>	P3		X		
<i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>	P3		X	X	
<i>Elatine macrocalyx</i>	P3			X	X
<i>Eleocharis papillosa</i>	P3		X	X	X
<i>Eremophila mirabilis</i>	P2		X		
<i>Eremophila praecox</i>	P1		X		
<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	T		X		
<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	P4		X	X	X
<i>Eutaxia actinophylla</i>	P3		X		
<i>Eutaxia nanophylla</i>	P3		X		
<i>Eutaxia rubricarina</i>	P3			X	X
<i>Grevillea erectiloba</i>	P4			X	X
<i>Gunniopsis propinqua</i>	P3		X		
<i>Hakea rigida</i>	P2		X		
<i>Homalocalyx grandiflorus</i>	P3	X	X	X	X
<i>Malleostemon</i> sp. Adelong (G.J. Keighery 11825)	P2		X	X	X
<i>Melichrus</i> sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	P3		X		
<i>Neurachne annularis</i>	P3		X		X
<i>Newcastelia insignis</i>	P2	X	X	X	X
<i>Notisia intonsa</i>	P3		X		
<i>Persoonia leucopogon</i>	P1	X	X	X	
<i>Philothea coateana</i>	P3	X	X	X	X
<i>Philothea deserti</i> subsp. <i>brevifolia</i>	P3		X		
<i>Pterostylis elegantissima</i>	P1		X		
<i>Ptilotus chortophytus</i>	P1			X	X
<i>Ptilotus rigidus</i>	P1			X	X
<i>Sowerbaea multicaulis</i>	P4		X	X	X
<i>Tecticornia flabelliformis</i>	P1		X		
<i>Thryptomene eremaea</i>	P2		X	X	X

Appendix E: Plant Species List by Vegetation Type.

Key: **FRAN**- Frankenia Low Shrubland; **GNEW**-Greenstone Hill Eucalypt Woodland; **SACS**-Sandplain Acacia Shrubland; **SAGS**- Sand Plain-Gum Stratum; **SDSH**-Sand Dune Shrubland; **MUWA**-Mulga Wanderrrie Grassy Shrubland

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
<i>Aizoaceae</i>	<i>Gunniopsis</i>	<i>quadrifida</i>	X	X		X		
<i>Aizoaceae</i>	<i>Gunniopsis</i>	<i>rodwayi</i>	X					
<i>Amaranthaceae</i>	<i>Ptilotus</i>	<i>drummondii</i>				X		
<i>Amaranthaceae</i>	<i>Ptilotus</i>	<i>obovatus</i>				X		X
<i>Amaranthaceae</i>	<i>Surreya</i>	<i>diandra</i>	X					
<i>Apocynaceae</i>	<i>Alyxia</i>	<i>buxifolia</i>		X		X	X	X
<i>Apocynaceae</i>	<i>Alyxia</i>	<i>tetanifolia (P3)</i>				X	X	
<i>Apocynaceae</i>	<i>Marsdenia</i>	<i>australis</i>				X	X	
<i>Araliaceae</i>	<i>Neosciadium</i>	<i>glochidiatum</i>	X					
<i>Asparagaceae</i>	<i>Thysanotus</i>	<i>manglesianus</i>			X			X
<i>Asteraceae</i>	<i>Calocephalus</i>	<i>francisii</i>	X					
<i>Asteraceae</i>	<i>Cratystylis</i>	<i>subspinescens</i>				X		
<i>Asteraceae</i>	<i>Olearia</i>	<i>lanuginosa</i>				X	X	
<i>Asteraceae</i>	<i>Olearia</i>	<i>meullerii</i>		X		X		
<i>Asteraceae</i>	<i>Olearia</i>	<i>ramosissima</i>					X	
<i>Asteraceae</i>	<i>Olearia</i>	<i>stuartii</i>				X		
<i>Asteraceae</i>	<i>Olearia</i>	<i>subspicata</i>			X	X	X	
<i>Boraginaceae</i>	<i>Halgania</i>	<i>cyanea var. Allambi Station</i>		X		X		
<i>Casuarinaceae</i>	<i>Allocasuarina</i>	<i>helmsii</i>		X				
<i>Casuarinaceae</i>	<i>Allocasuarina</i>	<i>spinosissima</i>				X	X	
<i>Casuarinaceae</i>	<i>Casuarina</i>	<i>pauper</i>		X		X		

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
Casuarinaceae	Casuarina	pauper		X		X		
Chenopodiaceae	Atriplex	bunburyana	X			X		
Chenopodiaceae	Atriplex	nana	X					
Chenopodiaceae	Enchylaena	tomentosa				X		
Chenopodiaceae	Maireana	amoena	X			X		
Chenopodiaceae	Maireana	glomerifolia				X		
Chenopodiaceae	Maireana	sedifolia	X					
Chenopodiaceae	Rhagodia	drummondii	X	X				
Chenopodiaceae	Salsola	australis				X		
Chenopodiaceae	Sclerolaena	parviflora				X		
Chenopodiaceae	Tecticornia	indica subsp. bidens	X					
Chenopodiaceae	Tecticornia	peltata	X					
Chenopodiaceae	Tecticornia	pergranulata subsp. pergranulata	X					
Chenopodiaceae	Tecticornia	pterygosperma subsp. pterygosperma	X					
Chenopodiaceae	Tecticornia	undulata	X					
Cupressaceae	Callitris	columellaris	X		X	X	X	
Cyperaceae	Chrysitrix	distigmata C.B.Clarke				X	X	
Cyperaceae	Schoenus	subaphyllus				X	X	
Ericaceae	Leucopogon	sp Coolgardie					X	
Euphorbiaceae	Bertya	dimerostigma				X	X	
Fabaceae	Acacia	accuminata						X
Fabaceae	Acacia	birkittii		X	X	X	X	
Fabaceae	Acacia	caesaneura		X	X	X		X

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
<i>Fabaceae</i>	<i>Acacia</i>	<i>coletioides</i>		X		X	X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>craspedocarpa</i>					X	X
<i>Fabaceae</i>	<i>Acacia</i>	<i>effusifolia</i>		X	X		X	X
<i>Fabaceae</i>	<i>Acacia</i>	<i>eremophila</i> var. <i>variabilis</i> (P3)			X	X	X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>erinaceae</i>		X				
<i>Fabaceae</i>	<i>Acacia</i>	<i>fragilis</i>			X	X		
<i>Fabaceae</i>	<i>Acacia</i>	<i>hemiteles</i>		X	X	X		
<i>Fabaceae</i>	<i>Acacia</i>	<i>incurvaneura</i>			X	X	X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>jennerae</i>			X	X		
<i>Fabaceae</i>	<i>Acacia</i>	<i>ligulata</i>	X	X		X	X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>longispinea</i>		X	X	X	X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>murrayana</i>			X			
<i>Fabaceae</i>	<i>Acacia</i>	<i>oswaldii</i>		X				
<i>Fabaceae</i>	<i>Acacia</i>	<i>prainii</i>		X	X	X		
<i>Fabaceae</i>	<i>Acacia</i>	<i>quadrimarginea</i>					X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>ramulosa</i> var. <i>ramulosa</i>	X	X	X	X	X	X
<i>Fabaceae</i>	<i>Acacia</i>	<i>sibina</i>					X	
<i>Fabaceae</i>	<i>Acacia</i>	<i>sibirica</i>						X
<i>Fabaceae</i>	<i>Acacia</i>	<i>steadmanii</i> subsp. <i>steadmanii</i>				X		
<i>Fabaceae</i>	<i>Acacia</i>	<i>tetragonaphylla</i>		X			X	X
<i>Fabaceae</i>	<i>Bossiaea</i>	<i>walkeri</i>		X		X		
<i>Fabaceae</i>	<i>Daviesia</i>	<i>grahamii</i>				X		

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	NEW	SACS	SAGS	SDSH	MUWA
<i>Fabaceae</i>	<i>Jacksonia</i>	<i>arida</i>	X	X		X	X	
<i>Fabaceae</i>	<i>Leptosema</i>	<i>aculeatum</i>				X	X	
<i>Fabaceae</i>	<i>Leptosema</i>	<i>chambersii</i>					X	
<i>Fabaceae</i>	<i>Mirbelia</i>	<i>rhagodioides</i>		X		X	X	
<i>Fabaceae</i>	<i>Senna</i>	<i>artemisioides</i> subsp. <i>filifolia</i>		X		X	X	X
<i>Fabaceae</i>	<i>Templetonia</i>	<i>incrassata</i>		X				
<i>Frankeniaceae</i>	<i>Frankenia</i>	<i>sessilis</i> var. <i>sessilis</i>	X					
<i>Goodeniaceae</i>	<i>Scaevola</i>	<i>spinescens</i>		X		X	X	X
<i>Gyrostemonaceae</i>	<i>Gyrostemon</i>	<i>ramulosus</i>				X	X	
<i>Lamiaceae</i>	<i>Dampiera</i>	<i>lavandulaceae</i>				X		
<i>Lamiaceae</i>	<i>Newcastelia</i>	<i>insignis</i> (P2)				X	X	
<i>Lamiaceae</i>	<i>Pityrodia</i>	<i>lepidota</i>					X	
<i>Lamiaceae</i>	<i>Prostanthera</i>	<i>althoferi</i> subsp. <i>althoferi</i>		X	X			X
<i>Lamiaceae</i>	<i>Prostanthera</i>	<i>campbellii</i>			X	X	X	X
<i>Lamiaceae</i>	<i>Prostanthera</i>	<i>grylloana</i>						X
<i>Lamiaceae</i>	<i>Spartothamnella</i>	<i>teucriflora</i>				X		
<i>Lamiaceae</i>	<i>Westringea</i>	<i>cephalantha</i>		X		X	X	
<i>Lamiaceae</i>	<i>Westringea</i>	<i>rigida</i>		X	X	X	X	
<i>Loranthaceae</i>	<i>Amyema</i>	<i>fitzgeraldii</i>				X	X	
<i>Malvaceae</i>	<i>Brachychiton</i>	<i>gregorii</i>					X	X
<i>Malvaceae</i>	<i>Hannafordia</i>	<i>quadrivalvis</i> F. Muell. subsp. <i>quadrivalvis</i>				X		

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
Malvaceae	<i>Seringia</i>	<i>velutina</i>					X	
Myrtaceae	<i>Aluta</i>	<i>aspera</i> subsp. <i>aspera</i>		X	X		X	X
Myrtaceae	<i>Calytrix</i>	<i>birdii</i>				X	X	
Myrtaceae	<i>Calytrix</i>	<i>watsonii</i>				X	X	
Myrtaceae	<i>Enekbatus</i>	<i>cryptandroides</i>			X			
Myrtaceae	<i>Eucalyptus</i>	<i>ceratocorys</i>				X	X	
Myrtaceae	<i>Eucalyptus</i>	<i>clelandiorum</i>		X				
Myrtaceae	<i>Eucalyptus</i>	<i>concinna</i>		X		X		X
Myrtaceae	<i>Eucalyptus</i>	<i>jutsonii</i> subsp. <i>jutsonii</i> (P4)			X	X	X	
Myrtaceae	<i>Eucalyptus</i>	<i>leptopoda</i>		X	X	X	X	X
Myrtaceae	<i>Eucalyptus</i>	<i>moderata</i>			X	X		
Myrtaceae	<i>Eucalyptus</i>	<i>oldfieldii</i>		X	X	X	X	
Myrtaceae	<i>Eucalyptus</i>	<i>oleosa</i>				X		X
Myrtaceae	<i>Eucalyptus</i>	<i>rigidula</i>		X	X	X	X	X
Myrtaceae	<i>Eucalyptus</i>	<i>transcontinentalis</i>		X		X	X	
Myrtaceae	<i>Homalocalyx</i>	<i>grandiflorus</i> (P3)			X	X	X	
Myrtaceae	<i>Homalocalyx</i>	<i>thryptomenoides</i>			X			X
Myrtaceae	<i>Hysterobaeckea</i>	<i>ochropetala</i> subsp. <i>cometes</i> (P3)			X			
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>			X	X	X	
Myrtaceae	<i>Leptospermum</i>	<i>fastigiatum</i>					X	
Myrtaceae	<i>Malleostemon</i>	<i>roseus</i>			X		X	
Myrtaceae	<i>Melaleuca</i>	<i>uncinata</i>		X	X	X	X	

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
Myrtaceae	<i>Micromyrtus</i>	<i>flaviflora</i>			X	X		X
Myrtaceae	<i>Thryptomene</i>	<i>eremaea (P2)</i>						X
Myrtaceae	<i>Thryptomene</i>	<i>urceolaris</i>		X	X	X	X	
Myrtaceae	<i>Verticordia</i>	<i>helmsii</i>			X	X	X	X
Pittosporaceae	<i>Bursaria</i>	<i>occidentalis</i>		X		X	X	
Pittosporaceae	<i>Marianthus</i>	<i>bicolor</i>				X	X	
Pittosporaceae	<i>Pittosporum</i>	<i>angustifolium</i>				X		
Poaceae	<i>Astrostipa</i>	<i>elegantissima</i>	X			X		X
Poaceae	<i>Eragrostis</i>	<i>eriopoda</i>						X
Poaceae	<i>Eragrostis</i>	<i>falcata</i>	X			X		
Poaceae	<i>Eriopoda</i>	<i>dielsii</i>				X		
Poaceae	<i>Monachather</i>	<i>paradoxus</i>					X	
Poaceae	<i>Rytidosperma</i>	<i>caespitosum</i>			X	X	X	X
Poaceae	<i>Triodia</i>	<i>basedowii</i>	X	X		X		X
Poaceae	<i>Triodia</i>	<i>schinzii</i>		X	X	X	X	
Proteaceae	<i>Grevillea</i>	<i>acacioides</i>			X		X	
Proteaceae	<i>Grevillea</i>	<i>berryana</i>				X		X
Proteaceae	<i>Grevillea</i>	<i>dydimobotrya</i> subsp. <i>dydimobotrya</i>				X	X	
Proteaceae	<i>Grevillea</i>	<i>eremophila</i>				X	X	
Proteaceae	<i>Grevillea</i>	<i>extorris</i>			X		X	
Proteaceae	<i>Grevillea</i>	<i>juncifolia</i>			X	X	X	
Proteaceae	<i>Grevillea</i>	<i>oligomera</i>						X

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
<i>Proteaceae</i>	<i>Grevillea</i>	<i>pterosperma</i>		X		X	X	
<i>Proteaceae</i>	<i>Grevillea</i>	<i>sarissa</i>	X	X		X	X	
<i>Proteaceae</i>	<i>Grevillea</i>	<i>secunda (P4)</i>				X	X	
<i>Proteaceae</i>	<i>Hakea</i>	<i>francisiana</i>		X		X	X	
<i>Proteaceae</i>	<i>Persoonia</i>	<i>coriacea</i>				X		
<i>Proteaceae</i>	<i>Persoonia</i>	<i>leucopogon (P1)</i>			X	X	X	
<i>Proteaceae</i>	<i>Persoonia</i>	<i>saundersiana</i>				X	X	
<i>Restionaceae</i>	<i>Lepidobolus</i>	<i>deserti</i>		X			X	
<i>Rhamnaceae</i>	<i>Cryptandra</i>	<i>distigma</i>					X	
<i>Rubiaceae</i>	<i>Psydrax</i>	<i>suevolens</i>				X		X
<i>Rutaceae</i>	<i>Phebalium</i>	<i>canaliculatum</i>		X	X	X	X	X
<i>Rutaceae</i>	<i>Phebalium</i>	<i>laevigatum</i>		X		X	X	
<i>Rutaceae</i>	<i>Philotheca</i>	<i>brucei</i> subsp. <i>brucei</i>				X		X
<i>Rutaceae</i>	<i>Philotheca</i>	<i>tomentella</i>						X
<i>Rutaceae</i>	<i>Psydrax</i>	<i>suevolens</i>						X
<i>Santalaceae</i>	<i>Exocarpos</i>	<i>aphyllus</i>	X	X	X	X	X	
<i>Santalaceae</i>	<i>Exocarpos</i>	<i>sparteus</i>				X		
<i>Santalaceae</i>	<i>Santalum</i>	<i>accuminatum</i>		X		X	X	
<i>Santalaceae</i>	<i>Santalum</i>	<i>spicatum</i>		X		X		X
<i>Sapindaceae</i>	<i>Dodonaea</i>	<i>amblyophylla</i>				X	X	
<i>Sapindaceae</i>	<i>Dodonaea</i>	<i>lobulata</i>		X		X		X
<i>Sapindaceae</i>	<i>Dodonaea</i>	<i>rigida</i>				X	X	X

Appendix E: Plant Species List by Vegetation Type. *continued*

Family	Genus	Species	FRAN	GNEW	SACS	SAGS	SDSH	MUWA
<i>Sapindaceae</i>	<i>Dodonaea</i>	<i>stenozyga</i>		X				
<i>Sapindaceae</i>	<i>Dodonaea</i>	<i>viscosa</i> subsp. <i>angustissima</i>	X	X		X		
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>alternifolia</i>		X				
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>caperata</i>		X		X	X	
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>clarkei</i>						X
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>decipiens</i>	X	X		X	X	
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>		X	X	X		X
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>latrobei</i>				X		X
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>metallicorum</i>		X				
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>miniata</i>	X	X				
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>Mt. Jackson</i>		X				
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>oppositifolia</i>		X				
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>platythamnos</i> subsp. <i>platythamnos</i>				X	X	
<i>Scrophulariaceae</i>	<i>Eremophila</i>	<i>scoparia</i>		X		X		
<i>Solanaceae</i>	<i>Anthotroche</i>	<i>pannosa</i>				X	X	
<i>Solanaceae</i>	<i>Duboisia</i>	<i>hopwoodii</i>					X	
<i>Solanaceae</i>	<i>Solanum</i>	<i>lasiophyllum</i>				X	X	X
<i>Solanaceae</i>	<i>Solanum</i>	<i>orbiculatum</i>	X					
<i>Stylideaceae</i>	<i>Stylidium</i>	<i>warriedarensense</i>						X
<i>Thymelaeaceae</i>	<i>Pimelea</i>	<i>microcephala</i> subsp. <i>microcephala</i>				X		
<i>Zygophyllaceae</i>	<i>Zygophyllum</i>	<i>aurantiacum</i>	X	X				

APPENDIX 3: FLORA AND FAUNA DESKTOP ASSESSMENT

NatureMap Species Report

Created By Guest user on 23/06/2021

Current Names Only Yes
Core Datasets Only Yes
Method 'Predefined Area Intersect'
Area Type Mining Tenements (live)
Intersect E 29/742
Buffer '20 km'
Group By Kingdom

Kingdom	Species	Records
Animalia	283	4234
Fungi	11	15
Plantae	452	1399
Protozoa	2	2
TOTAL	748	5650

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Animalia				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
4.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
5.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
6.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
7.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
8.	<i>Allodessus bistrigatus</i>			
9.	<i>Alona rigidicaudis</i>			
10.	<i>Alona sp. a</i> (GOL)			
11.	<i>Aname tepperi</i>			
12.	24312 <i>Anas gracilis</i> (Grey Teal)			
13.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
14.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
15.	<i>Anax papuensis</i>			
16.	44630 <i>Anillios bicolor</i>			Y
17.	44631 <i>Anillios bituberculatus</i>			
18.	44637 <i>Anillios hamatus</i>			
19.	44650 <i>Anillios waitii</i>			
20.	<i>Anisops gratus</i>			
21.	<i>Anisops thienemanni</i>			
22.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
23.	<i>Antichiropus sp.</i>			
24.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
25.	<i>Apocyclops dengizicus</i>			
26.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
27.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
28.	<i>Argiope protensa</i>			
29.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
30.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
31.	<i>Asadipus phaleratus</i>			
32.	<i>Asadipus yundamindra</i>			
33.	<i>Austrolestes annulosus</i>			
34.	<i>Austrolestes io</i>			
35.	<i>Backobourkia collina</i>			
36.	<i>Backobourkia heroine</i>			
37.	<i>Barnardius zonarius</i>			
38.	<i>Berosus munitipennis</i>			
39.	24319 <i>Biziura lobata</i> (Musk Duck)			
40.	<i>Boeckella triarticulata</i>			
41.	42380 <i>Brachyurophis fasciolatus subsp. fasciolatus</i> (Narrow-banded Shovel-nosed Snake)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
42.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
43.	33935 <i>Branchinella simplex</i> (fairy shrimp (inland WA))		P1	
44.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
45.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
46.	<i>Cavasteron crassicalcar</i>			
47.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
48.	24564 <i>Certhionyx variegatus</i> (Pied Honeyeater)			
49.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattleed Bat)			
50.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
51.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
52.	47909 <i>Cheramoeca leucosterna</i> (White-backed Swallow)			
53.	<i>Chironomus tepperi</i>			
54.	24434 <i>Chrysococcyx osculans</i> (Black-eared Cuckoo)			
55.	25580 <i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
56.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
57.	25581 <i>Climacteris affinis</i> (White-browed Treecreeper)			
58.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
59.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
60.	<i>Cormocephalus turneri</i>			
61.	24416 <i>Corvus bennetti</i> (Little Crow)			
62.	25592 <i>Corvus coronoides</i> (Australian Raven)			
63.	25593 <i>Corvus orru</i> (Torresian Crow)			
64.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
65.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
66.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
67.	24424 <i>Cracticus torquatus</i> subsp. <i>torquatus</i> (Grey Butcherbird)			
68.	30886 <i>Cryptoblepharus australis</i>			
69.	30893 <i>Cryptoblepharus buchananii</i>			
70.	25020 <i>Cryptoblepharus plagioccephalus</i>			
71.	<i>Cryptochironomus griseidorsum</i>			
72.	24871 <i>Ctenophorus cristatus</i> (Bicycle Dragon)			
73.	24873 <i>Ctenophorus fordii</i> (Mallee Sand Dragon)			
74.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
75.	24888 <i>Ctenophorus salinarum</i> (Salt Pan Dragon)			
76.	24889 <i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
77.	25026 <i>Ctenotus atlas</i>			
78.	25461 <i>Ctenotus brooksi</i>			
79.	25050 <i>Ctenotus leae</i>			
80.	25052 <i>Ctenotus leonhardii</i>			
81.	25074 <i>Ctenotus schomburgkii</i>			
82.	25080 <i>Ctenotus uber</i> subsp. <i>uber</i> (Spotted Ctenotus)			
83.	25082 <i>Ctenotus xenopleura</i>			
84.	<i>Culicoides</i> sp.			
85.	25089 <i>Cyclodomorphus melanops</i> subsp. <i>elongatus</i> (Slender Blue-tongue)			
86.	24322 <i>Cygnus atratus</i> (Black Swan)			
87.	<i>Cyprinotus cingalensis</i>			
88.	<i>Cyrtophora parnasia</i>			
89.	<i>Daphnia</i> sp.			
90.	25673 <i>Daphnoesitta chrysoptera</i> (Varied Sittella)			
91.	24092 <i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
92.	24995 <i>Delma australis</i>			
93.	24997 <i>Delma butleri</i>			
94.	25247 <i>Demansia psammophis</i> subsp. <i>psammophis</i> (Yellow-faced Whipsnake)			
95.	<i>Diaphanosoma unguiculatum</i>			
96.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
97.	<i>Dingosa humphreysi</i>			
98.	<i>Dingosa simsoni</i>			
99.	<i>Diplacodes bipunctata</i>			
100.	24929 <i>Diplodactylus granariensis</i> subsp. <i>granariensis</i>			
101.	24940 <i>Diplodactylus pulcher</i>			
102.	30909 <i>Diporiphora amphiboluroides</i> (Mulga Dragon)			
103.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
104.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
105.	25094 <i>Egernia formosa</i>			
106.	<i>Egretta novaehollandiae</i>			
107.	47937 <i>Euseyornis melanops</i> (Black-fronted Dotterel)			
108.	<i>Eolophus roseicapillus</i>			
109.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
110.	24568 <i>Epthianura aurifrons</i> (Orange Chat)			
111.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
112.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
113.	24379 <i>Erythrogonyx cinctus</i> (Red-kneed Dotterel)			
114.	<i>Ethmostigmus curtipes</i>			
115.	<i>Ethmostigmus rubripes</i>			
116.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
117.	25621 <i>Falco berigora</i> (Brown Falcon)			
118.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
119.	25727 <i>Fulica atra</i> (Eurasian Coot)			
120.	25301 <i>Furina ornata</i> (Moon Snake)			
121.	42314 <i>Gavicalis virescens</i> (Singing Honeyeater)			
122.	24957 <i>Gehyra purpurascens</i>			
123.	24959 <i>Gehyra variegata</i>			
124.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
125.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
126.	<i>Grayenulla australensis</i>			
127.	<i>Hemicordulia tau</i>			
128.	<i>Heterocypris</i> sp. 540			Y
129.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
130.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
131.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
132.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
133.	<i>Hoggicosa alfi</i>			
134.	<i>Hoggicosa bicolor</i>			
135.	<i>Hoggicosa forresti</i>			
136.	<i>Hoggicosa storri</i>			
137.	<i>Hoggicosa wolodymyri</i>			
138.	<i>Hogna crispipes</i>			
139.	<i>Hogna salifodina</i>			
140.	<i>Holasteron humphreysi</i>			
141.	<i>Holconia nigrigularis</i>			
142.	<i>Holconia westralia</i>			
143.	<i>Homoeothele micans</i>			
144.	<i>Hyphydrus elegans</i>			
145.	<i>Isopedella cana</i>			
146.	<i>Isopedella saundersi</i>			
147.	<i>Kwonkan goongarriensis</i>			
148.	<i>Lampona quinqueplagiata</i>			
149.	<i>Lamponina scutata</i>			
150.	<i>Latrodectus hasseltii</i>			
151.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
152.	<i>Lerista kingi</i>			
153.	25149 <i>Lerista macropisthopus</i> subsp. <i>macropisthopus</i>			
154.	25162 <i>Lerista picturata</i>			
155.	42411 <i>Lerista timida</i>			
156.	25005 <i>Lialis burtonis</i>			
157.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
158.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
159.	41411 <i>Liopholis inornata</i> (Desert Skink)			
160.	41417 <i>Liopholis striata</i> (Night Skink)			
161.	<i>Longrita millewa</i>			
162.	30935 <i>Lucasium maini</i>			
163.	<i>Lycosa australicola</i>			
164.	24135 <i>Macropus robustus</i> subsp. <i>erubescens</i> (Euro, Biggada)			
165.	<i>Macrothrix breviseta</i>			
166.	<i>Macrothrix</i> sp.			
167.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
168.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
169.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
170.	<i>Mandjelia humphreysi</i>			
171.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
172.	<i>Maraura macracantha</i> (formerly <i>Alona macracantha</i>)			
173.	<i>Masasteron piankai</i>			
174.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
175.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
176.	24586 <i>Melithreptus brevirostris</i> subsp. <i>leucogenys</i> (Brown-headed Honeyeater)			
177.	25184 <i>Menetia greyii</i>			
178.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
179.	<i>Mesocyclops brooksi</i>			
180.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
181.	<i>Micronecta gracilis</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
182.	24904 <i>Moloch horridus</i> (Thorny Devil)			
183.	<i>Molycrisa vokes</i>			
184.	25190 <i>Morethia butleri</i>			
185.	24223 <i>Mus musculus</i> (House Mouse)	Y		
186.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
187.	25427 <i>Neobatrachus sutor</i> (Shoemaker Frog)			
188.	25428 <i>Neobatrachus wilsmorei</i> (Plonking Frog)			
189.	24740 <i>Neophema splendida</i> (Scarlet-chested Parrot)			
190.	<i>Nephila edulis</i>			
191.	24966 <i>Nephurus laevisissimus</i>			
192.	24971 <i>Nephurus vertebralis</i>			
193.	<i>Newnhamia</i> sp.			
194.	<i>Nicodamus mainae</i>			
195.	24094 <i>Ningai ridei</i> (Wongai Ningai)			
196.	24096 <i>Ningai yvonneae</i> (Southern Ningai)			
197.	<i>Nomindra leeuweni</i>			
198.	24224 <i>Notomys alexis</i> (Spinifex Hopping-mouse)			
199.	24229 <i>Notomys mitchellii</i> (Mitchell's Hopping-mouse)			
200.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
201.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
202.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
203.	<i>Oecetis</i> sp.			
204.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
205.	34011 <i>Oreoica gutturalis</i> subsp. <i>gutturalis</i> (Crested Bellbird (southern))			
206.	<i>Orthetrum caledonicum</i>			
207.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
208.	<i>Oxyopes amoenus</i>			
209.	<i>Oxyopes dingo</i>			
210.	24619 <i>Pachycephala inornata</i> (Gilbert's Whistler)			
211.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
212.	25254 <i>Parasuta monachus</i>			
213.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
214.	<i>Pediana occidentalis</i>			
215.	<i>Pediana tenuis</i>			
216.	<i>Pescecyclops</i> sp. 442=462=465=CB2 (salinarum in Morton)			
217.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
218.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
219.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
220.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
221.	<i>Phryganoporus candidus</i>			
222.	<i>Phryganoporus nigrinus</i>			
223.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
224.	<i>Poecilopta smaragdinea</i>			
225.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
226.	24681 <i>Poliocephalus poliocephalus</i> (Hoary-headed Grebe)			
227.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
228.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
229.	<i>Procladius</i> DEC sp. P1 (formerly <i>P. paludicola</i> P1 no U-claws)			
230.	<i>Procladius paludicola</i>			
231.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
232.	24230 <i>Pseudomys albocinereus</i> (Ash-grey Mouse)			
233.	24232 <i>Pseudomys bolami</i> (Bolam's Mouse)			
234.	24237 <i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
235.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
236.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
237.	25434 <i>Pseudophryne occidentalis</i> (Western Toadlet)			
238.	<i>Ptilonorhynchus guttatus</i>			
239.	42344 <i>Purnella albifrons</i> (White-fronted Honeyeater)			
240.	25009 <i>Pygopus nigriceps</i>			
241.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
242.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
243.	<i>Repandocypris austinensis</i>			Y
244.	<i>Reticocypris</i> sp. 544			Y
245.	<i>Rhipidura albicauda</i>			
246.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
247.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
248.	24982 <i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
249.	<i>Sandalodes superbus</i>			
250.	<i>Scolopendra laeta</i>			
251.	<i>Scolopendra morsitans</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
252.	24199	<i>Scotorepens balstoni</i> (Inland Broad-nosed Bat)		
253.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)		
254.	30948	<i>Smicromis brevirostris</i> (Weebill)		
255.	24108	<i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)		
256.	24109	<i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)		
257.	24111	<i>Sminthopsis gilberti</i> (Gilbert's Dunnart)		
258.	24114	<i>Sminthopsis hirtipes</i> (Hairy-footed Dunnart)		
259.	24329	<i>Stictonetta naevosa</i> (Freckled Duck)		
260.	25597	<i>Strepera versicolor</i> (Grey Currawong)		
261.	24923	<i>Strophurus assimilis</i> (Goldfields Spiny-tailed Gecko)		
262.	24927	<i>Strophurus elderi</i>		
263.	24949	<i>Strophurus wellingtonae</i>		
264.		<i>Supunna picta</i>		
265.	25269	<i>Suta fasciata</i> (Rosen's Snake)		
266.		<i>Synothele goongarrie</i>		Y
267.	25705	<i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)		
268.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)		
269.	30870	<i>Taeniopygia guttata</i> (Zebra Finch)		
270.		<i>Tanytarsus fuscithorax/semibarbitarsus</i>		
271.	25203	<i>Tiliqua occipitalis</i> (Western Bluetongue)		
272.	25207	<i>Tiliqua rugosa</i> subsp. <i>rugosa</i>		
273.		<i>Trachyspina goongarrie</i>		Y
274.	48141	<i>Tribonyx ventralis</i> (Black-tailed Native-hen)		
275.	24983	<i>Underwoodisaurus milii</i> (Barking Gecko)		
276.		<i>Urodacus similis</i>		
277.	25211	<i>Varanus caudolineatus</i>		
278.	25216	<i>Varanus giganteus</i> (Perentie)		
279.	25218	<i>Varanus gouldii</i> (Bungarra or Sand Monitor)		
280.	25526	<i>Varanus tristis</i> (Racehorse Monitor)		
281.	25227	<i>Varanus tristis</i> subsp. <i>tristis</i> (Racehorse Monitor)		
282.	24202	<i>Vespadelus baverstocki</i> (Inland Forest Bat)		
283.	24206	<i>Vespadelus regulus</i> (Southern Forest Bat)		

Fungi

284.	27574	<i>Acarospora citrina</i>		
285.	44000	<i>Austroparmelia chlorolecanorica</i>		
286.	27748	<i>Flavoparmelia rutidota</i>		
287.		<i>Geastrum floriforme</i>		
288.		<i>Geastrum</i> sp.		
289.	27905	<i>Paraporphidia glauca</i>		
290.		<i>Poronia erici</i>		
291.	28000	<i>Psora decipiens</i>		
292.	48835	<i>Pycnoporus coccineus</i>		
293.	44221	<i>Xalocoa ocellata</i>		
294.	28186	<i>Xanthoparmelia versicolor</i>		

Plantae

295.	3248	<i>Acacia burkittii</i> (Sandhill Wattle)		
296.	36417	<i>Acacia caesaneura</i>		
297.	3264	<i>Acacia colletioides</i> (Wait-a-while)		
298.	3269	<i>Acacia coolgardiensis</i> (Spinifex Wattle)		
299.	15281	<i>Acacia desertorum</i> var. <i>desertorum</i>		
300.	3315	<i>Acacia duriuscula</i>		
301.	32118	<i>Acacia effusifolia</i>		
302.	16020	<i>Acacia eremophila</i> var. <i>eremophila</i>		
303.	16121	<i>Acacia eremophila</i> var. <i>variabilis</i>		P3
304.	3324	<i>Acacia erinacea</i>		
305.	3364	<i>Acacia helmsiana</i>		
306.	3366	<i>Acacia hemiteles</i>		
307.	15285	<i>Acacia heteroneura</i> var. <i>jutsonii</i>		
308.	16164	<i>Acacia inceana</i> subsp. <i>inceana</i>		
309.	3393	<i>Acacia jennerae</i>		
310.	3419	<i>Acacia ligulata</i> (Umbrella Bush, Watarka)		
311.	3426	<i>Acacia longispinea</i>		
312.	3440	<i>Acacia merrallii</i>		
313.	36416	<i>Acacia mulganeura</i>		
314.	3452	<i>Acacia murrayana</i> (Sandplain Wattle)		
315.	15479	<i>Acacia nigripilosa</i> subsp. <i>nigripilosa</i>		
316.	3473	<i>Acacia oswaldii</i> (Miljee, Nelia)		
317.	3507	<i>Acacia quadrimarginea</i>		
318.	3510	<i>Acacia ramulosa</i> (Horse Mulga)		

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319.	19499 <i>Acacia ramulosa</i> var. <i>ramulosa</i>			
320.	3545 <i>Acacia sibina</i>			
321.	8949 <i>Acacia sibirica</i> (Bastard Mulga)			
322.	13070 <i>Acacia synchronicia</i>			
323.	3577 <i>Acacia tetragonophylla</i> (Kurara, Wakalpuka)			
324.	16156 <i>Acacia xerophila</i> var. <i>xerophila</i>			
325.	7817 <i>Actinobole uliginosum</i> (Flannel Cudweed)			
326.	18163 <i>Actinotus</i> sp. <i>Comet Vale</i> (A.V. Milewski AVM 1093)			
327.	11730 <i>Alectryon oleifolius</i> subsp. <i>canescens</i>			
328.	13906 <i>Allocasuarina eriochlamys</i> subsp. <i>eriochlamys</i>			
329.	1730 <i>Allocasuarina helmsii</i>			
330.	12655 <i>Allocasuarina spinosissima</i>			
331.	2652 <i>Alternanthera nodiflora</i> (Common Joyweed)			
332.	19466 <i>Aluta aspera</i> subsp. <i>aspera</i>			
333.	6565 <i>Alyxia buxifolia</i> (Dysentery Bush)			
334.	14636 <i>Alyxia tetanifolia</i>		P3	
335.	12025 <i>Amphipogon caricinus</i> var. <i>caricinus</i>			
336.	2369 <i>Amyema benthamii</i>			
337.	2372 <i>Amyema fitzgeraldii</i> (Pincushion Mistletoe)			
338.	11614 <i>Amyema gibberula</i> var. <i>gibberula</i>			
339.	2380 <i>Amyema miquelii</i> (Stalked Mistletoe)			
340.	2382 <i>Amyema nestor</i>			
341.	40910 <i>Androcalva luteiflora</i> (Yellow-flowered Rulingia)			
342.	7836 <i>Angianthus tomentosus</i> (Camel-grass)			
343.	6952 <i>Anthotroche pannosa</i> (Felted Anthotroche)			
344.	39940 <i>Arthropodium</i> sp. <i>Goldfields</i> (H. Pringle 2188)			
345.	7846 <i>Asteridea athrixioides</i>			
346.	2453 <i>Atriplex codonocarpa</i> (Flat-topped Saltbush)			
347.	2459 <i>Atriplex holocarpa</i> (Pop Saltbush)			
348.	2468 <i>Atriplex nana</i>			
349.	2469 <i>Atriplex nummularia</i> (Old Man Saltbush)			
350.	11516 <i>Atriplex nummularia</i> subsp. <i>spathulata</i> (Old Man Saltbush)			
351.	2470 <i>Atriplex paludosa</i> (Marsh Saltbush)			
352.	11525 <i>Atriplex paludosa</i> subsp. <i>baudinii</i>			
353.	11791 <i>Atriplex quadrivalvata</i> var. <i>quadrivalvata</i>			
354.	2479 <i>Atriplex stipitata</i> (Mallee Saltbush)			
355.	2481 <i>Atriplex vesicaria</i> (Bladder Saltbush)			
356.	17238 <i>Austrostipa eremophila</i>			
357.	17246 <i>Austrostipa nitida</i>			
358.	17247 <i>Austrostipa platychaeta</i>			
359.	17251 <i>Austrostipa scabra</i>			
360.	4591 <i>Bertya dimerostigma</i>			
361.	2770 <i>Boerhavia coccinea</i> (Tar Vine, Wituka)			
362.	3722 <i>Bossiaea walkeri</i>			
363.	4999 <i>Brachychiton gregorii</i> (Desert Kurrajong, Ngalta)			
364.	7871 <i>Brachyscome ciliaris</i>			
365.	7413 <i>Brunonia australis</i> (Native Cornflower)			
366.	19069 <i>Brunonia</i> sp. <i>Goldfields</i> (K.R. Newbey 6044)			
367.	32331 <i>Bryum lanatum</i>			
368.	750 <i>Bulbostylis barbata</i>			
369.	3167 <i>Bursaria occidentalis</i>			
370.	2853 <i>Calandrinia eremaea</i> (Twining Purslane)			
371.	2855 <i>Calandrinia lehmannii</i>			
372.	2860 <i>Calandrinia polyandra</i> (Parakeelya)			
373.	48773 <i>Calandrinia quartzitica</i>		P1	
374.	40824 <i>Calandrinia sculpta</i>			
375.	30396 <i>Calandrinia translucens</i>			
376.	5395 <i>Callistemon phoeniceus</i> (Lesser Bottlebrush, Dubarda)			
377.	8466 <i>Callitris columellaris</i> (White Cypress Pine)			
378.	96 <i>Callitris preissii</i> (Rottnest Island Pine, Maro)			
379.	7903 <i>Calotis hispidula</i> (Bindy Eye)			
380.	5438 <i>Calytrix amethystina</i>			
381.	5442 <i>Calytrix birdii</i>			
382.	13654 <i>Calytrix breviseta</i> subsp. <i>stipulosa</i>			
383.	9138 <i>Calytrix watsonii</i>			
384.	7911 <i>Carthamus lanatus</i> (Saffron Thistle)	Y		
385.	12658 <i>Casuarina pauper</i> (Black Oak)			
386.	7921 <i>Centipeda thespidioides</i> (Desert Sneezewood)			
387.	1126 <i>Centrolepis eremica</i>			
388.	7922 <i>Cephalopterum drummondii</i> (Pompom Head)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
389.	7924 <i>Ceratogyne obionoides</i> (Wingwort)			
390.	5491 <i>Chamelaucium ciliatum</i>			
391.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
392.	2487 <i>Chenopodium curvispicatum</i>			
393.	765 <i>Chrysitrix distigmata</i>			
394.	47153 <i>Chrysocephalum apiculatum</i> subsp. <i>glandulosum</i>			
395.	47074 <i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>		P3	
396.	7933 <i>Chthonocephalus pseudevax</i> (Woolly Groundheads)			
397.	2778 <i>Codonocarpus cotinifolius</i> (Native Poplar, Kundurangu)			
398.	4566 <i>Comesperma volubile</i> (Love Creeper)			
399.	40927 <i>Commersonia magniflora</i> subsp. <i>oblongifolia</i>			
400.	6612 <i>Convolvulus clementii</i>			
401.	7939 <i>Conyza bonariensis</i> (Flaxleaf Fleabane)	Y		
402.	7950 <i>Cratystylis microphylla</i> (Small-leaved Grey Bush)			
403.	6955 <i>Crenidium spinescens</i>			
404.	16183 <i>Cryptandra aridicola</i>			
405.	48865 <i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i>	Y		
406.	809 <i>Cyperus rigidellus</i>			
407.	814 <i>Cyperus squarrosus</i>			
408.	7480 <i>Dampiera tenuicaulis</i> (Slender-stemmed Dampiera)			
409.	6218 <i>Daucus glochidiatus</i> (Australian Carrot)			
410.	3813 <i>Daviesia grahamii</i>			
411.	6759 <i>Dicrastylis flexuosa</i>			
412.	2498 <i>Didymanthus roei</i>			
413.	19854 <i>Dillwynia</i> sp. <i>Coolgardie</i> (V.E. Sands 637.3.1)			
414.	2799 <i>Disphyma crassifolium</i> (Round-leaved Pigface)			
415.	7961 <i>Dittrichia graveolens</i> (Stinkwort)	Y		
416.	4752 <i>Dodonaea adenophora</i>			
417.	4753 <i>Dodonaea amblyophylla</i>			
418.	4769 <i>Dodonaea lobulata</i> (Bead Hopbush)			
419.	4779 <i>Dodonaea rigida</i>			
420.	11247 <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>			
421.	6966 <i>Duboisia hopwoodii</i> (Pituri, Kundugu)			
422.	2504 <i>Dysphania plantaginella</i>			
423.	19919 <i>Elatine macrocalyx</i>		P3	
424.	31017 <i>Eleocharis papillosa</i>		P3	
425.	20444 <i>Enekbatus cryptandroides</i>			
426.	380 <i>Eragrostis eriopoda</i> (Woollybutt Grass, Wangurnu)			
427.	381 <i>Eragrostis falcata</i> (Sickle Lovegrass)			
428.	7180 <i>Eremophila alternifolia</i> (Poverty Bush)			
429.	13807 <i>Eremophila caperata</i>			
430.	7189 <i>Eremophila clarkei</i> (Turpentine Bush)			
431.	14895 <i>Eremophila decipiens</i> subsp. <i>decipiens</i>			
432.	7200 <i>Eremophila drummondii</i>			
433.	7204 <i>Eremophila eriocalyx</i> (Desert Pride)			
434.	7208 <i>Eremophila forrestii</i> (Wilcox Bush)			
435.	15052 <i>Eremophila forrestii</i> subsp. <i>forrestii</i>			
436.	7211 <i>Eremophila georgei</i>			
437.	17175 <i>Eremophila glabra</i> subsp. <i>albicans</i>			
438.	14340 <i>Eremophila glabra</i> subsp. <i>glabra</i>			
439.	16475 <i>Eremophila glandulifera</i>			
440.	7219 <i>Eremophila granitica</i> (Thin-leaved Poverty Bush)			
441.	15112 <i>Eremophila interstans</i> subsp. <i>interstans</i>			
442.	17576 <i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
443.	7242 <i>Eremophila miniata</i> (Kopi Poverty Bush)			
444.	15003 <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>			
445.	18570 <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			
446.	7250 <i>Eremophila pantonii</i>			
447.	14594 <i>Eremophila parvifolia</i> subsp. <i>auricampa</i>			
448.	15054 <i>Eremophila platythamnos</i> subsp. <i>exotrachys</i>			
449.	15055 <i>Eremophila platythamnos</i> subsp. <i>platythamnos</i>			
450.	10780 <i>Eremophila psilocalyx</i>			
451.	7259 <i>Eremophila pustulata</i> (Warted Eremophila)			
452.	7267 <i>Eremophila scoparia</i> (Broom Bush ())			
453.	7269 <i>Eremophila serrulata</i> (Serrate-leaved Eremophila)			
454.	<i>Eremophila</i> sp.			
455.	15168 <i>Eremophila spuria</i>			
456.	16486 <i>Eriachne pulchella</i> subsp. <i>pulchella</i>			
457.	2514 <i>Eriochiton sclerolaenoides</i> (Woolly Bindii)			
458.	4331 <i>Erodium aureum</i>	Y		

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459.	12739 <i>Erymophyllum ramosum</i>			
460.	14377 <i>Erymophyllum ramosum</i> subsp. <i>ramosum</i>			
461.	14300 <i>Eucalyptus celastroides</i> subsp. <i>celastroides</i> (Mirret)			
462.	5588 <i>Eucalyptus ceratocorys</i>			
463.	48436 <i>Eucalyptus clelandiorum</i>			
464.	5595 <i>Eucalyptus comitae-vallis</i> (Comet Vale Mallee)			
465.	5596 <i>Eucalyptus concinna</i> (Victoria Desert Mallee)			
466.	5612 <i>Eucalyptus cylindrocarpa</i> (Woodline Mallee)			
467.	5632 <i>Eucalyptus ebbanoensis</i> (Sandplain Mallee)			
468.	13549 <i>Eucalyptus ebbanoensis</i> subsp. <i>ebbanoensis</i>			
469.	18349 <i>Eucalyptus ebbanoensis</i> subsp. <i>glauciramula</i>			
470.	5660 <i>Eucalyptus gongylocarpa</i> (Marble Gum, Baarla)			
471.	5662 <i>Eucalyptus gracilis</i> (Yorrell)			
472.	5665 <i>Eucalyptus griffithsii</i> (Griffith's Grey Gum)			
473.	5673 <i>Eucalyptus horistes</i>			
474.	31815 <i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>		P4	
475.	15682 <i>Eucalyptus leptophylla</i> (Narrow-leaved Red Mallee)			
476.	13056 <i>Eucalyptus leptopoda</i> subsp. <i>subluta</i>			
477.	5701 <i>Eucalyptus longicornis</i> (Red Morrel, Moril)			
478.	13037 <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>			
479.	19323 <i>Eucalyptus moderata</i>			
480.	5725 <i>Eucalyptus oldfieldii</i> (Oldfield's Mallee)			
481.	5726 <i>Eucalyptus oleosa</i> (Giant Mallee)			
482.	20091 <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>			
483.	5747 <i>Eucalyptus platycorys</i> (Boorabbin Mallee)			
484.	5761 <i>Eucalyptus rigidula</i> (Stiff-leaved Mallee)			
485.	5766 <i>Eucalyptus salmonophloia</i> (Salmon Gum, Wurak)			
486.	<i>Eucalyptus</i> sp.			
487.	29701 <i>Eucalyptus</i> sp. Mulga Rock (K.D. Hill & L.A.S. Johnson KH 2668)			
488.	5793 <i>Eucalyptus transcontinentalis</i> (Redwood, Pungul)			
489.	29733 <i>Eucalyptus trivalva</i> (Victoria Spring Mallee)			
490.	5802 <i>Eucalyptus yilgarnensis</i> (Yorrell)			
491.	17027 <i>Euryomyrtus leptospermoides</i>			
492.	16722 <i>Euryomyrtus maidenii</i>			
493.	20742 <i>Eutaxia rubricarina</i>		P3	
494.	10977 <i>Exocarpos aphyllus</i> (Leafless Ballart)			
495.	5200 <i>Frankenia fecunda</i>			
496.	5206 <i>Frankenia laxiflora</i> (Loose Flowered Frankenia)			
497.	5210 <i>Frankenia punctata</i>			
498.	5212 <i>Frankenia setosa</i> (Bristly Frankenia)			
499.	12780 <i>Gilberta tenuifolia</i>			
500.	6143 <i>Glischrocaryon aureum</i> (Common Popflower)			
501.	8002 <i>Gnephosis tenuissima</i>			
502.	15306 <i>Gomphrena</i> sp. <i>Belele</i> (D.W. Goodall 3215)			
503.	7495 <i>Goodenia berardiana</i>			
504.	7507 <i>Goodenia eremophila</i>			
505.	7514 <i>Goodenia havilandii</i>			
506.	7527 <i>Goodenia mimuloides</i>			
507.	7565 <i>Goodenia xanthosperma</i> (Yellow-seeded Goodenia)			
508.	1946 <i>Grevillea acacioides</i>			
509.	15769 <i>Grevillea eremophila</i>			
510.	14413 <i>Grevillea haplantha</i> subsp. <i>haplantha</i>			
511.	15845 <i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>			
512.	15844 <i>Grevillea juncifolia</i> subsp. <i>temulenta</i>			
513.	19541 <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>			
514.	19543 <i>Grevillea nematophylla</i> subsp. <i>planicosta</i>			
515.	19542 <i>Grevillea nematophylla</i> subsp. <i>supraplana</i>			
516.	15978 <i>Grevillea oligomera</i>			
517.	2077 <i>Grevillea pterosperma</i>			
518.	2088 <i>Grevillea sarissa</i> (Wheel Grevillea)			
519.	12823 <i>Grevillea sarissa</i> subsp. <i>rectitepala</i>			
520.	13458 <i>Grevillea sarissa</i> subsp. <i>sarissa</i>			
521.	2807 <i>Gunniopsis quadrifida</i> (Sturts Pigface)			
522.	2810 <i>Gunniopsis septifraga</i>			
523.	2784 <i>Gyrostemon ramulosus</i> (Corkybark)			
524.	2163 <i>Hakea francisiana</i> (Emu Tree)			
525.	2182 <i>Hakea minyma</i>			
526.	2196 <i>Hakea preissii</i> (Needle Tree, Dandjin)			
527.	17556 <i>Hakea recurva</i> subsp. <i>arida</i>			
528.	17557 <i>Hakea recurva</i> subsp. <i>recurva</i>			

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529.	29840 <i>Halgania cyanea</i> var. <i>Allambi Stn (B.W. Strong 676)</i>			
530.	31117 <i>Halgania cyanea</i> var. <i>Charleville (R.W. Purdie +111)</i>			
531.	6691 <i>Halgania integerrima</i>			
532.	6172 <i>Haloragis dura</i>			
533.	6176 <i>Haloragis odontocarpa (Mulga Nettle)</i>			
534.	11370 <i>Haloragis odontocarpa forma octoforma</i>			
535.	6180 <i>Haloragis trigonocarpa</i>			
536.	17722 <i>Hannafordia bissillii</i> subsp. <i>bissillii</i>			
537.	17781 <i>Hannafordia quadrivalvis</i> subsp. <i>quadrivalvis</i>			
538.	8045 <i>Helipterum craspedioides (Yellow Billy Buttons)</i>			
539.	6843 <i>Hemigenia brachyphylla</i>			
540.	6776 <i>Hemiphora elderi (Red Velvet)</i>			
541.	5811 <i>Homalocalyx grandiflorus</i>		P3	
542.	5815 <i>Homalocalyx thryptomenoides</i>			
543.	11973 <i>Hybanthus floribundus</i> subsp. <i>curvifolius</i>			
544.	8086 <i>Hypochaeris glabra (Smooth Catsear)</i>	Y		
545.	48649 <i>Hysterobaeckea ochropetala</i> subsp. <i>cometes</i>		P3	
546.	14884 <i>Indigofera occidentalis</i>			
547.	8087 <i>Isoetopsis graminifolia (Cushion Grass)</i>			
548.	911 <i>Isolepis congrua</i>			
549.	14779 <i>Jacksonia arida</i>			
550.	6779 <i>Lachnostachys coolgardiensis</i>			
551.	13289 <i>Lawrencella davenportii</i>			
552.	4959 <i>Lawrenzia squamata</i>			
553.	7587 <i>Lechenaultia striata</i>			
554.	19237 <i>Leiocarpa websteri</i>			
555.	12628 <i>Lemooria burkittii</i>			
556.	3039 <i>Lepidium platypetalum (Slender Peppergrass)</i>			
557.	3044 <i>Lepidium rotundum (Veined Peppergrass)</i>			
558.	1074 <i>Lepidobolus deserti</i>			
559.	2352 <i>Leptomeria preissiana</i>			
560.	5848 <i>Leptospermum fastigiatum</i>			
561.	5852 <i>Leptospermum nitens</i>			
562.	41770 <i>Leucopogon</i> sp. <i>Boorabbin (K.R. Newbey 8374)</i>			
563.	20763 <i>Leucopogon</i> sp. <i>Coolgardie (M. Hislop & F. Hort MH 3197)</i>			
564.	36861 <i>Lobelia fissiflora</i>			
565.	1226 <i>Lomandra effusa (Scented Matrush)</i>			
566.	6967 <i>Lycium australe (Australian Boxthorn)</i>			
567.	2398 <i>Lysiana murrayi (Mistletoe, Parka-Parka)</i>			
568.	2533 <i>Maireana amoena</i>			
569.	2535 <i>Maireana appressa</i>			
570.	2544 <i>Maireana georgei (Satiny Bluebush)</i>			
571.	2545 <i>Maireana glomerifolia (Ball Leaf Bluebush)</i>			
572.	2547 <i>Maireana lanosa (Woolly Bluebush)</i>			
573.	2553 <i>Maireana oppositifolia</i>			
574.	2560 <i>Maireana pyramidata (Sago Bush)</i>			
575.	2563 <i>Maireana sedifolia (Pearl Bluebush, Myall)</i>			
576.	2565 <i>Maireana suaedifolia</i>			
577.	2568 <i>Maireana trichoptera (Downy Bluebush)</i>			
578.	2569 <i>Maireana triptera (Threewinged Bluebush)</i>			
579.	16295 <i>Malleostemon</i> sp. <i>Adelong (G.J. Keighery 11825)</i>		P2	
580.	41544 <i>Malva weinmanniana</i>			
581.	19421 <i>Marianthus bicolor (Painted Marianthus)</i>			
582.	4077 <i>Medicago minima (Small Burr Medic)</i>	Y		
583.	5895 <i>Melaleuca conothamnoides</i>			
584.	5916 <i>Melaleuca halmaturorum</i>			
585.	19486 <i>Melaleuca hamata</i>			
586.	5995 <i>Micromyrtus flaviflora</i>			
587.	19787 <i>Micromyrtus monotaxis</i>			
588.	12629 <i>Millotia incurva</i>			
589.	8107 <i>Minuria cunninghamii (Bush Minuria)</i>			
590.	4094 <i>Mirbelia microphylla</i>			
591.	4099 <i>Mirbelia seorsifolia</i>			
592.	490 <i>Monachather paradoxus</i>			
593.	4664 <i>Monotaxis luteiflora</i>			
594.	14186 <i>Myriocephalus pygmaeus</i>			
595.	6190 <i>Myriophyllum decussatum</i>			
596.	6791 <i>Newcastelia hexarrhena (Lambs' Tails)</i>			
597.	6792 <i>Newcastelia insignis</i>		P2	
598.	6978 <i>Nicotiana rotundifolia (Round-leaved Tobacco)</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
599.	8134 <i>Olearia exiguifolia</i> (Small-leaved Daisy Bush)			
600.	12734 <i>Olearia humilis</i>			
601.	8138 <i>Olearia lanuginosa</i> (Woolly Daisy Bush)			
602.	8140 <i>Olearia muelleri</i> (Goldfields Daisy)			
603.	8145 <i>Olearia pimeleoides</i> (Pimelea Daisybush, Burrobunga)			
604.	44401 <i>Olearia</i> sp. <i>Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)			
605.	8151 <i>Olearia stuartii</i>			
606.	8152 <i>Olearia subspicata</i> (Spiked Daisy Bush)			
607.	19828 <i>Oligocarpus calendulaceus</i>	Y		
608.	12670 <i>Parietaria cardiostegia</i>			
609.	2266 <i>Persoonia leucopogon</i>		P1	
610.	2274 <i>Persoonia saundersiana</i>			
611.	14886 <i>Phebalium brevifolium</i>			
612.	4497 <i>Phebalium canaliculatum</i>			
613.	4500 <i>Phebalium filifolium</i> (Slender Phebalium)			
614.	14883 <i>Phebalium laevigatum</i>			
615.	4502 <i>Phebalium microphyllum</i>			
616.	4504 <i>Phebalium tuberculosum</i>			
617.	18537 <i>Philoteca brucei</i> subsp. <i>brucei</i>			
618.	16833 <i>Philoteca coateana</i>		P3	
619.	18506 <i>Philoteca tomentella</i>			
620.	17626 <i>Phyllanthus erwinii</i>			
621.	13229 <i>Phyllota humilis</i>			
622.	17206 <i>Physopsis viscida</i>			
623.	5271 <i>Pimelea trichostachya</i> (Spiked Riceflower)			
624.	19744 <i>Pittosporum angustifolium</i>			
625.	6812 <i>Pityrodia lepidota</i>			
626.	10974 <i>Plagiobothrys plurisepalus</i>			
627.	7300 <i>Plantago drummondii</i> (Sago Weed)			
628.	45238 <i>Podolepis aristata</i> subsp. <i>affinis</i>			
629.	8173 <i>Podolepis capillaris</i> (Wiry Podolepis)			
630.	8177 <i>Podolepis lessonii</i>			
631.	8182 <i>Podotecta angustifolia</i> (Sticky Longheads)			
632.	12731 <i>Podotecta wilsonii</i>			
633.	29098 <i>Poranthera leioperma</i>			
634.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
635.	12706 <i>Prostanthera althoferi</i>			
636.	15822 <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>			
637.	6912 <i>Prostanthera campbellii</i>			
638.	6916 <i>Prostanthera grylloana</i>			
639.	8189 <i>Pseudognaphalium luteoalbum</i> (Jersey Cudweed)			
640.	18155 <i>Psydax suaveolens</i>			
641.	2690 <i>Ptilotus aervoides</i>			
642.	2707 <i>Ptilotus carlsonii</i>			
643.	2708 <i>Ptilotus chamaecladus</i>			
644.	38463 <i>Ptilotus chortophytus</i>		P1	
645.	2718 <i>Ptilotus drummondii</i> (Narrowleaf Mulla Mulla)			
646.	11797 <i>Ptilotus drummondii</i> var. <i>minor</i>			
647.	2721 <i>Ptilotus exaltatus</i> (Tall Mulla Mulla)			
648.	2727 <i>Ptilotus gaudichaudii</i>			
649.	2731 <i>Ptilotus helipteroides</i> (Hairy Mulla Mulla)			
650.	2747 <i>Ptilotus obovatus</i> (Cotton Bush)			
651.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
652.	31252 <i>Ptilotus rigidus</i>		P1	
653.	11643 <i>Ranunculus pentandrus</i> var. <i>platycarpus</i>			
654.	2581 <i>Rhagodia drummondii</i>			
655.	11254 <i>Rhagodia preissii</i> subsp. <i>preissii</i>			
656.	13308 <i>Rhodanthe charsleyae</i>			
657.	13241 <i>Rhodanthe chlorocephala</i> subsp. <i>rosea</i>			
658.	13242 <i>Rhodanthe chlorocephala</i> subsp. <i>splendida</i>			
659.	13301 <i>Rhodanthe floribunda</i>			
660.	13293 <i>Rhodanthe haigii</i>			
661.	13238 <i>Rhodanthe maryonii</i>			
662.	13249 <i>Rhodanthe oppositifolia</i> subsp. <i>oppositifolia</i>			
663.	<i>Riccia bifurca</i>			
664.	4705 <i>Ricinus communis</i> (Castor Oil Plant)	Y		
665.	48885 <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i>			
666.	48898 <i>Roepera ovata</i>			
667.	11151 <i>Rostraria pumila</i>	Y		
668.	46434 <i>Rumex hypogaeus</i>	Y		

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
669.	40425 <i>Rytidosperma caespitosum</i>			
670.	6929 <i>Salvia verbenaca</i> (Wild Sage)	Y		
671.	2356 <i>Santalum acuminatum</i> (Quandong, Warnga)			
672.	2359 <i>Santalum spicatum</i> (Sandalwood, Wilarak)			
673.	7644 <i>Scaevola spinescens</i> (Currant Bush, Maroon)			
674.	41660 <i>Schenkia australis</i>			
675.	8200 <i>Schoenia cassiniana</i> (Schoenia)			
676.	48355 <i>Schoenoplectiella dissachantha</i>			
677.	1015 <i>Schoenus subaphyllus</i>			
678.	2606 <i>Sclerolaena cuneata</i> (Yellow Bindii)			
679.	2607 <i>Sclerolaena densiflora</i>			
680.	2608 <i>Sclerolaena deserticola</i>			
681.	2609 <i>Sclerolaena diacantha</i> (Grey Copperburr)			
682.	2610 <i>Sclerolaena drummondii</i>			
683.	2612 <i>Sclerolaena eurotioides</i> (Fluffy Bindii)			
684.	2615 <i>Sclerolaena fusiformis</i>			
685.	8877 <i>Sclerolaena gardneri</i>			
686.	2626 <i>Sclerolaena parviflora</i> (Small-flower Saltbush)			
687.	25881 <i>Senecio lacustrinus</i>			
688.	17645 <i>Senna artemisioides</i>			
689.	12276 <i>Senna artemisioides</i> subsp. <i>filifolia</i>			
690.	17558 <i>Senna artemisioides</i> subsp. <i>x artemisioides</i>			
691.	18430 <i>Senna cardiosperma</i>			
692.	18444 <i>Senna charlesiana</i>			
693.	16378 <i>Senna pleurocarpa</i>			
694.	46824 <i>Seringia velutina</i> (Velvet firebush)			
695.	31759 <i>Sida ectogama</i>			
696.	6998 <i>Solanum cleistogamum</i>			
697.	7013 <i>Solanum hoplopetalum</i> (Thorny Solanum)			
698.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mindjulu)			
699.	11241 <i>Solanum orbiculatum</i> subsp. <i>orbiculatum</i> (Round-leaved Solanum)			
700.	7030 <i>Solanum plicatile</i>			
701.	1313 <i>Sowerbaea multicaulis</i> (Many Stemmed Lily)		P4	
702.	19555 <i>Stackhousia muricata</i> subsp. <i>annual</i> (W.R. Barker 2172)			
703.	16200 <i>Stenanthemum stipulosum</i>			
704.	3076 <i>Stenopetalum filifolium</i>			
705.	30212 <i>Stenopetalum lineare</i> var. <i>lineare</i>			
706.	43203 <i>Surreya diandra</i>			
707.	4221 <i>Swainsona colutooides</i> (Bladder Vetch)			
708.	2641 <i>Tecticornia arborea</i> (Bulli Bulli)			
709.	31492 <i>Tecticornia disarticulata</i>			
710.	33319 <i>Tecticornia indica</i> subsp. <i>bidens</i>			
711.	31674 <i>Tecticornia peltata</i>			
712.	33297 <i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i> (Blackseed Samphire)			
713.	31618 <i>Tecticornia pruinosa</i>			
714.	33218 <i>Tecticornia pterygosperma</i> subsp. <i>pterygosperma</i>			
715.	31717 <i>Tecticornia undulata</i>			
716.	4248 <i>Templetonia aculeata</i>			
717.	35841 <i>Templetonia incrassata</i>			
718.	48603 <i>Teucrium teucriiflorum</i>			
719.	19695 <i>Thryptomene eremaea</i>		P2	
720.	6068 <i>Thryptomene urceolaris</i>			
721.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
722.	6268 <i>Trachymene cyanopetala</i>			
723.	6279 <i>Trachymene ornata</i> (Spongefruit)			
724.	678 <i>Tragus australianus</i> (Small Burrgrass)			
725.	12652 <i>Trichanthodium skirrophorum</i>			
726.	145 <i>Triglochin hexagona</i> (Six-point Arrowgrass)			
727.	147 <i>Triglochin mucronata</i>			
728.	17881 <i>Triodia desertorum</i>			
729.	17874 <i>Triodia rigidissima</i>			
730.	699 <i>Triodia scariosa</i>			
731.	48319 <i>Tripogonella loliiformis</i>			
732.	8253 <i>Triptilodiscus pygmaeus</i>			
733.	7656 <i>Velleia cycnopotamica</i>			
734.	7657 <i>Velleia daviesii</i> (Hairy Velleia)			
735.	7664 <i>Velleia rosea</i> (Pink Velleia)			
736.	6087 <i>Verticordia helmsii</i>			
737.	48986 <i>Vincetoxicum lineare</i>			
738.	11788 <i>Vittadinia dissecta</i> var. <i>hirta</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
739.	8268 <i>Vittadinia humerata</i>			
740.	<i>Wahlenbergia</i> sp.			
741.	13331 <i>Waitzia acuminata</i> var. <i>acuminata</i>			
742.	46093 <i>Waitzia fitzgibbonii</i>			
743.	6938 <i>Westringia cephalantha</i>			
744.	9247 <i>Westringia rigida</i> (<i>Stiff Westringia</i>)			
745.	1403 <i>Wurmbea tenella</i> (<i>Eight Nancy</i>)			
746.	1257 <i>Xanthorrhoea thurtonii</i> (<i>Grass Tree</i>)			

Protozoa

747.	38980 <i>Badhamia versicolor</i>			Y
748.	39056 <i>Paradiacheopsis fimbriata</i>			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX 4: FLORA AND VEGETATION SURVEY 2022

FLORA AND VEGETATION SURVEY

of the

Comet Vale Project

Prepared for

MLG Oz Ltd.



Prepared by

Goldfields Landcare Services

April 2022

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- E: Vegetation Classification System

1. SUMMARY

Goldfields Landcare Services (GLS) conducted a Reconnaissance Flora and Vegetation Survey for MLG Oz Pty Ltd (MLG) on the Companies Exploration Lease, E 29/742, at Comet Vale, approximately 21 kilometres south-east of Menzies, over two areas covering 374 Ha. An additional 138 Ha was also surveyed within the adjacent Unoccupied Crown Land (UCL) making the total area surveyed 512 Ha. That survey was carried out between 04.10.2017 and 29.07. 2018.

A Detailed Flora and Vegetation Survey was subsequently commissioned and carried out between 17.09.2021 and 14.11.2021. This survey covered an area of 774 Ha. It excluded the previously surveyed UCL and included two proposed haulage corridors linking the surveyed areas to the Goldfields Highway.

Two Botanists conducted the fieldwork which consisted of quadrat surveys, traverses, a relevé and opportunistic sampling, as well as recording the locations of the Priority plant species in and around the survey area.

Two hundred and fifteen vascular plant species have been recorded from within the survey areas. The most prevalent family was *Fabaceae* with 35 species.

No plant species gazetted as “Threatened” pursuant to Part 2 of the *Biodiversity Conservation Act 2016* Western Australia (W A) (The Conservation Codes for Western Australian Flora and Fauna) and no plant species listed as “Critically Endangered” under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999, Commonwealth) have been recorded within the surveyed areas.

Nine plant species of conservation significance were recorded within the survey areas: *Persoonia leucopogon* (P1); *Apatelantha insignis* (P2); *Thryptomene eremaea* (P2); *Acacia eremophila* var. *variabilis* (P3); *Alyxia tetanifolia* (P3); *Homalocalyx grandiflorus* (P3); *Hysterobaeckea ochropetala* subsp. *cometes* (P3). *Eucalyptus jutsonii* subsp. *jutsonii* (P4) and *Grevillea secunda* (P4).

No Threatened Ecological Communities (TEC) or Priority Environmental Communities (PEC) were encountered during the survey.

No non-native introduced species were recorded within the survey areas.

Six vegetation types were recorded and described within the survey area.

The vegetation condition was rated as “Good” based on the Vegetation Condition Scale adapted from Keighery (1994) and Trudgen (1998) (Appendix B).

2. INTRODUCTION

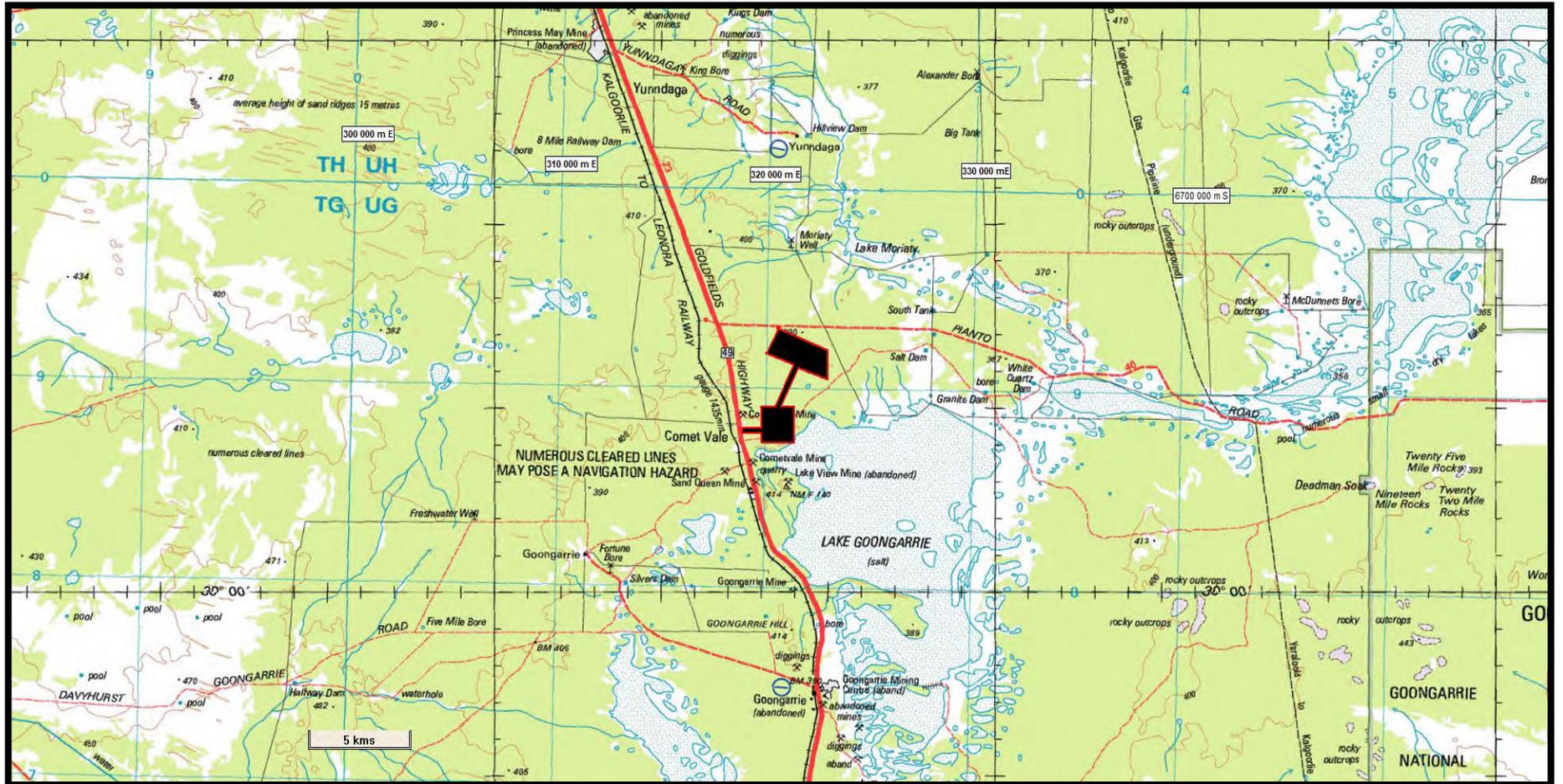
2.1 Location

The area surveyed is located 100 kilometres north of Kalgoorlie in Western Australia. It sits within the Shire of Menzies local government area and is 21 kilometres south-east of the town of Menzies. The area lies within MLG Oz Ltd.'s Exploration Lease E 29/742 where it is situated between the Goldfields Highway on the western side and Lake Goongarrie on the eastern.

The now abandoned townsite of Comet Vale, 1.5 kilometres south of the survey area, was gazetted shortly after the discovery of gold there in 1894. More recently, gold and sand have been mined locally, and extensive nickel and base metal exploration conducted throughout the area.

The pre-European vegetation mapped by Beard et al (2013) shows the vegetation type, within which this survey area lies, to have been Hummock grassland, (Triodia spp.) which is described as scattered low trees over dwarf shrubs or mixed short grass and spinifex mixed species. This vegetation type covers an area of 1.6 million hectares or 6.3% of the total area of WA. (Beard 2013, p.14)

Map 1: Location Map 2021 Detailed Survey Area



2.2 Objective

Following the 2017/18 Reconnaissance Survey, Goldfields Landcare Services (GLS) conducted a Detailed Flora and Vegetation Survey, together with Targeted surveys to delineate the boundaries of Priority plant species, over an area of 774 Ha on MLG's Exploration Lease E 29/742, as part of the company's assessment of a potential sand mining operation.

The surveys were conducted in compliance with EPA Technical Guidance Statement, December 2016, guidelines.

2.3 Survey Categories

Reconnaissance Survey

“A reconnaissance survey is undertaken to verify the information obtained from the desktop study, to characterise the flora and to delineate the vegetation units present. In some instances, a reconnaissance survey is necessary to determine the type of survey required. A reconnaissance survey generally involves a site visit by an experienced botanist to undertake low intensity sampling of the flora and vegetation, to describe the general vegetation characteristics and condition at an appropriate scale. The reconnaissance survey should clarify whether the area may support any significant flora or vegetation. If significant flora or vegetation is located or considered likely to be present during a reconnaissance survey, a targeted or detailed survey may be required.” (EPA 2016, p. 5)

Targeted Survey

“A targeted survey is used to gather information on significant flora and/or vegetation. A targeted survey aims to determine the size and extent of all significant flora populations or vegetation in the survey area and to place any impacts into context” (EPA 2016, p. 5)

Detailed Survey

“A detailed survey is necessary for significant proposals to adequately address the EPA's objective for Flora and Vegetation, as a preliminary or key environmental factor of assessment.” (EPA 2016, p.5)

2.4 Background Research

The purpose is to gather background information on the target area (usually at the locality scale). This involves a search of available sources of literature, data, and map-based information.

In the WA Department of Agriculture's *Technical Bulletin, No 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia*, authors H. Pringle *et.al.* 1994 describe land systems according to their topography, soils and vegetation, reference to which, has provided the basis for the identification of the vegetation types described in this survey.

The other relevant survey report reviewed was Goldfields Landcare Services. (2017) "*Flora and Vegetation survey of the Comet Vale Project*" prepared for MLG Oz Ltd.

2.4.1 Rare and Priority Flora Searches

In WA, under the *Biodiversity Conservation Act 2016 WA* (BC Act), all plants are protected. Some, which are under threat of extinction, are classified as Threatened Species. Others which are either under consideration to be declared as Threatened Species or still require monitoring are classified as Priority Flora species. The definitions of the five different classifications of Priority Species and that of Threatened Species and Presumed Extinct Species are shown in Appendix D.

A database search for Rare and Priority Flora potentially occurring within 50 kilometres of the centre of the survey area was carried out by the WA Department of Biodiversity Conservation and Attractions (DBCA) on 29.09.21, (Ref. No. 12-0921FL).

The search results were cross-checked against the results of a search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) list of Threatened Flora.

A Protected Matters Report was generated from the Department of Environment and Energy's online search facility on 07.03.2022. The report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act. The search area was located approximately at the centre of the survey area with a 40-kilometre buffer. Four plant species were listed as Endangered within the search area and three species as Vulnerable. See Appendix A.

There are 23 species classified as Threatened or Priority species recorded in the DBCA searches.

The W.A. Department of Parks and Wildlife (DPaW) Threatened and Priority Flora Database (TPFL) contained five species.

The West Australia Herbarium Database (WAHerb) contained 23.

A DBCA NatureMap Species Report was generated on 26.08.21 covering an area with a 40-km radius from the survey area which revealed 20 priority plant species occurring within it.

Some species occurred in more than one of the searches resulting in a total of 28 species of conservation significance from five searches, potentially occurring in the area (See Appendix A).

- Four species were listed as Threatened (Rare)
- Six plant species were listed as Priority 1
- Four plant species were listed as Priority 2
- Eleven plant species were listed as Priority 3
- Three plant species were listed as Priority 4

2.4.2 Threatened and Priority Ecological Communities Searches

Listed threatened species and ecological communities are recognized as a matter of national environmental significance. Consequently, any action that is likely to have a significant impact on listed threatened species and ecological communities under the *EPBC Act* must be referred to the Minister. The different categories of threatened species and threatened ecological communities and their respective definitions are shown in Appendices D.

The Australian Government Department of Environment and Energy's (DoEE) List of Threatened Ecological Communities (TEC) viewed online shows that the TEC nearest the survey area is Depot Springs stygofauna community, 237 kilometres north-west of the survey area.

A database search was conducted by the DBCA of TEC's and PEC's endorsed by the minister for the environment on 09.09 21 (Ref: 49-0821EC)

The search revealed that the nearest TEC to the survey area is the Depot Springs stygofauna complex which is located approximately 273 kilometres north-west.

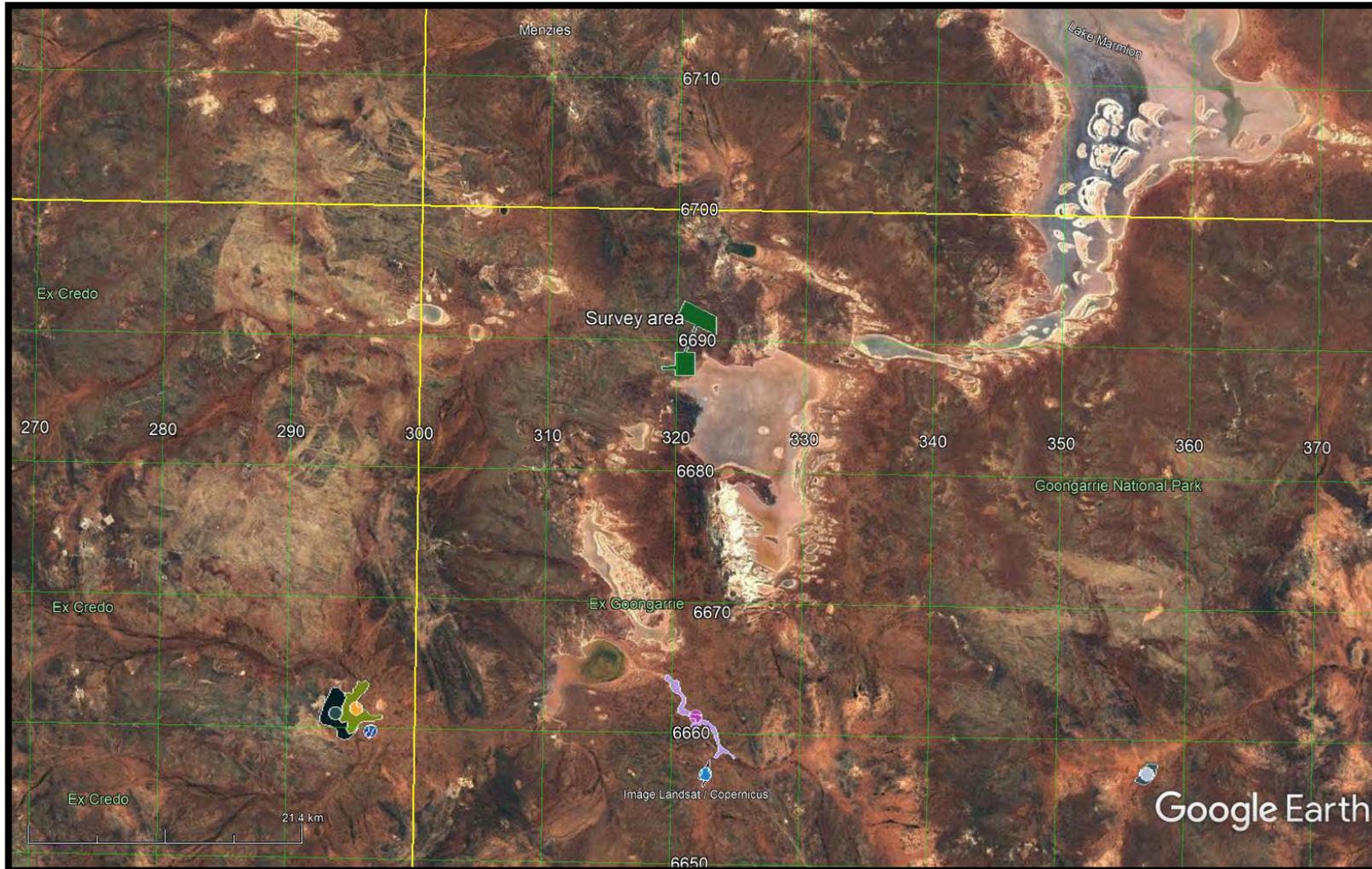
Ten areas within 50 kilometres of the survey area were identified as PEC's. All were designated as Emu Land System (P3) threatened by overgrazing.

The nearest PEC to this survey area is located approximately 23 kilometres south of the survey area. (See map on page 13)

Table 1: TEC and PEC's Nearest the Survey Area.

Community Name	Status
Depot Springs stygofauna complex (TEC)	Vulnerable (B)
Emu Land System (405) (PEC)	P3

Map 2: PEC Search Results



NB: Coloured areas south of the survey area represent individual locations designated as Emu Land System (P3)

2.4.3 Climate

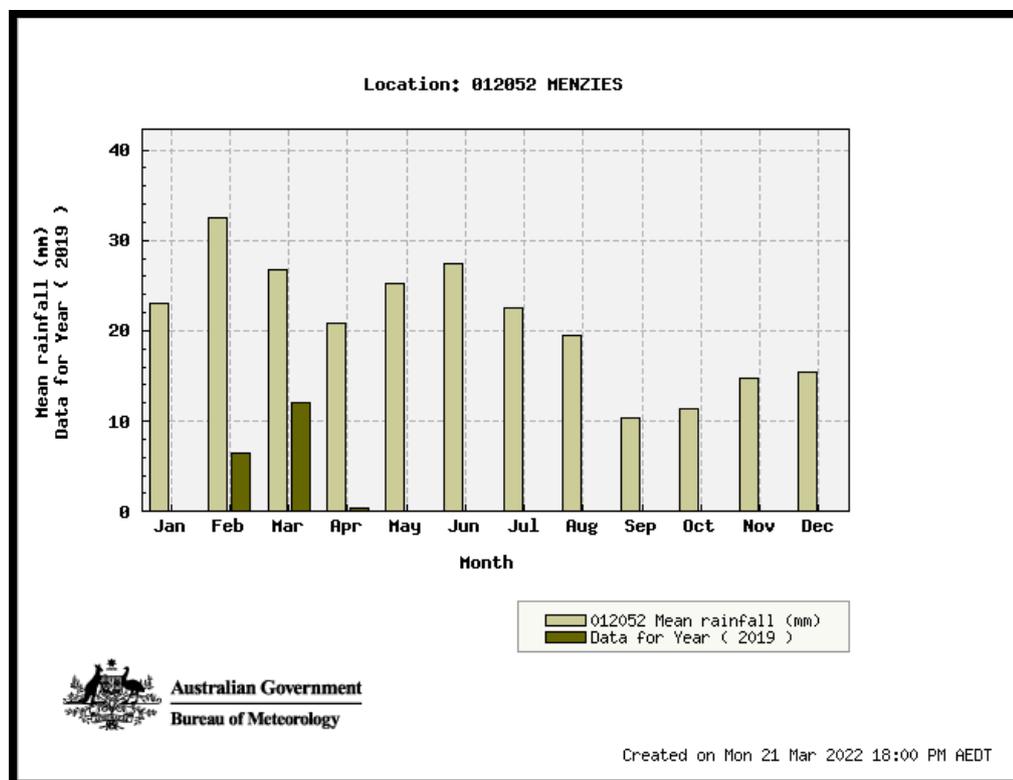
Beard described the climate of the Murchison Region, (Austin Botanical District) in Plant Life of Western Australia, within which the survey area lies, as “Arid with summer and winter rains; annual precipitation 200 mm”. (Beard 1990, p. 186)

The nearest Bureau of Meteorology (BOM) weather station, number 12052, is located at Menzies, which lies approximately 23 kilometres north-north-west of the survey area.

Records from the station for 105 years from 1896 to 2018 show that the mean annual rainfall is 254 mm with almost 80% of that normally falling within the eight months of January to August. The four months of September to December receive a combined total of just 52 mm constituting 20% of the annual total. The wettest month is February with a mean of 32.5 mm.

For 95 years from 1898 to 1996 the mean annual maximum temperature was 26.3° C, and the mean annual minimum temperature was 12.6° C (Bureau of Meteorology 2022).

Figure 1: Menzies Mean Rainfall Graph.



(BOM 2022)

2.4.4 Land Systems

Although lying within 30 kilometres of the northern boundary of the South West Interzone, the surveyed areas fall entirely within the Eastern Murchison (MUR01) sub-region of the Murchison (MUR) region as classified under the Interim Biogeographic Regionalisation of Australia (IBRA) Version 7, which states:

“Under the Convention of Biological Diversity, Australia has worked towards a target of 17 per cent of our continent to be protected as part of the National Reserve System. In building the National Reserve System, priority is given to under-represented bioregions that have less than 10 per cent of their remaining area protected in reserves.” (Department of Environment and Energy (DEE) 2021).

The Murchison Bioregion is classed as Underrepresented with less than 1% protected in reserves (DWER 2021d). It is described as:

“Mulga low woodlands, often rich in ephemerals, on outcrop and fine-textured Quaternary alluvial and eluvial surfaces mantling granitic and greenstone strata of the northern part of the Yilgarn Craton. Surfaces associated with the occluded drainage occur throughout with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils and Halosarcia low shrublands on saline alluvia. Areas of red sandplains with mallee-mulga parkland over hummock grasslands occur in the east.” (Thackway and Cresswell 1995, p. 68)

In *Plant Life of Western Australia*, Dr. John Beard described and mapped the vegetation in the Austin Botanical District, now recognised as The Murchison Region which covers 316,239 square kilometres. He characterised the vegetation as “Predominantly mulga low woodland (*Acacia aneura*) on plains, reduced to scrub on hills. Tree steppe of *Eucalyptus* spp. and *Triodia basedowii* on sand plains.” Referring to the Eastern half of the region he wrote that it has “catenas comprising sandplains on the higher ground, loam soils on the slopes and plains, and salt lakes in the valley bottoms. In some case there are “low level sandplains” in the valleys formed of sand transported from the upper parts of the landscape.” (Beard 1990, p. 187)

In the WA Department of Agriculture’s *Technical Bulletin, No. 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia*, authors H. Pringle *et.al.* (Technical Bulletin No. 87) describe land systems according to their topography, soils and vegetation. The 1: 250 000 scale map of the land systems accompanying the report shows the areas surveyed for this project lie

almost entirely within the Marmion Land System with a portion of lake edge lying within the Carnegie Land System.

These land systems are described as follows:

“Marmion Land System: Extensive gently undulating sand plains (mixed spinifex, acacia, heath and mallees). (Pringle et al. p. 240)

“Carnegie Land System: Salt lakes with fringing saline flats and dunes.” (Pringle et al. p.186)

2.4.5 Vegetation

Technical Bulletin No. 87 identifies six different landform units which may exist within the Marmion Land System and ten within the Carnegie Land System.

Each landform unit hosts a number of different vegetation types.

3. METHODS

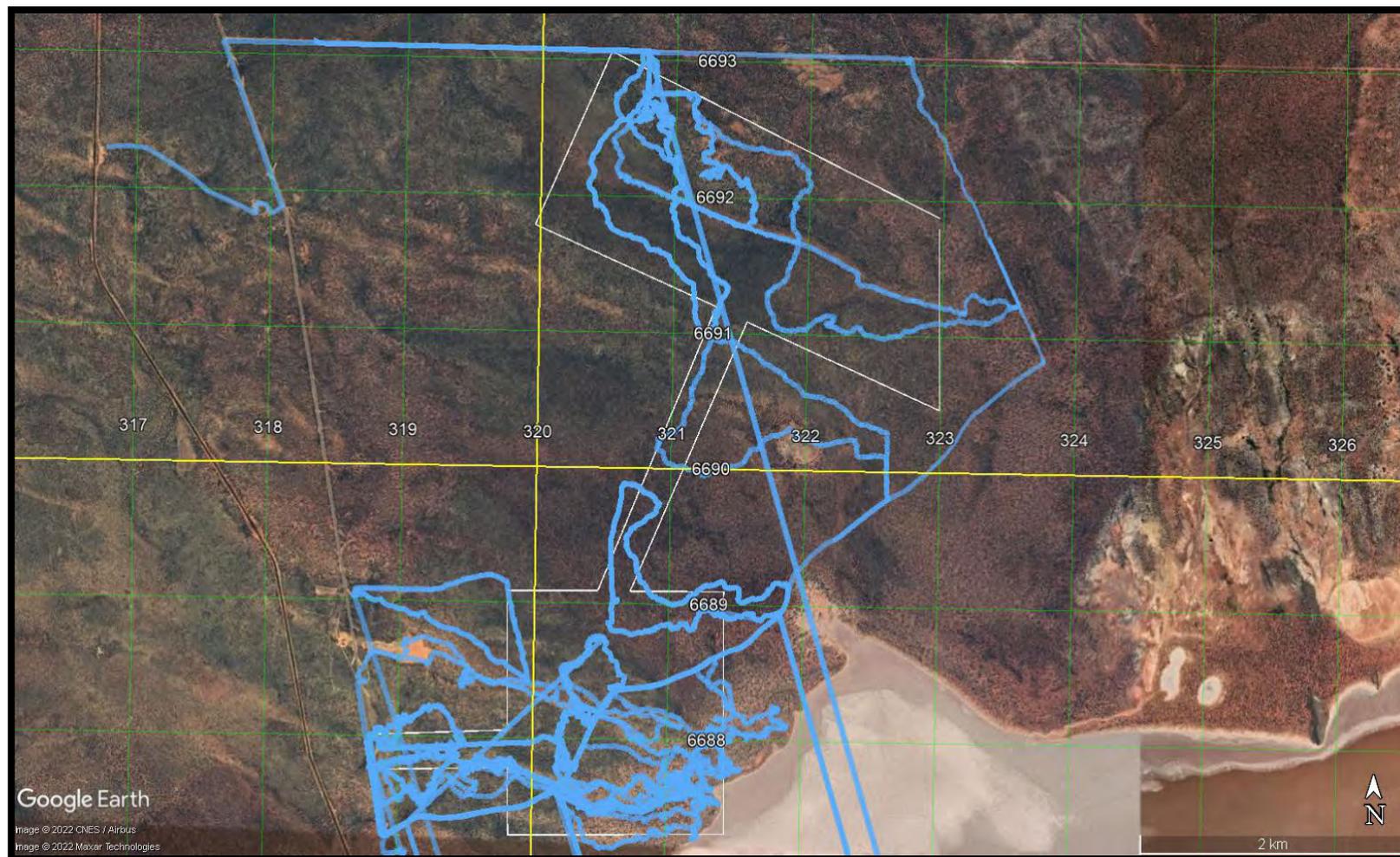
The field surveys were designed to provide data to facilitate the characterisation of the vegetation types present and produce a map depicting those units. Also, to search for Threatened or Priority plants species likely to occur in the area.

The fieldwork for the Reconnaissance Survey was carried out between 04.10.2017 and 29.07.2018 and for the Detailed and Targeted surveys from 17.09.21 to 14.11.22. They were designed to confirm the validity of the imagery interpretations made from satellite data of the area, to record and collect plant samples from traverses, and quadrat surveys, to determine the presence or otherwise of potential PEC's and flora of conservation significance and to record the condition of the vegetation.

Land Systems and associated Landform units were identified from the WA Department of Agriculture's *Technical Bulletin, No. 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia*. Vegetation Types were interpreted from quadrat surveys and vegetation type boundaries defined using satellite imagery.

The survey areas were accessed from an existing track running north- east from the Goldfields Highway to Pianto/Tonkin Road and from fence line tracks. Traverses were conducted on foot within the survey areas.

Map 3: 2021 Detailed Survey Tracks



Key:  tracks

Twenty-one quadrat surveys were conducted in 2017/18, and seven in 2021

Each 20m x 20m quadrat survey recorded descriptions of: Landscape, Surface, Rock Type, Soils, Overall Vegetation Type, Fire Age, Condition/Disturbances, Vegetation Stratum Height, Total Percentage Cover and Dominant Species from which a vegetation description was deduced using the Vegetation Classification System shown at Appendix E. A list of species together with their height and percentage foliar cover was also recorded.

Plant species were recorded or sampled, and locations were recorded using a Garmin GPSmap76csx device and a Garmin g66i device. Photographs were taken from the north – west corner of each quadrat. Opportunistic samples, notes, photographs, and GPS coordinates were also taken to aid the mapping and reporting.

Specimens collected in the field were subsequently identified using appropriate text references, plant keys and web sites.

Nine specimens collected during the reconnaissance survey and four from the Detailed and Targeted surveys were sent to the WA Herbarium for positive identification,

The methods adopted for the Targeted Surveys of the Priority plant species were determined by the abundance and distribution of each of the nine species. This varied from relatively few, spread over a large area e.g., *Persoonia leucopogon* (P1), where individual stems were recorded and boundaries mapped to extremely abundant and widespread, e.g., *Hysterobaeckea ochropetala* subsp. *cometes* (P3) where locations of stems were recorded in traverses and density estimates derived from that data.

3.1 Definitions of Survey Limitations

According to the EPA Guidance Statement June 2016 for Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, flora and vegetation surveys may be limited by the following:

- sources of information and availability of contextual information (i.e. pre-existing background versus new material);
- the scope (i.e. what life forms, etc., were sampled);
- Proportion of flora collected and identified (based on sampling, timing and intensity);
- completeness and further work which might be needed (e.g. was the relevant area fully surveyed);
- mapping reliability;

- timing, weather, season, cycle;
- disturbances (fire, flood, accidental human intervention etc.);
- intensity (in retrospect, was the intensity adequate);
- resources;
- access problems; and
- experience levels (e.g. degree of expertise in plant identification to taxon level). (EPA, pp.13-15)

An assessment of these aspects is detailed in the table below:

3.2 Survey Limitations

TABLE 2: Survey Limitations

ASPECT	CONSTRAINT	COMMENT
Sources and availability of contextual information	No	The WA Department of Agriculture's <i>Technical Bulletin, No. 87 An inventory and condition survey of the north-eastern Goldfields, Western Australia</i> , provides extensive reference material for the area. The 2017/18 survey provided data for the 2021 Detailed and Targeted Surveys
Scope	No	The project comprised reconnaissance, detailed and targeted surveys and covered all aspects of flora and vegetation assessment and requirements for IBSA data submission. For practical purposes, the extent of the populations of some widely distributed Priority plant species, beyond the survey area, was not determined.
Proportion of flora collected and identified	No	Traverses and quadrats covered the six vegetation types encountered. Sampling was

		detailed and identification to species level was 99% complete.
Completeness	No	Twenty eight quadrat surveys and extensive foot traverses deemed sufficient.
Mapping reliability	No	Detail considered adequate for this level of survey in this region.
Timing	No	The recommended timing for the Eremaean botanical province is March-June, however the proximity of this survey area to the South-West Interzone influences flowering times and favours a Spring survey.
Disturbances	No	No impediments encountered.
Intensity	No	Survey intensity considered to be adequate.
Resources	No	Resources were adequate with 53-person days devoted to botanical survey work.
Access Problems	No	Survey areas accessible by foot and four-wheel drive vehicle.
Experience Levels	No	Personnel have combined over 32 years field surveying experience in the Eastern and North-Eastern Goldfields and Murchison Region.

4. RESULTS

4.1 Flora

Twenty-eight quadrats, each 20m x 20m were surveyed.

A total of 161 separate plant specimens (including duplicates) were collected from within and around the survey areas.

Two hundred and fifteen different species, including sub-species and varieties have been identified from 40 families and 102 genera.

NB These figures do not include the eight additional species located in a saline depression, outside the survey area, which are noted in the Discussion, Section 5, but were not included in the statistical analysis of the data shown in Section 4.3.

The most abundant genera were *Acacia* with 28 species followed by *Eremophila* with 14, *Eucalyptus* with 12 and *Grevillea* with 11 species.

A complete list of species recorded is shown in the attached Appendix C.

No non-native introduced species were recorded within the survey areas.

A database search was conducted by the DBCA of TEC's and PEC's endorsed by the minister for the environment on 09.09 21 (Ref: 49-0821EC)

The search revealed that the nearest TEC to the survey area is the Depot Springs stygofauna complex which is located approximately 273 kilometres north-west.

The nearest PEC to this survey area is the Emu Land System located approximately 23 kilometres south of the survey area.

No TEC's or PEC's were encountered during the survey.

No plant species gazetted as Declared Rare Flora pursuant to Part 2 of the *Biodiversity Conservation Act 2016* (W. A.) and no species listed as Threatened pursuant to the List of Threatened Flora of the *EPBC Act* (Department of Agriculture, Water and the Environment) has been recorded from within the survey area.

Nine plant species of conservation significance were recorded within and around the survey area. They are: *Persoonia leucopogon* (P1); *Apatelantha insignis* (P2); *Thryptomene eremaea* (P2); *Acacia eremophila* var. *variabilis* (P3); *Alyxia tetanifolia* (P3); *Homalocalyx grandiflorus* (P3) *Hysterobaeckea ochropetala* subsp *cometes* (P3); *Eucalyptus jutsonii* subsp. *jutsonii* (P4) and *Grevillea secunda* (P4). (See Maps 9-26)

4.2 Vegetation Classification

The Vegetation types described occur within different landforms, which, in turn, occur within different land systems as described below:

Land Systems

As mentioned in Section 2.4 above, two land systems were identified during the background research from the Department of Agriculture's Technical Bulletin 87 which covered the survey areas:

“**Marmion Land System**: Extensive gently undulating sand plains (mixed spinifex, acacia, heath and mallees).” (Pringle et al. p. 240)

“**Carnegie Land System**: Salt lakes with fringing saline flats and dunes.” (Pringle et al. p. 186)

An additional land system, “Yilgangi”, was found during the reconnaissance survey to be represented in a relatively small area (< 8 Ha), fringing the north-western corner of Lake Goongarrie, which was not identified on the 1:250 000 scale map accompanying the bulletin, probably due to the fact that it would have been too small to depict at that scale.

The **Yilgangi Land System** is described as: “Low breakaways with saline, gravelly lower plains, supporting predominantly halophytic low shrublands.” (Pringle et al. p. 288)

Landforms

Six different **landform units** may occur within the Marmion Land System, eight within the Yilgangi Land System and ten within the Carnegie Land System.

Marmion Land System Landforms:

Three of the six Landform units were identified within the Marmion Land System:

Unit 1-Sand sheet – gently undulating sandplain. The vegetation was described as: “Scattered to moderately close acacia tall shrubland with occasional small mallees, a heath stratum, and spinifex and wanderrie grasses, each occasionally dominant.” (Pringle et al. p. 241)

Unit 5-Dunes – occasional low (<10m) dunes occurring in the more extensive areas of Unit 1. The vegetation was described as: “Variable, often moderately close tall shrublands consisting of acacias, mallees, *Callitris collumelaris* (native pine), *Grevillea* spp. *Hakea* spp. with a heath stratum and spinifex.” (Pringle et al. p. 241)

Unit 6 – Narrow drainage tracts- occasional narrow (<500 m wide), linear zones receiving concentrated run-on from Unit 2. The vegetation was described as: “Close *Acacia aneura* tall shrublands, understory may contain heath species, hardpan low shrubs, and wanderie grasses.” (Pringle et al. p. 241)

Although Unit 2, referred to above, barely encroached into the survey area, its influence in providing run-off, together with a lower elevation in the landscape, provide the conditions and vegetation consistent with that described in Unit 6.

Unit 2 was described as, “Stripped surfaces – exfoliating low (5 m) outcrops of granite with narrow fringing plains.” (Pringle et al. p. 241)

Carnegie Land System Landforms

Of the ten different Landform units which may occur in the Carnegie Land System, two were identified:

Unit 1- Lake beds – lake floors. Unvegetated.

Unit 3- Saline plains- level to gently undulating highly saline lower plains and drainage zones. The vegetation was described as: “Scattered to moderately close low shrublands, usually *Halosarcia* spp. (samphire) but also *Frankenia* spp. (frankenian).” (Pringle et al. p. 187)

Yilgangi Land System Landforms

One of the eight Landform units possibly occurring within the Yilgangi Land System was mapped:

Unit 1- Breakaways – narrow, stripped, lateritised surfaces above escarpments (generally < 10 m high), with stony scree slopes. The vegetation was described as: “Scattered eucalypt woodland in the south... [of the Technical Bulletin No 87- survey area] Scattered mixed shrublands... elsewhere.” (Pringle et al. p. 289)

Vegetation Types

Marmion Land System Vegetation Types

Occurring within the **Sand sheet landform**, the Vegetation Type classification of **Sandplain spinifex hummock grassland (SASP)** described in Technical Bulletin No.87 covers a number of different sub-types; typically determined by the depth of the underlying sand, the dominance of Spinifex, and represented by their upper strata, including Mallees and Mulga.

Three of these sub-types of SASP were identified and mapped within the surveyed area:

- **Sandplain -gum stratum – SAGS**
- **Sand dune shrubland – SDSH**
- **Sandplain acacia shrublands - SACS**

One additional vegetation type was found within the Marmion Land System:

- **Mulga wanderrie grassy shrublands – MUWA**

Carnegie Land System Vegetation Types

The south-eastern corner of survey Area,1 encroaches on a salt lake, Lake Goongarrie.

One Vegetation Type was mapped within this land system: **Frankenia low shrublands – FRAN**. Although it is recognised that a similar vegetation type, Samphire low shrublands (SAMP) predominated in some sections of the lake edge it was not differentiated in the mapping at the scale of approximately 1:10 000.

Yilgangi Land System Vegetation Type

A small area of breakaways with stony foot slopes occurs on the north-western corner of Lake Goongarrie which is considered to be a landform described as occurring within the Yilgangi Land System. It appears to be an extension of the Yilgangi Land System that has been shown on the 1:250 000 map accompanying Technical Bulletin 87 as occurring approximately 2.5 kilometres to the east.

The Landform unit is described in Technical Bulletin 87 as:” Breakaways-narrow stripped, lateritised surfaces above escarpments (generally < 10 m high), with stony scree slopes.”

Within this Landform unit, one Vegetation Type was identified and mapped:

- **Greenstone hill (non - halophytic) eucalypt woodlands- GNEW**

Find below the complete map of vegetation types with quadrats locations from the survey:

Map 4: Comet Vale Vegetation and Quadrat Locations.

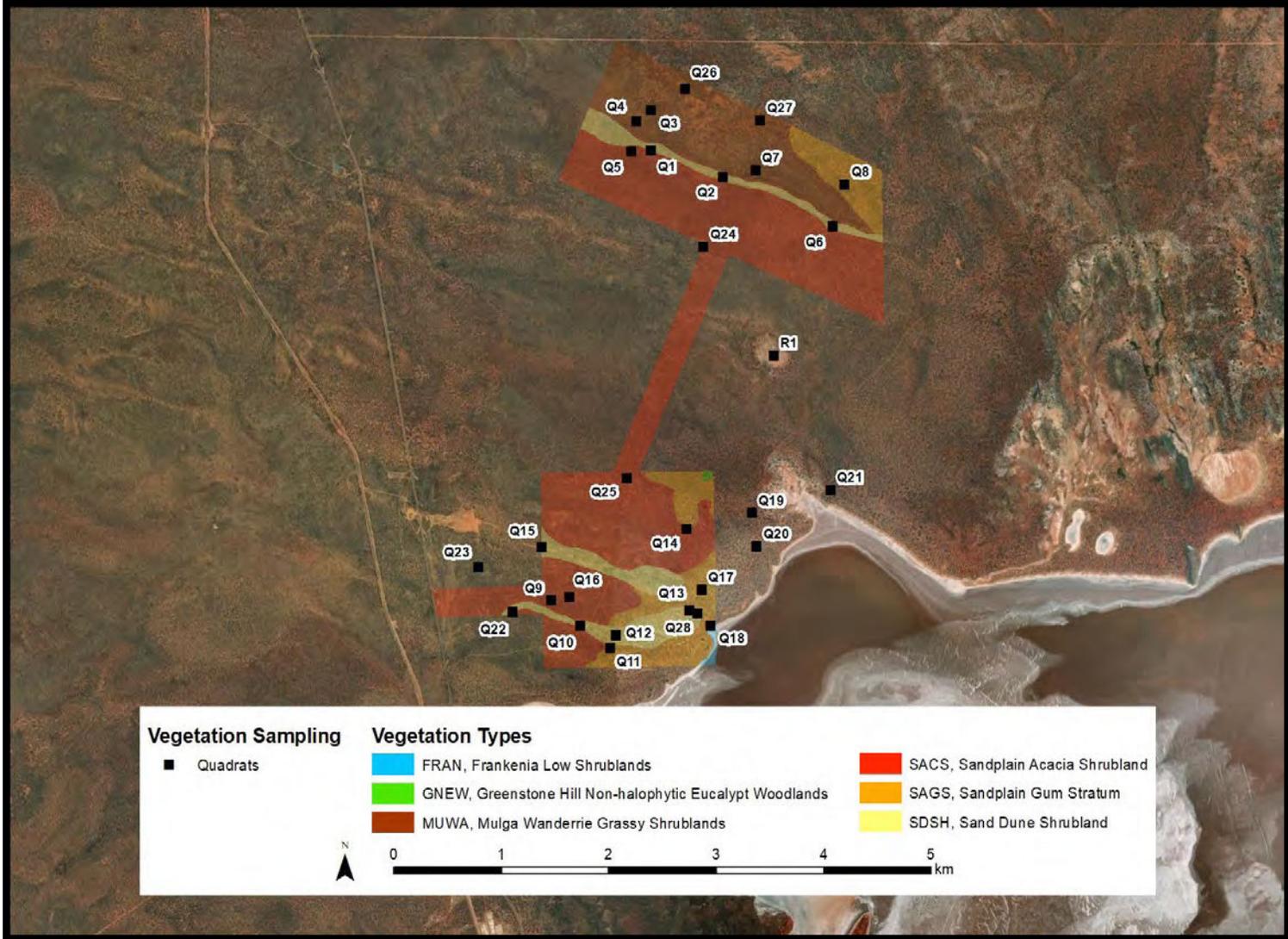


Table 3: Vegetation Type Proportions within the Survey Area

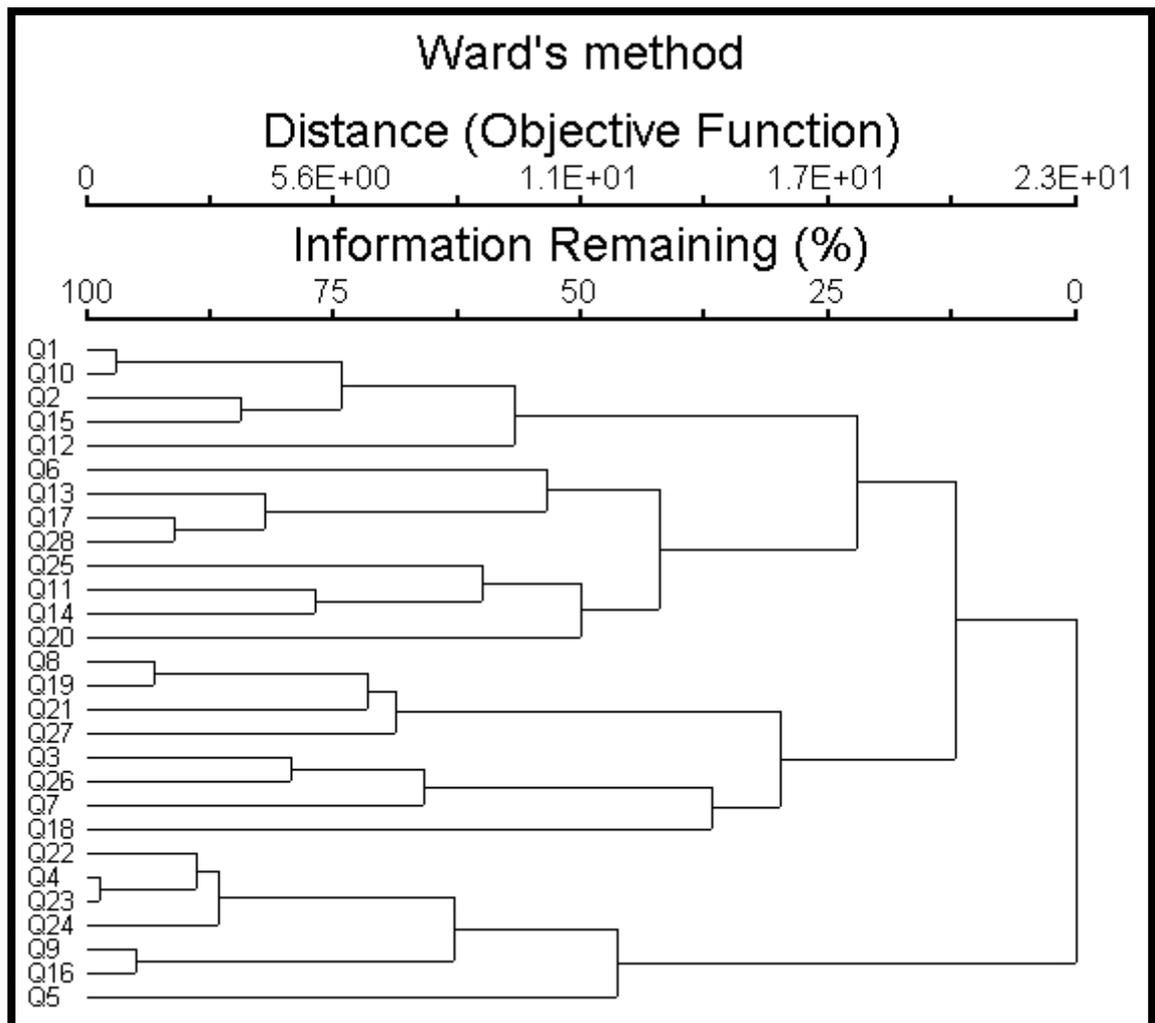
VEG TYPE	HECTARES
FRAN, Frankenia Low Shrublands	2.7
GNEW, Greenstone Hill Non-halophytic Eucalypt Woodlands	0.981
MUWA, Mulga Wanderrrie Grassy Shrublands	150.184
SACS, Sandplain Acacia Shrubland	440.317
SAGS, Sandplain Gum Stratum	100.567
SDSH, Sand Dune Shrubland	78.532
Grand Total	773.281

4.3 Statistical analysis

A group cluster analysis was carried out on the data collected from the reconnaissance and detailed surveys, and a dendrogram was produced using Ward's method (Ward 1963). This is one of two methods recommended by McCune and Grace (2002),

Based on presence/absence of species, the dendrogram confirmed the grouping of 26 of the 28 quadrats into the vegetation types in which they had been previously mapped. The remaining two quadrats, 25 and 22, fell close to the mapped boundaries of the vegetation types to which they had been allocated.

Figure 2: Ward's Method Dendrogram



Quadrats 1,10, 2,15, 12, and 6 are in SDSH

Quadrats 13, 17,and 28 are in SAGS

Quadrat 25 is in SACS

Quadrats 11, 14, 20, 8 and 19 are in SAGS

Quadrat 21 is in GNEW

Quadrats 27, 3 ,26, and 7 are in MUWA

Quadrat 18 is in FRAN

Quadrat 22 is in SDSH

Quadrats 4, 23, 24, 9,16 and 5 are in SACS

A species-area curve was produced using the Sorensen/Bray-Curtis distance measure with β set to -0.25, as recommended by McCune and Grace (2002)

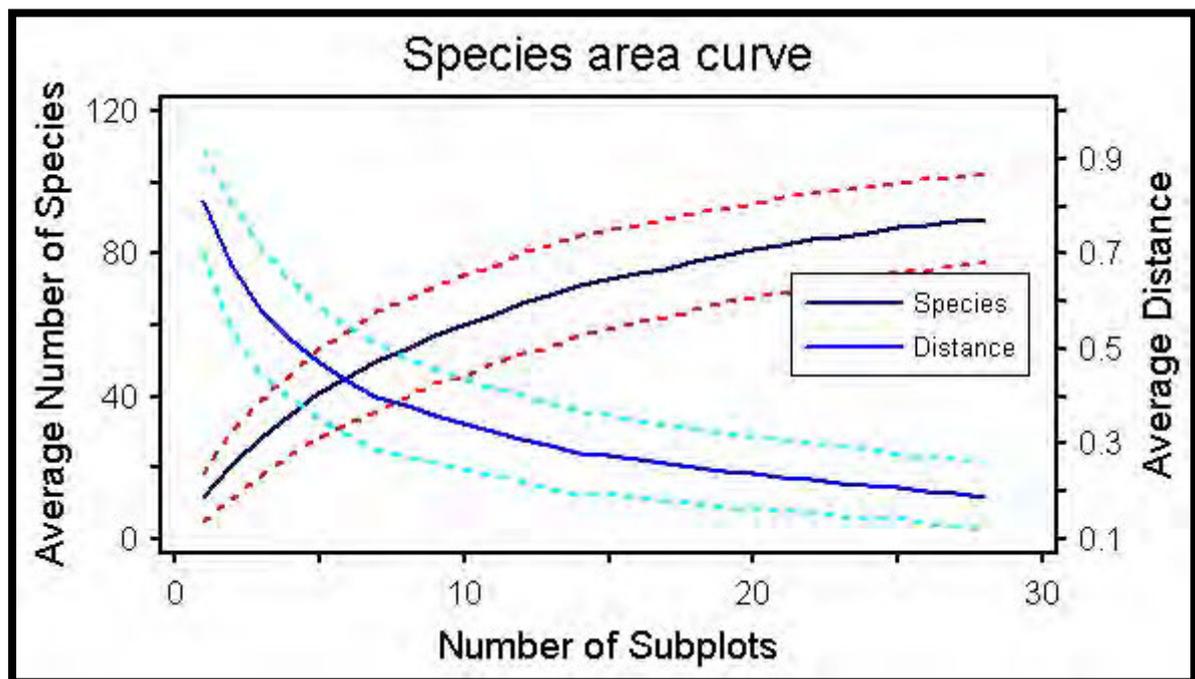
One hundred and four species were collected opportunistically in addition to the 111 species collected within the quadrats giving a total of 215.

First and second order jack-knife estimates, calculated from the quadrat records, of the total number of species occurring within the survey area, were 159.2 and 190.4 respectively.

Chao2 classic form and Chao2 bias corrected form estimates were 184.5 and 176.6 respectively.

These figures indicate that the 111 taxa recorded from the quadrat surveys represent between 58.3 and 69.7% of the total taxa on the site.

Figure 3: Species Area Graph



Priority Flora species

Nine Priority flora species were encountered within the area surveyed. *Persoonia leucopogon* (P1), *Apatelantha insignis* (P2), *Thryptomene eremaea* (P2), *Acacia eremophila* var. *variabilis* (P3), *Alyxia tetanifolia* (P3), *Homalocalyx grandiflorus* (P3), *Hysterobaeckea ochropetala* subsp. *cometes* (P3), *Eucalyptus jutsonii* subsp. *jutsonii* (P4), and *Grevillea secunda* (P4). Many of these were overlapping populations particularly in the south-eastern corner of the survey area.

The table below shows the total number of the various Priority species recorded within and around the survey area. Four species were found to extend well beyond the extent of the surveys: *Hysterobaeckea ochropetala* subsp. *cometes* (P3); *Eucalyptus jutsonii* subsp. *jutsonii* (P4); *Alyxia tetanifolia* (P3) and *Thryptomene eremaea* (P2).

Details of these species are shown below:

Table 4: Priority Species Ranking and Abundance

Priority ranking	Abundance
P1	30
<i>Persoonia leucopogon</i>	30
P2	4047
<i>Apatelantha insignis</i>	47
<i>Thryptomene eremaea</i>	4000
P3	14834
<i>Acacia eremophila</i> var. <i>variabilis</i>	326
<i>Alyxia tetanifolia</i>	359
<i>Homalocalyx grandiflorus</i>	7703
<i>Hysterobaeckea ochropetala</i> subsp. <i>cometes</i>	6446
P4	1452
<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	1001
<i>Grevillea secunda</i>	451
Total	20363

Plate 1: *Persoonia leucopogon* (P1)



Persoonia leucopogon (P1) was the least abundant of the Priority plant species observed with a total of 30 recordings. Although individual sightings were made in Sand Dune Shrubland and Sandplain Gum Stratum, the majority, 90%, occurred in one population which was growing on both sides of the access track at the base of a dune in the south-eastern part of the survey area, in Sandplain Acacia Shrublands.

Persoonia leucopogon (P1) is described in Florabase as: “Erect or decumbent shrub, 0.3-0.6 m high. Fl. Yellow/green-yellow, Oct to Dec. Yellow sand or sandy clay.”

Map 5: *Persoonia leucopogon* (P1) Regional Distribution.

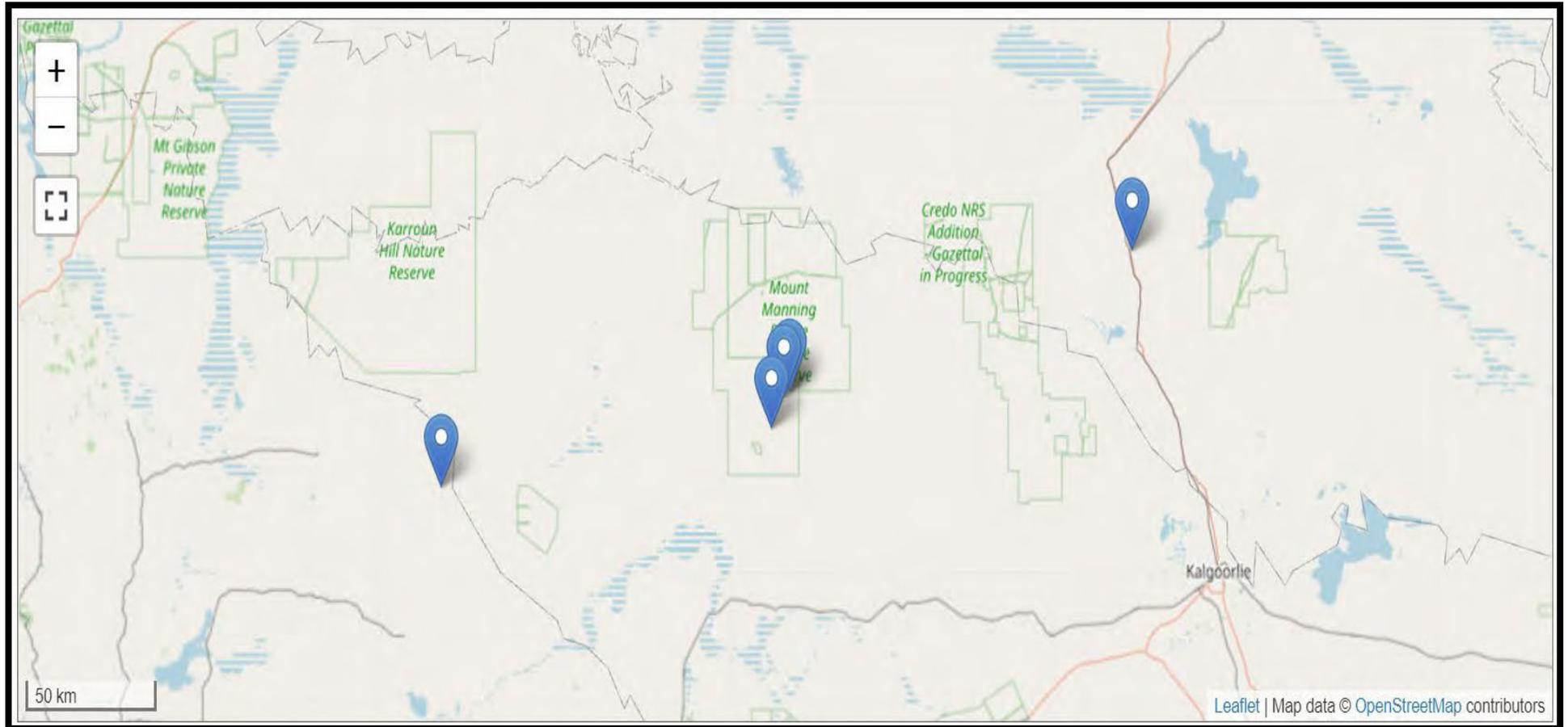
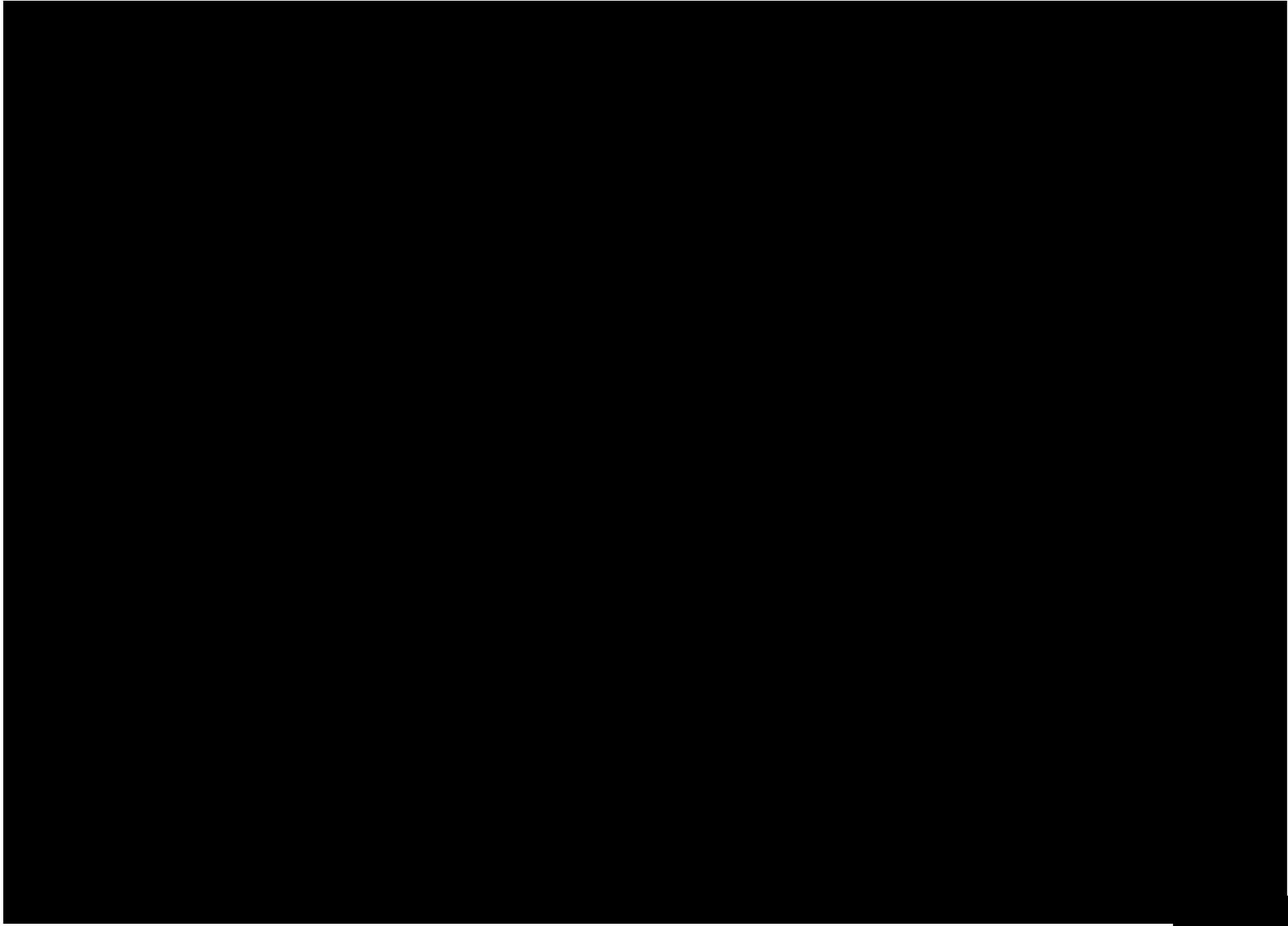
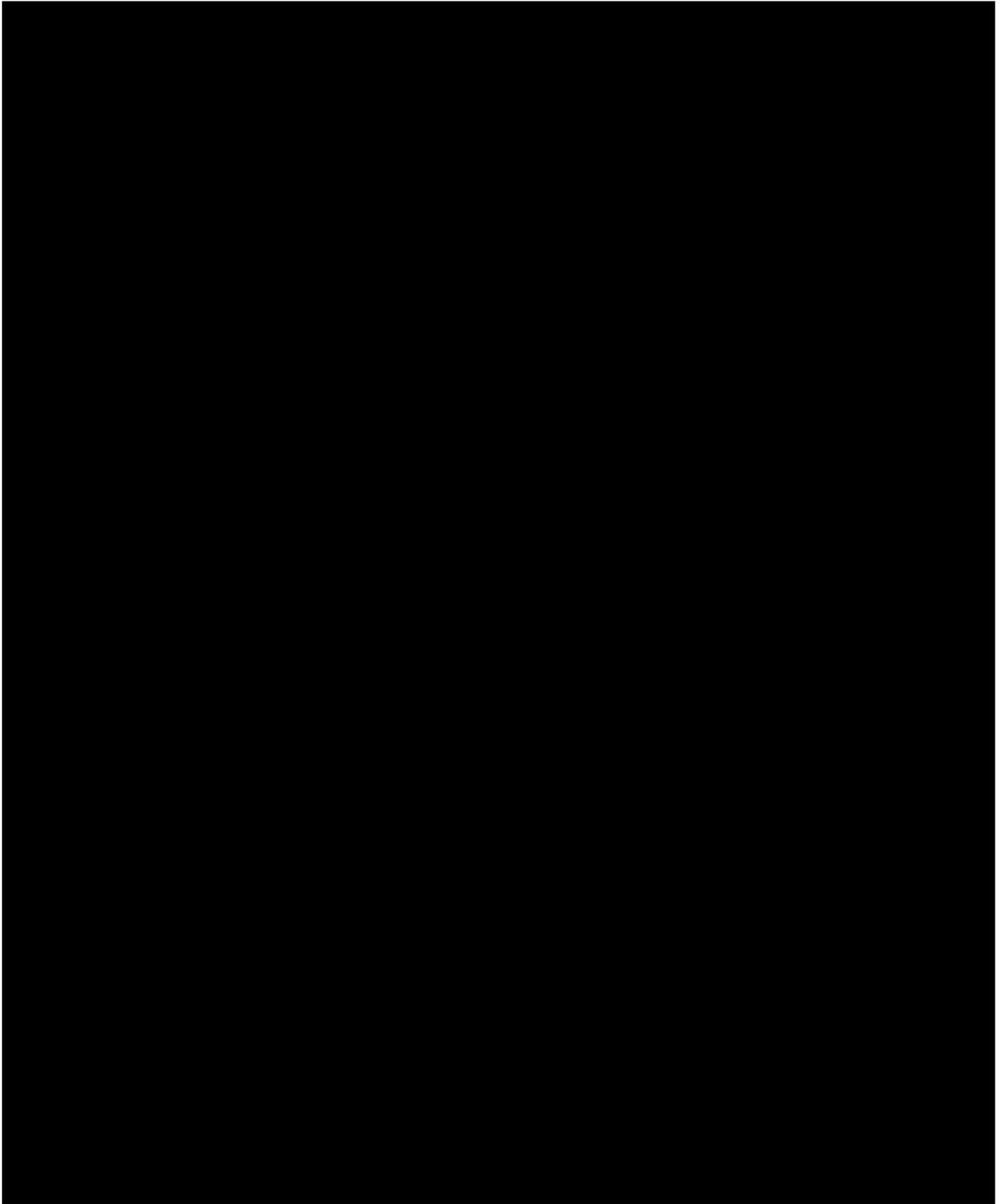
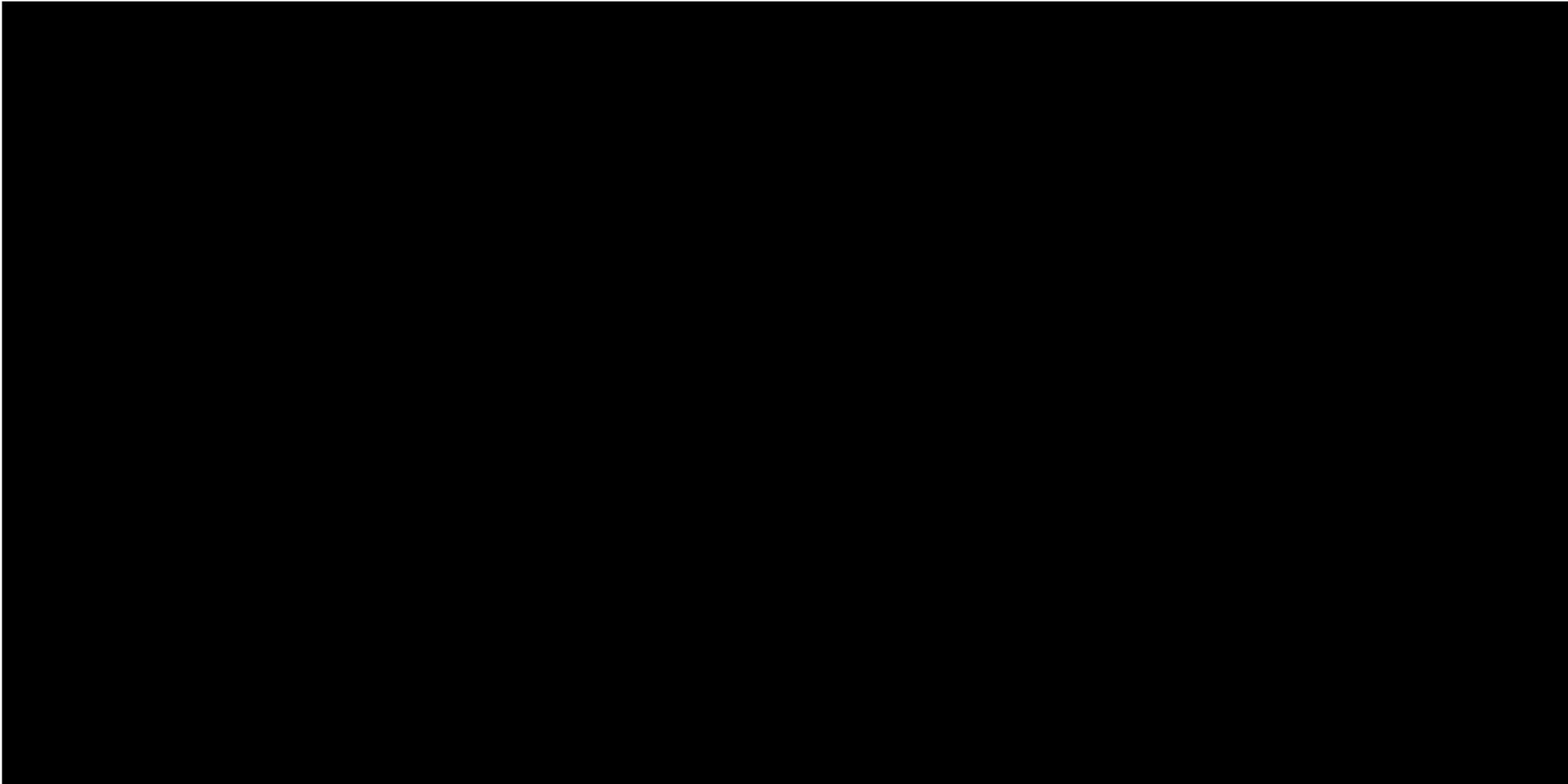


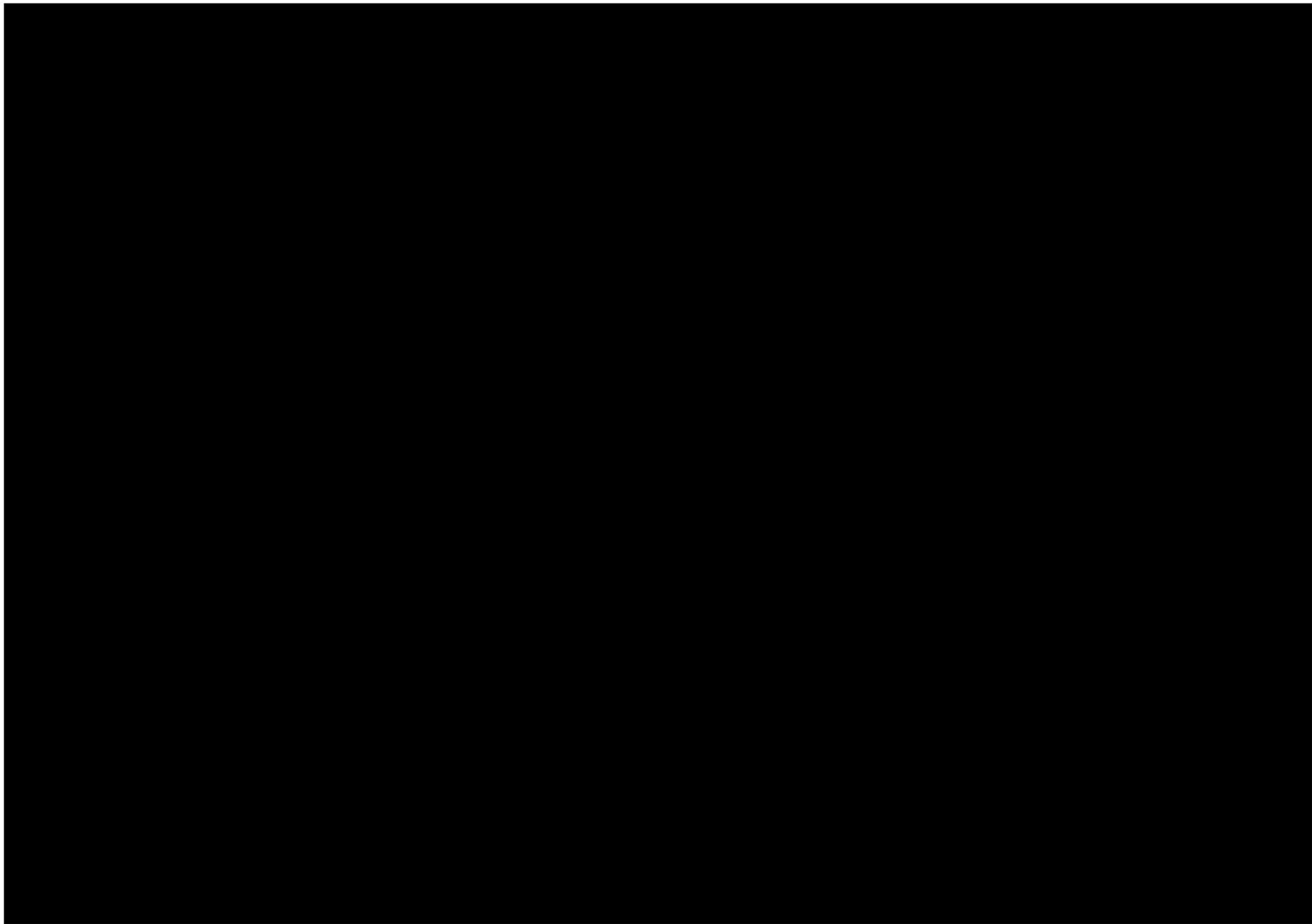
Image used with the permission of the Western Australian Herbarium, Department of Biodiversity, Conservation and Attraction (<https://florabase.dpaw.wa.gov.au/browse/profile/2266>) Accessed on Thursday 14 April 2022

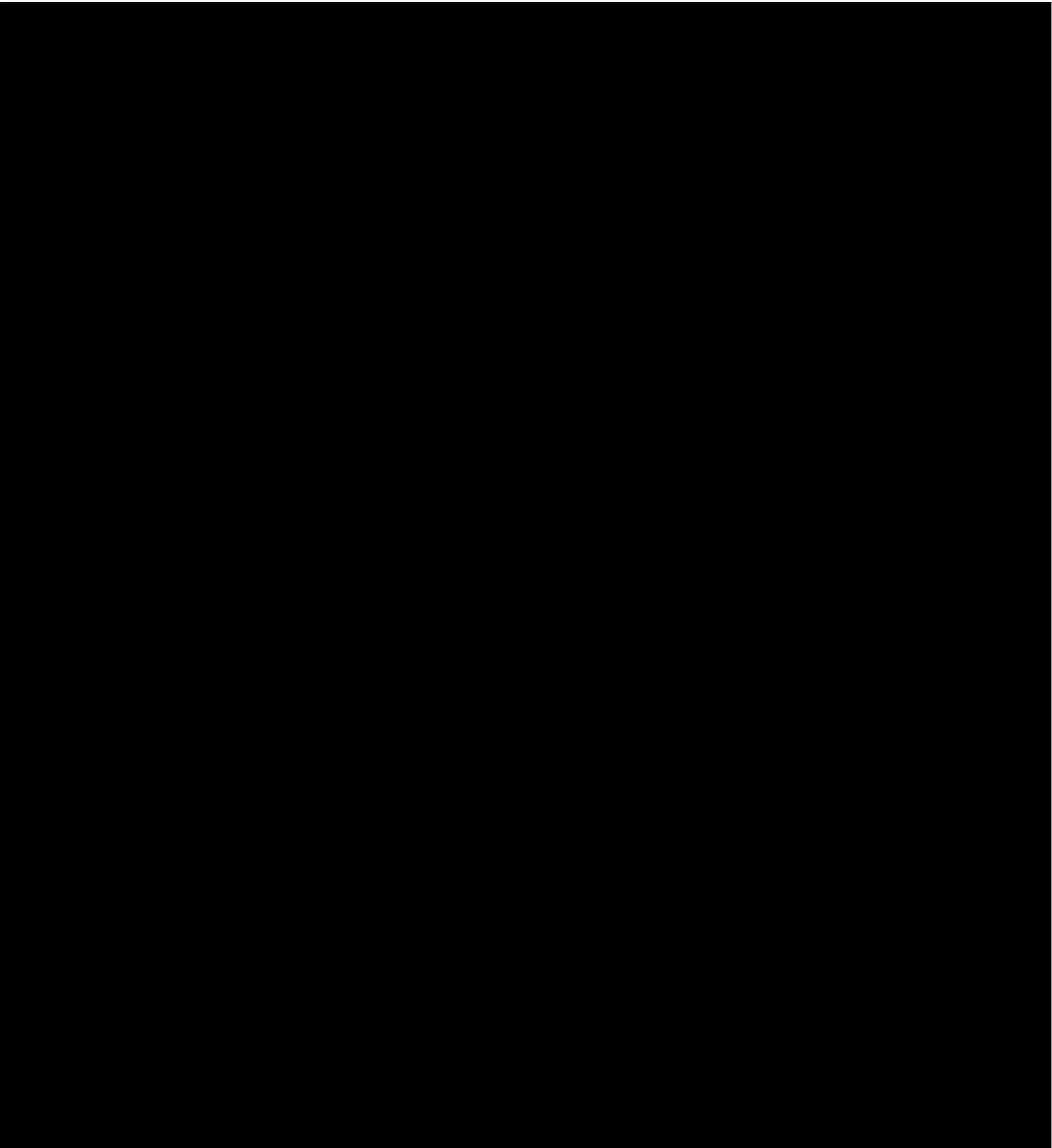


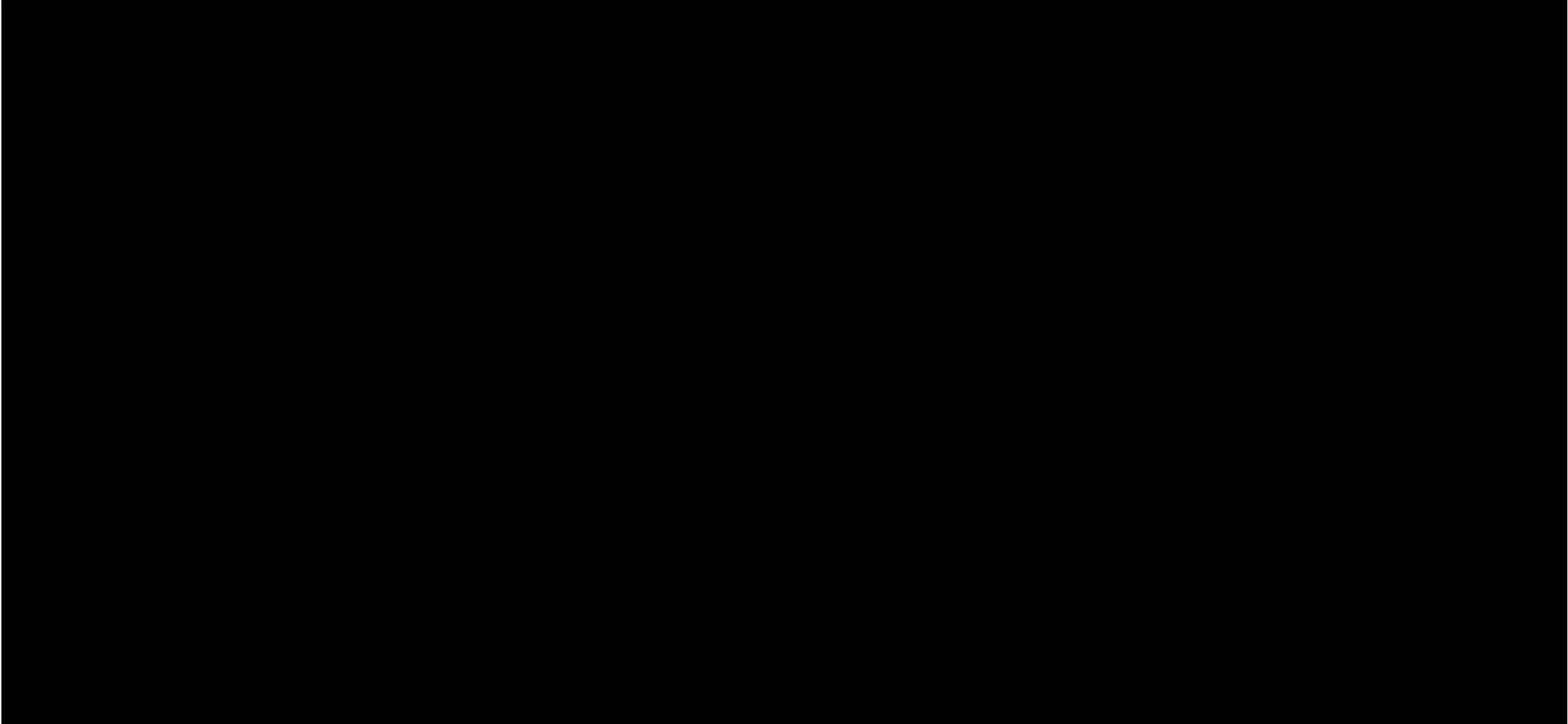
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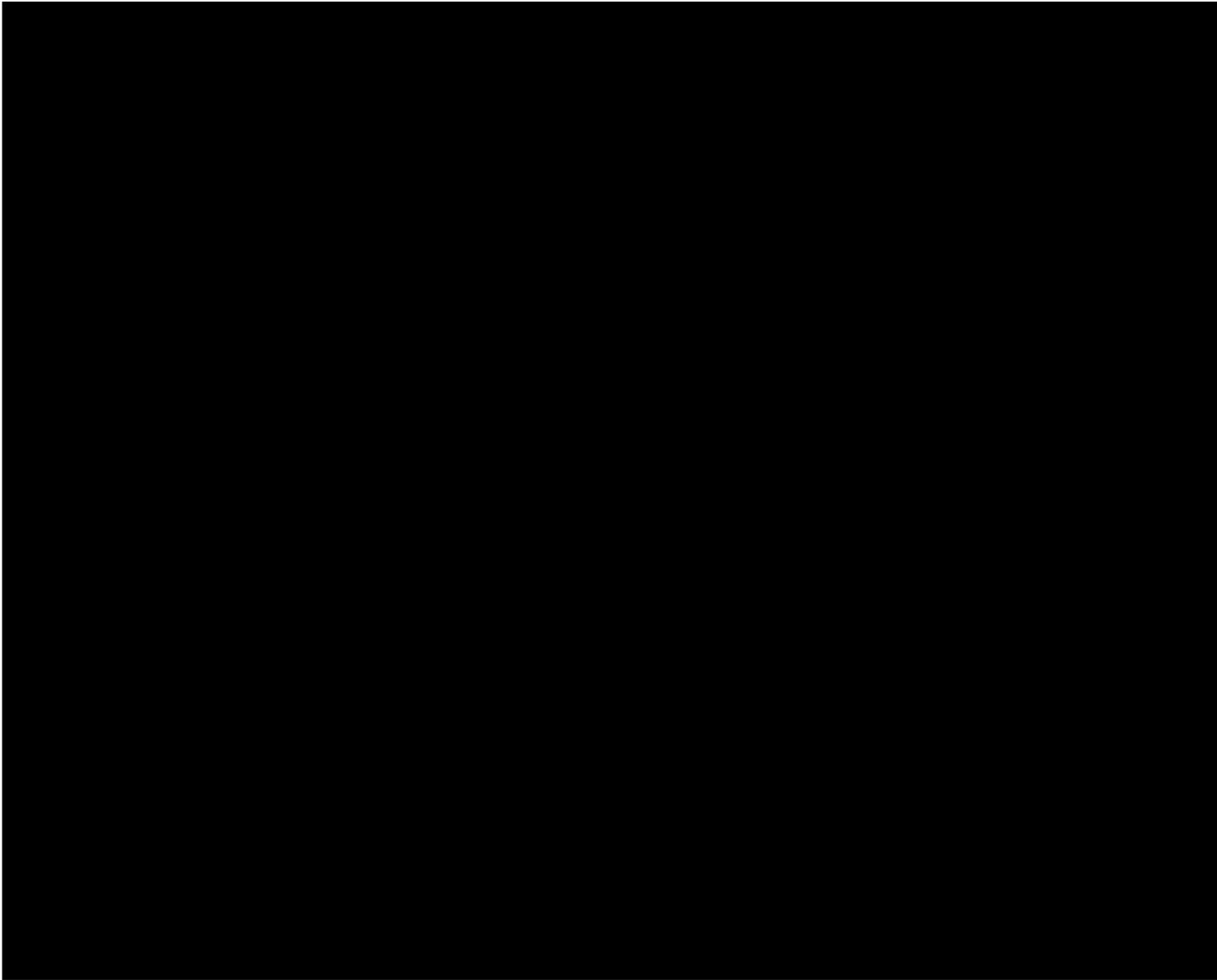




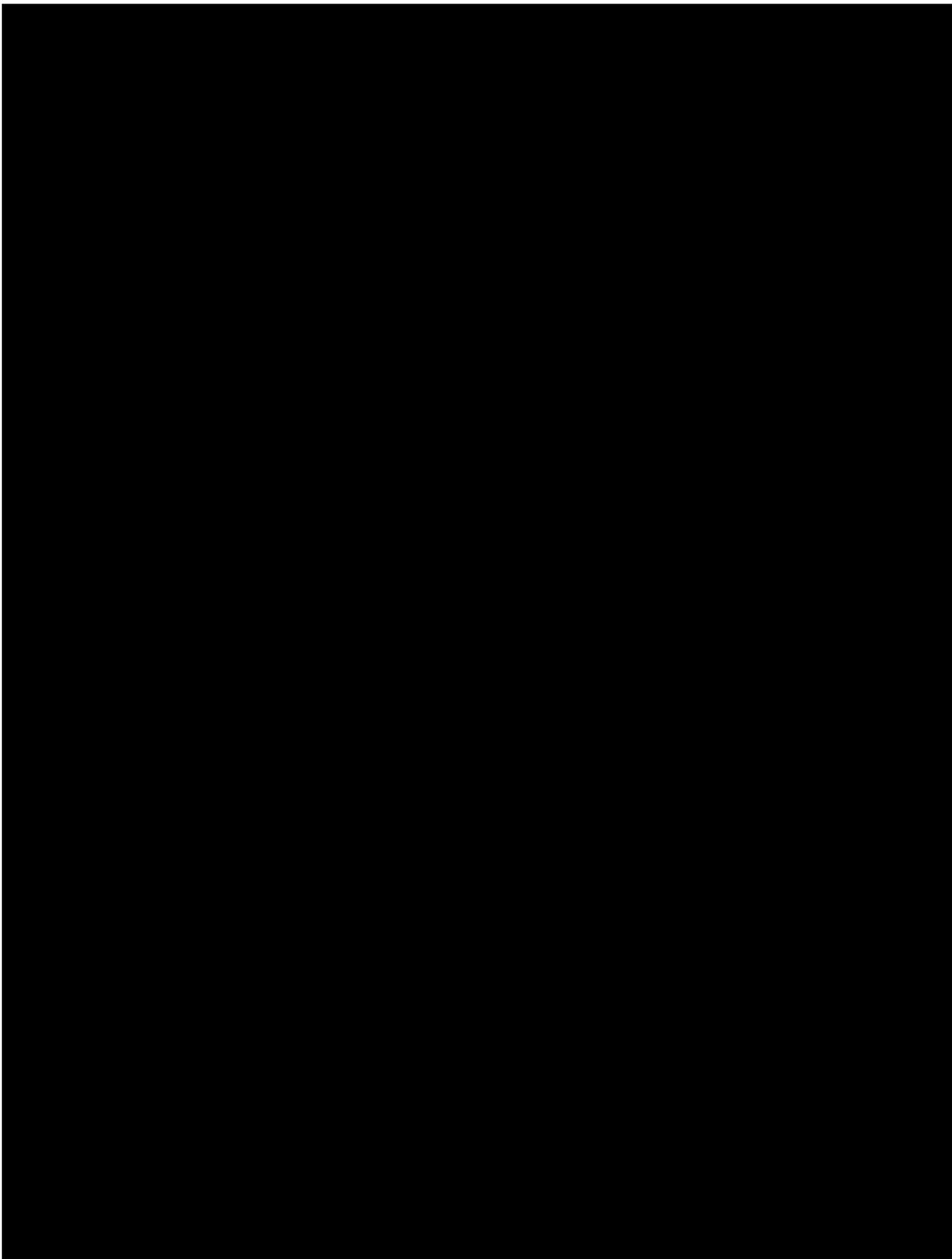


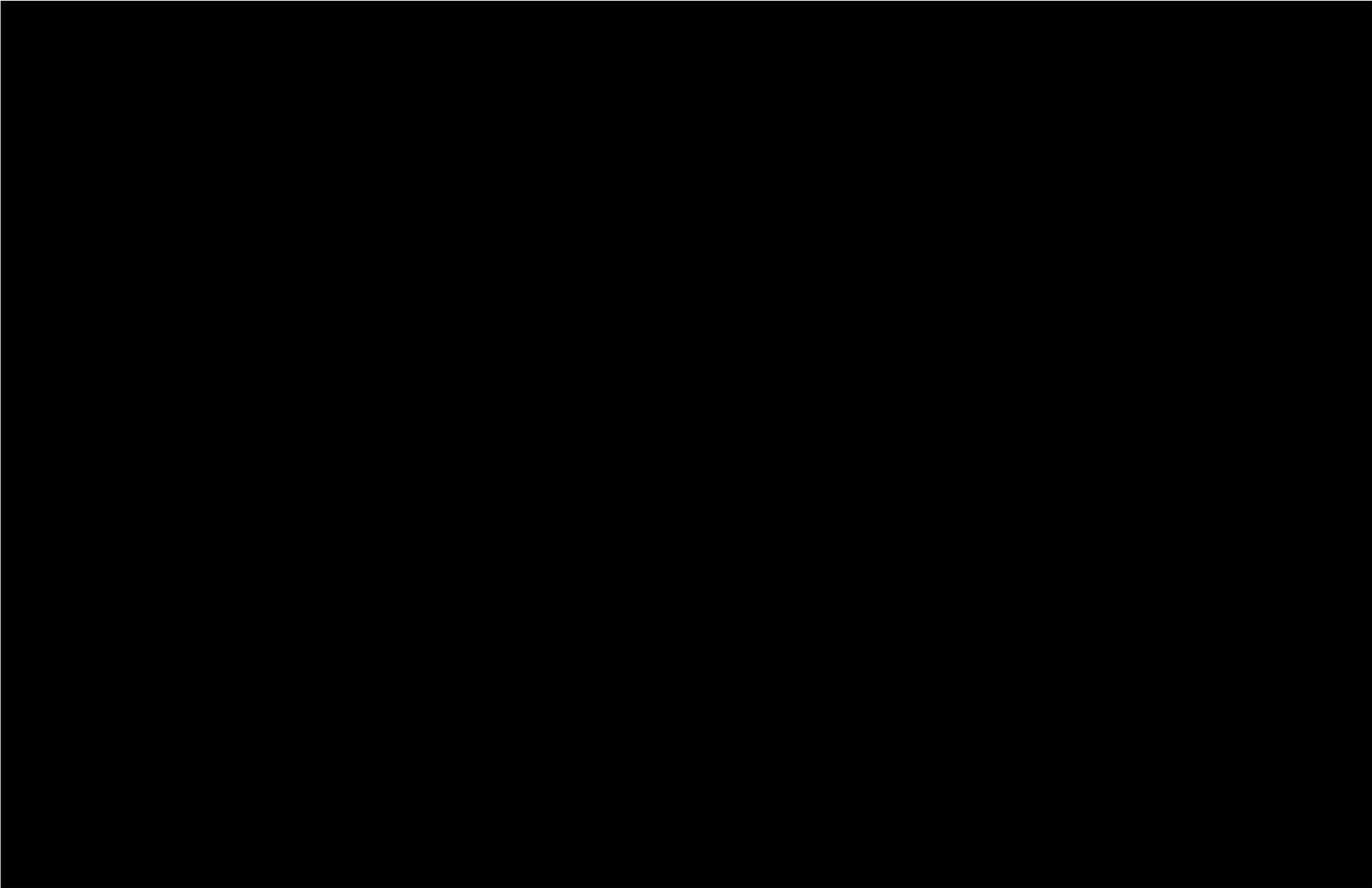


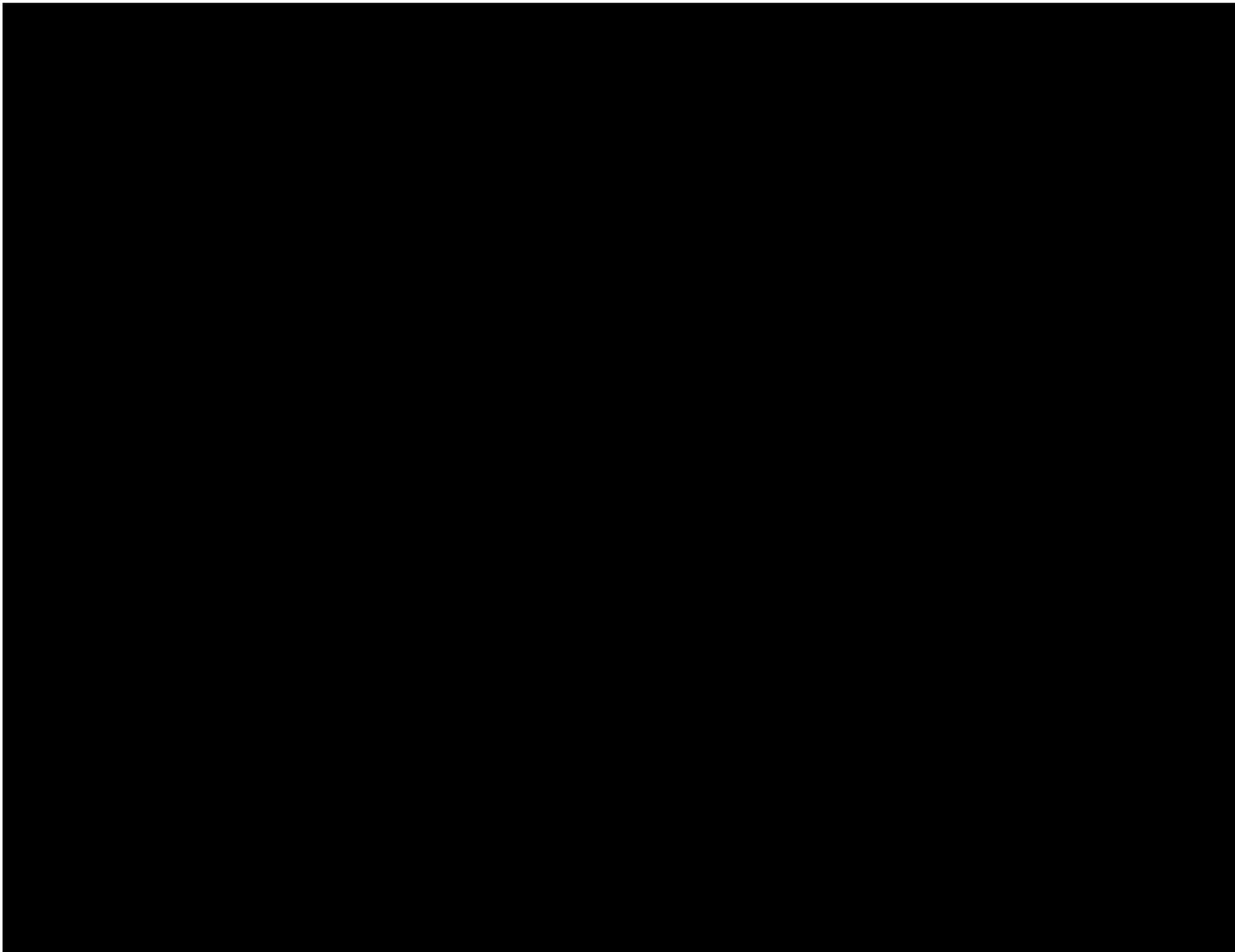


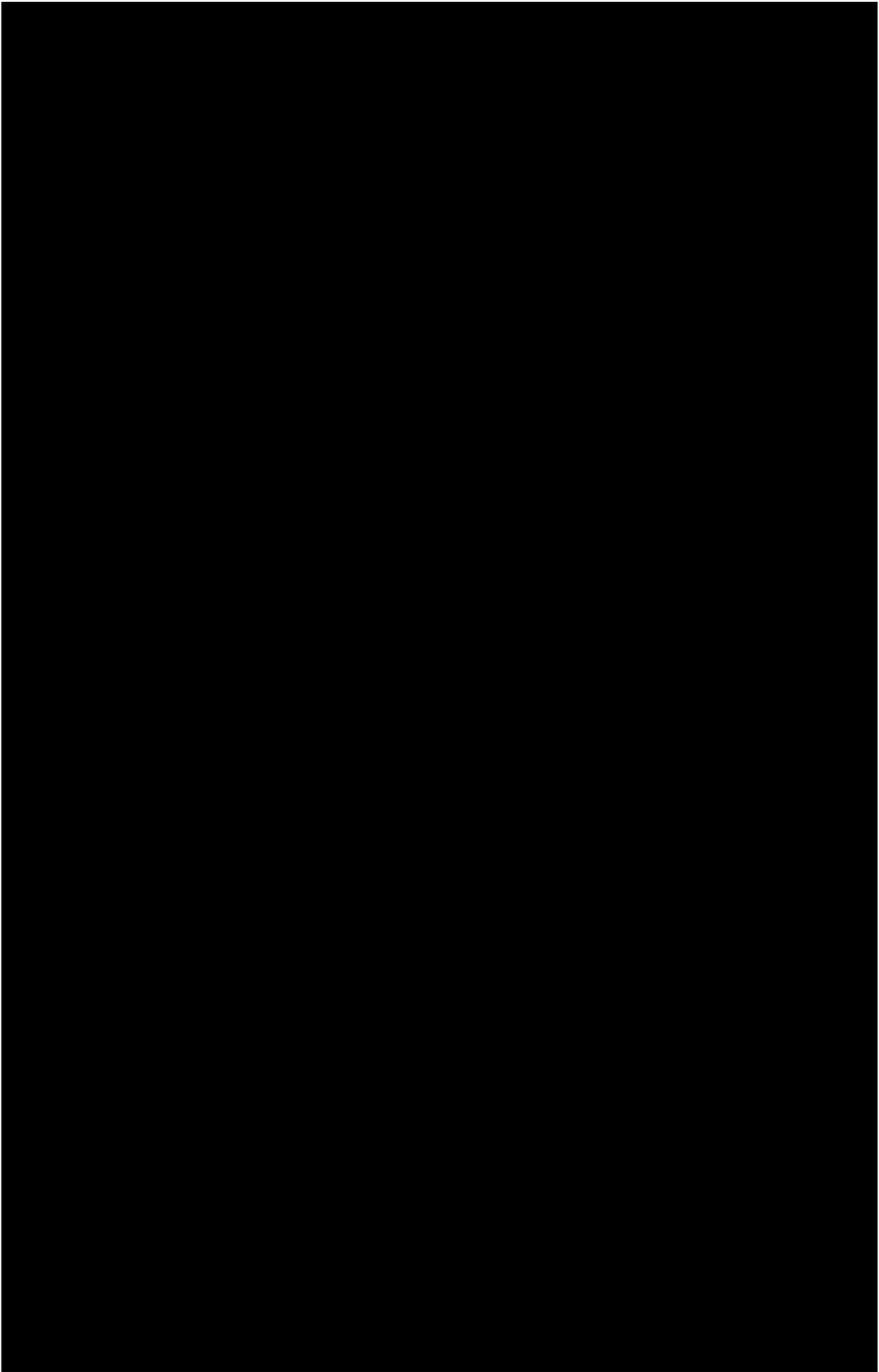


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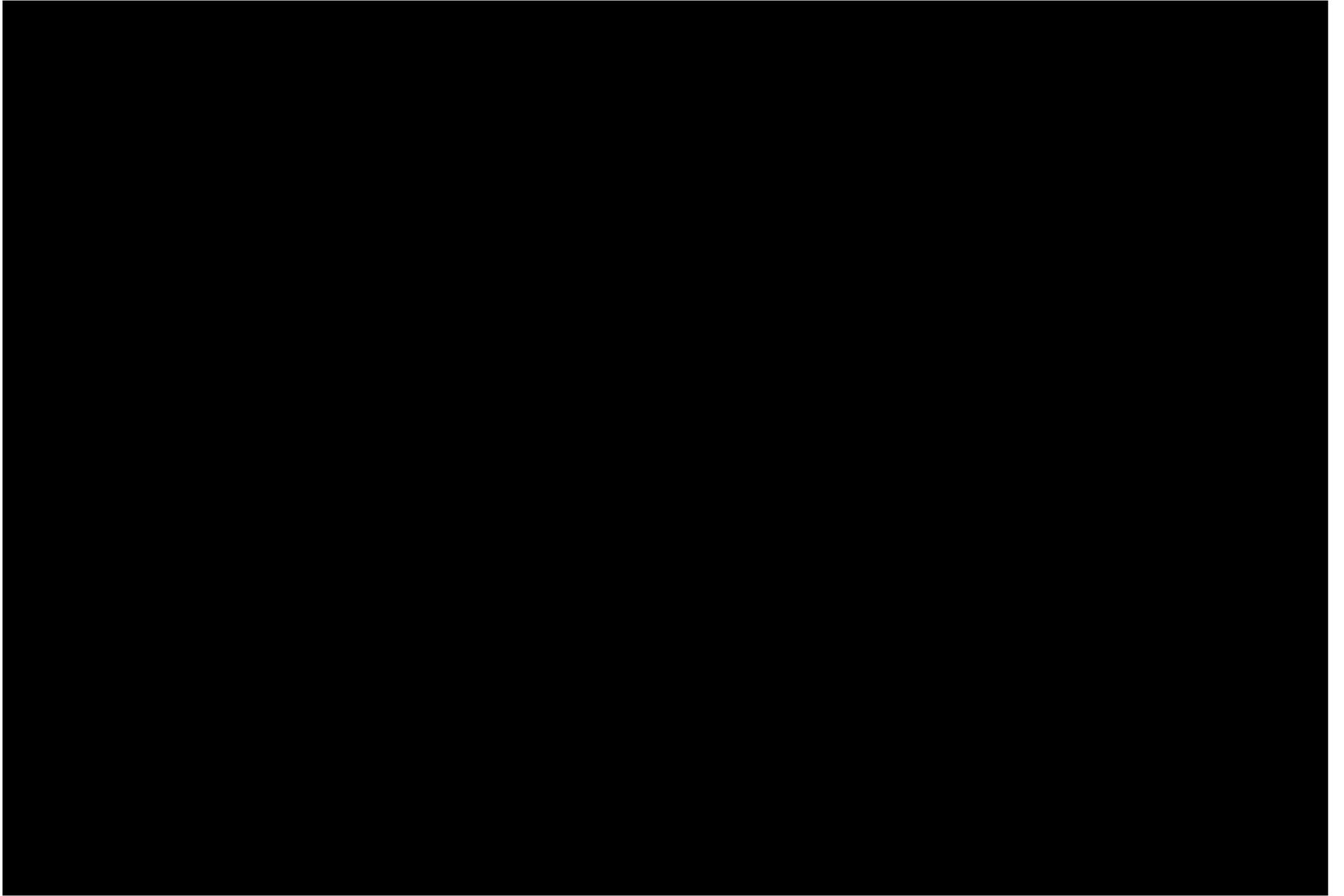


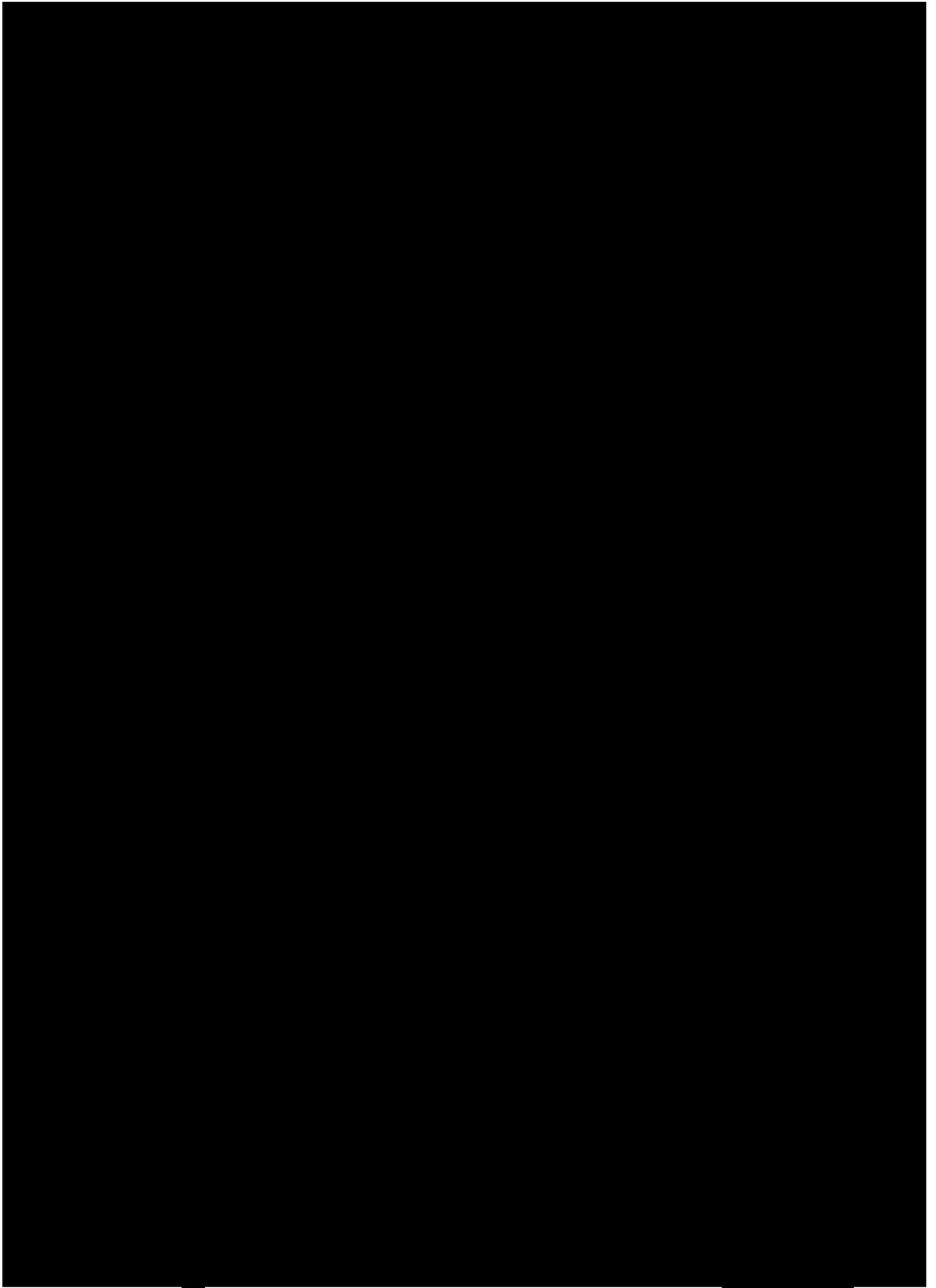


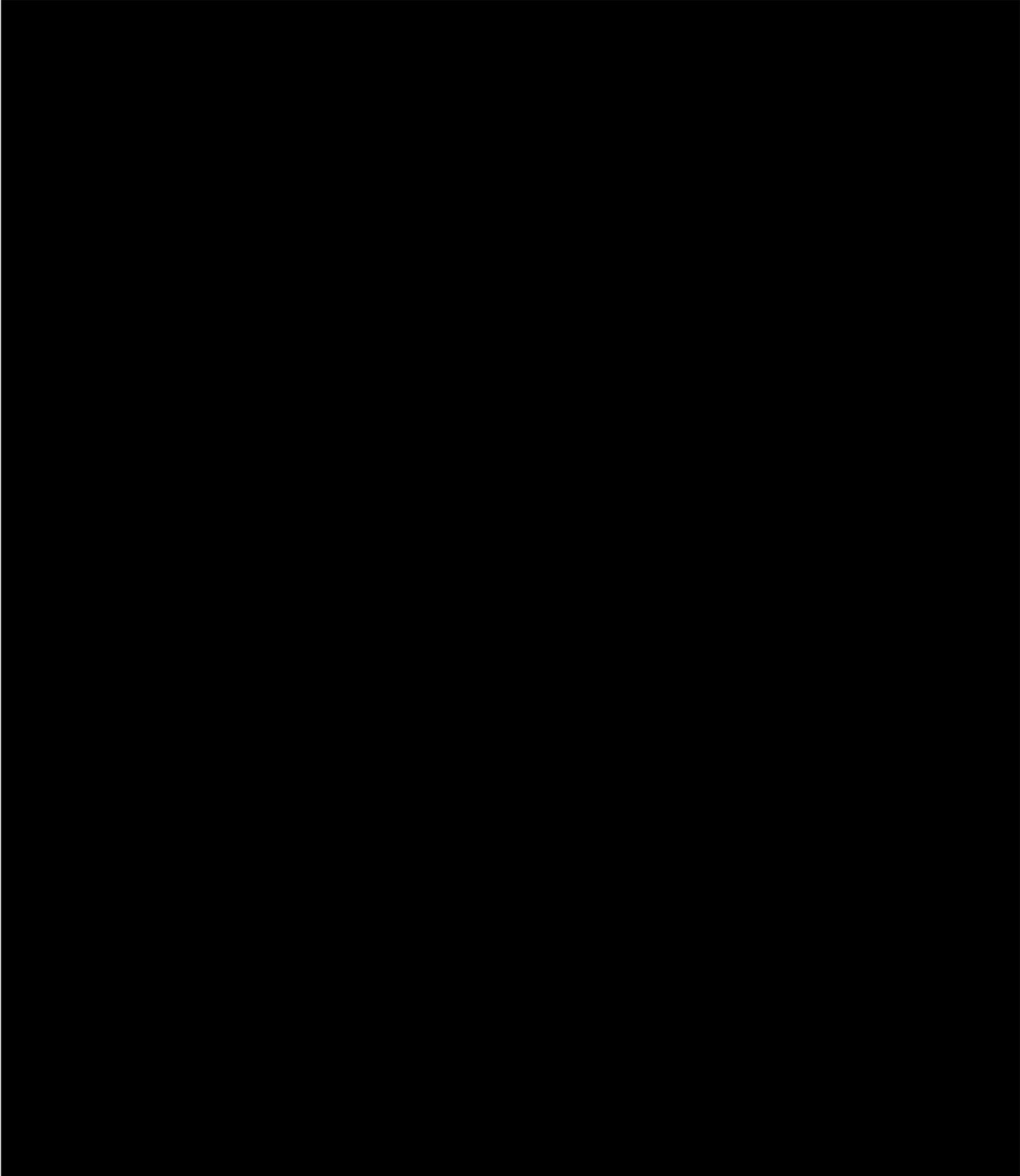
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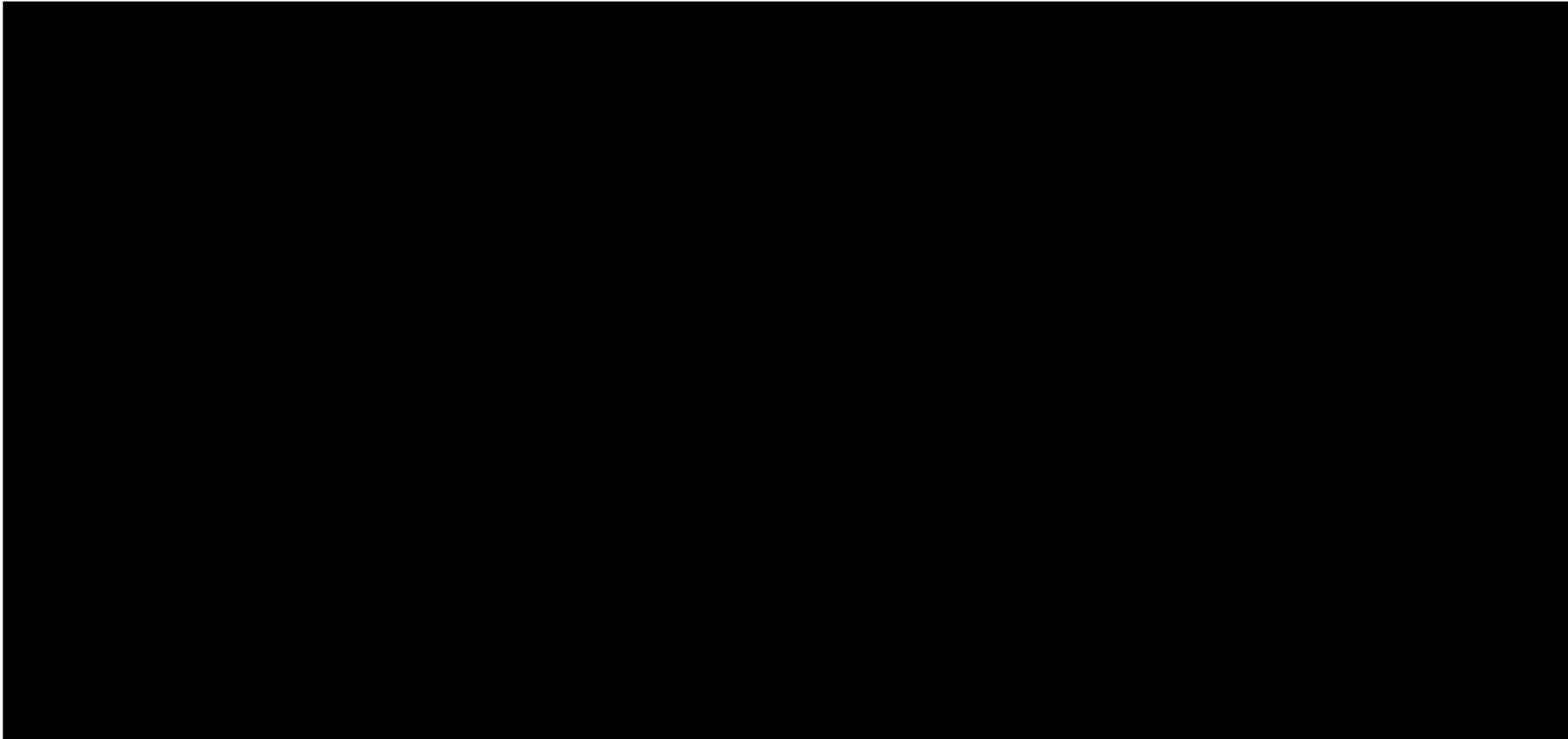
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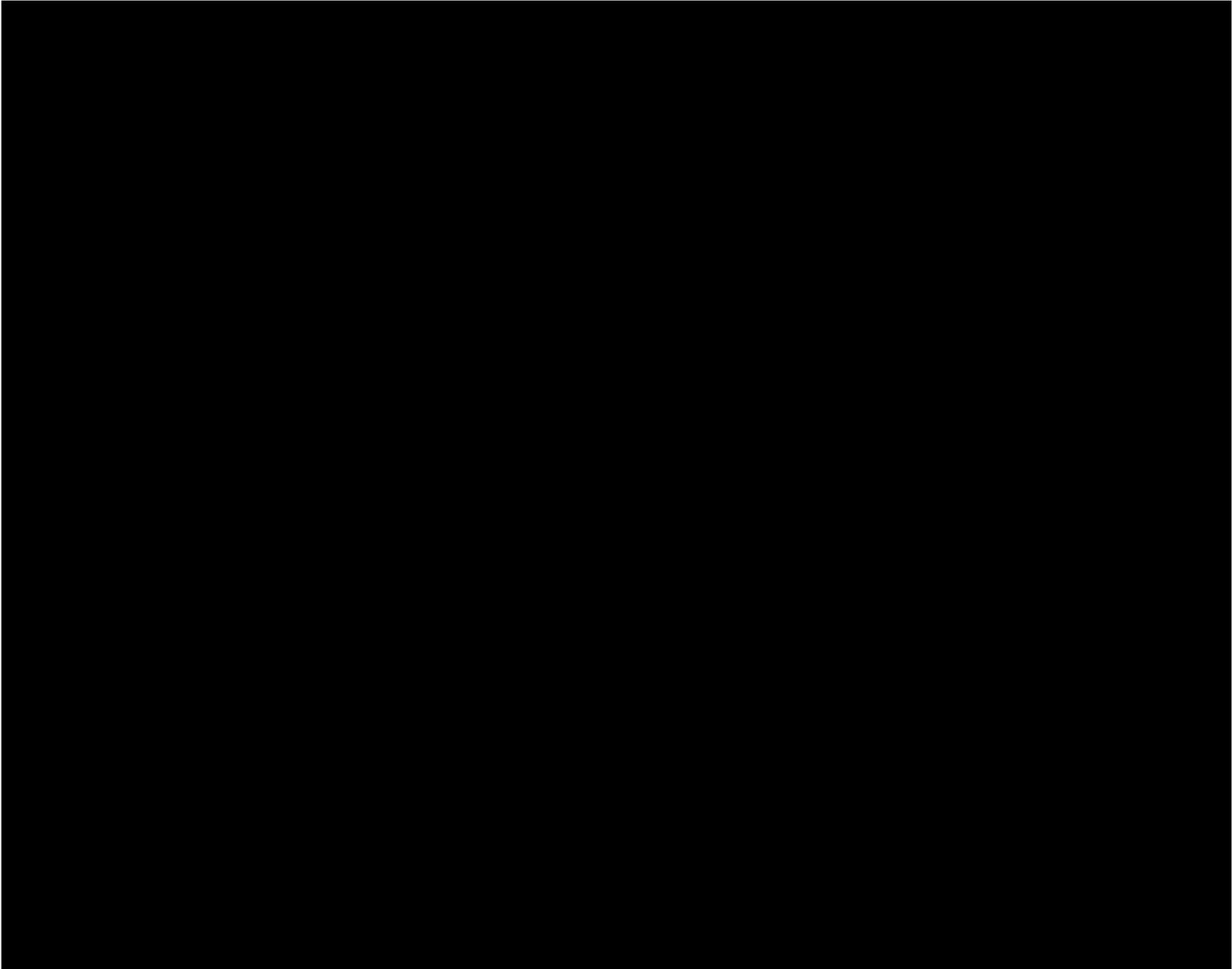


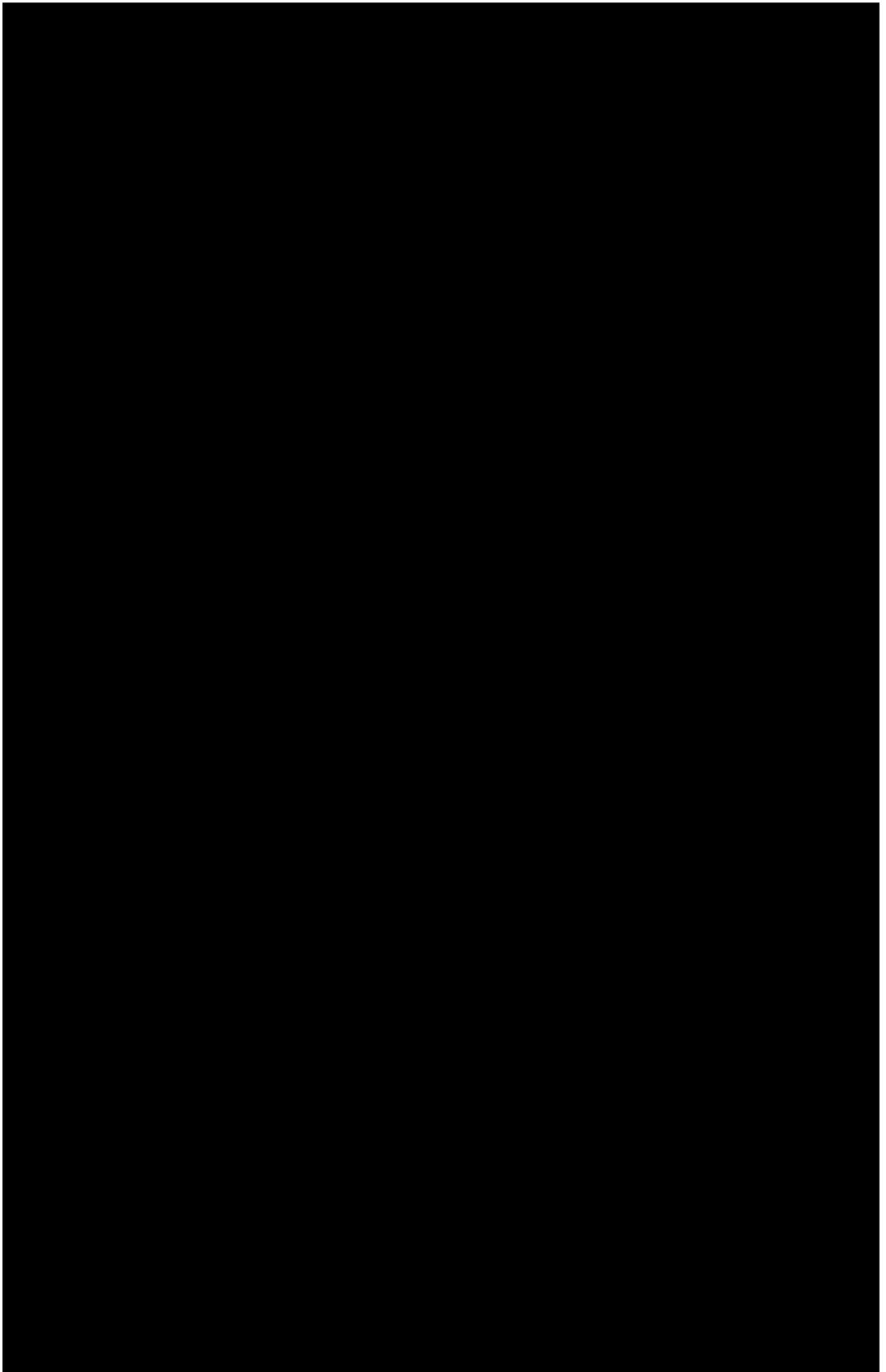




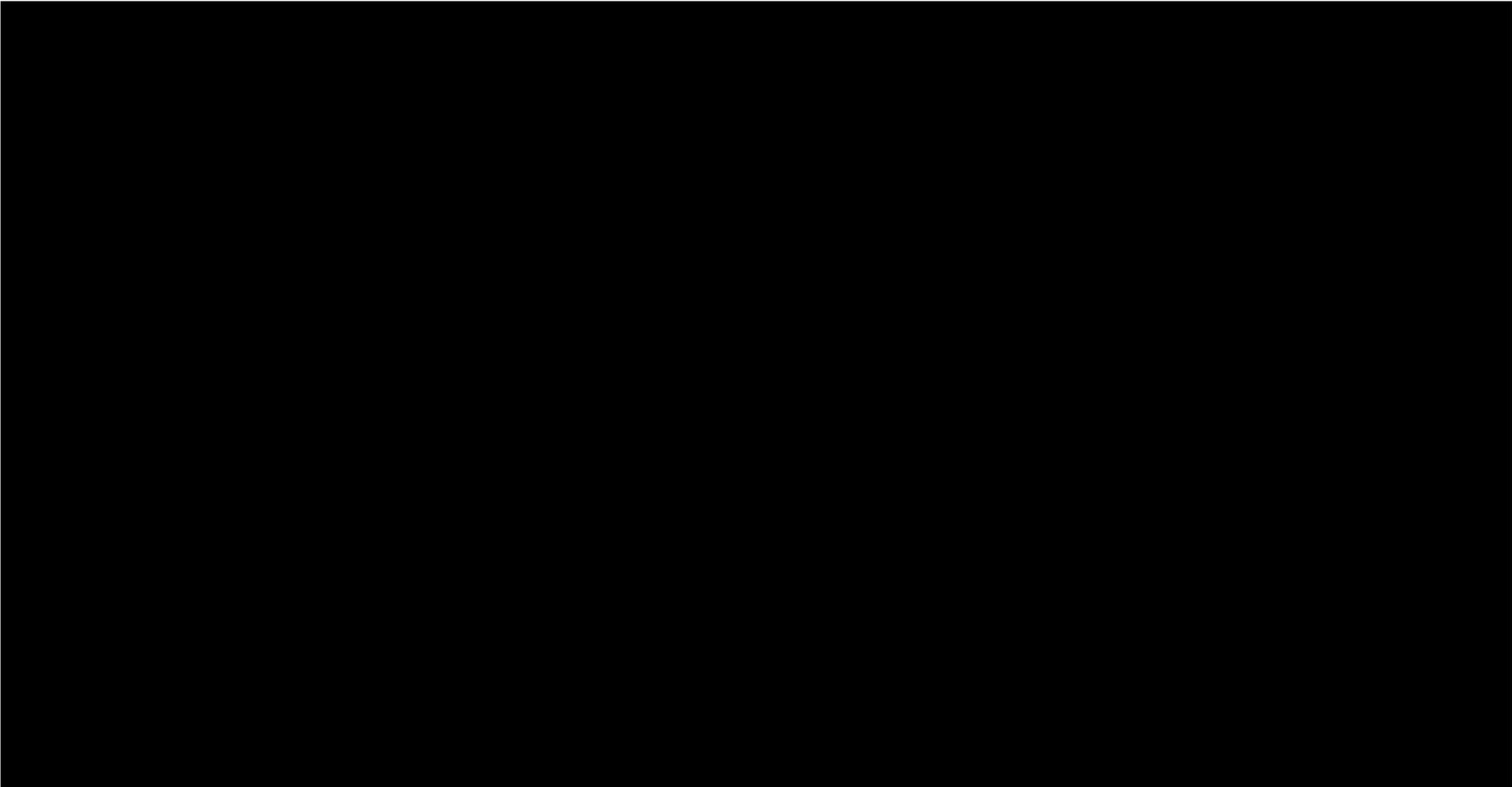


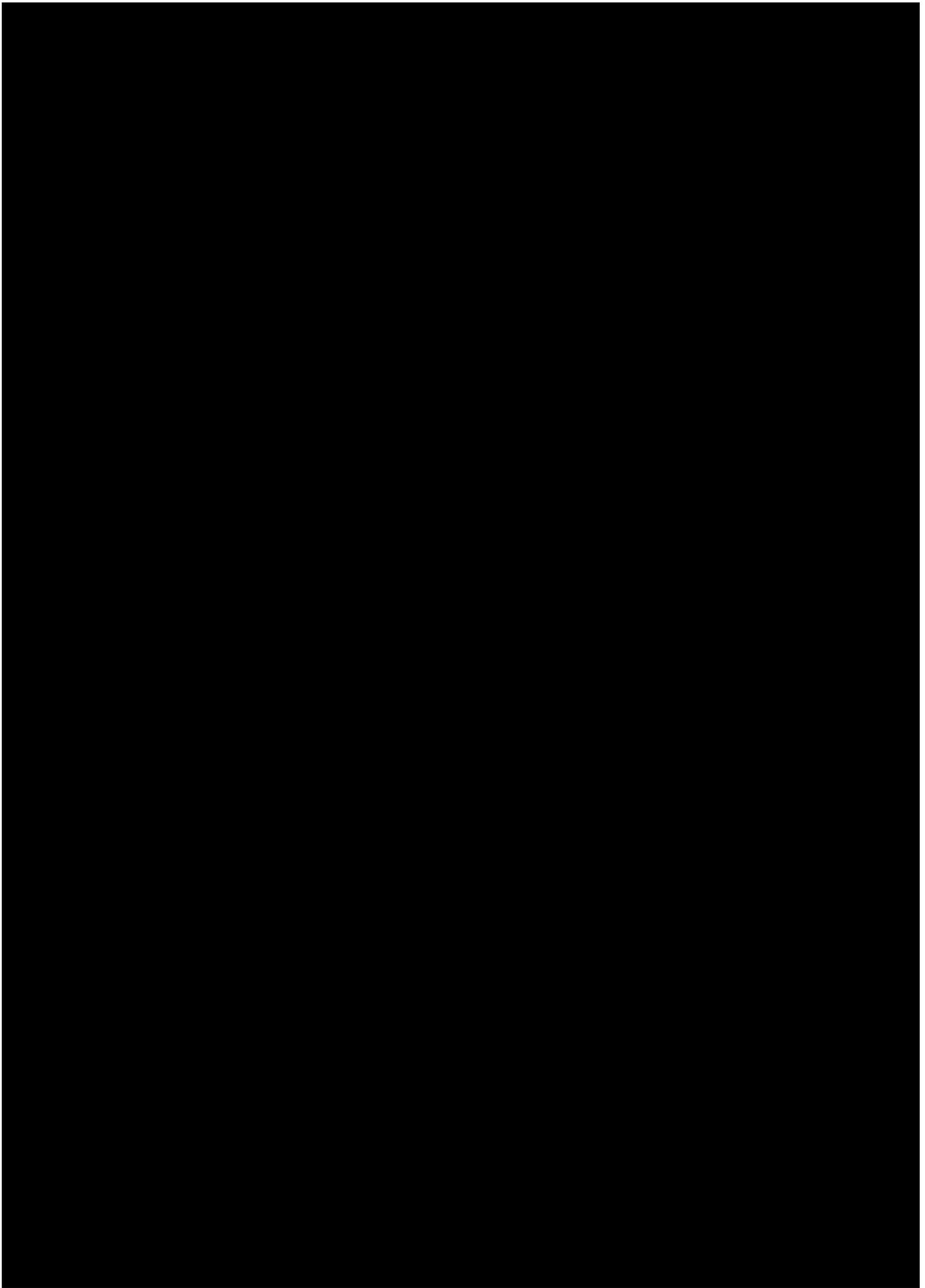


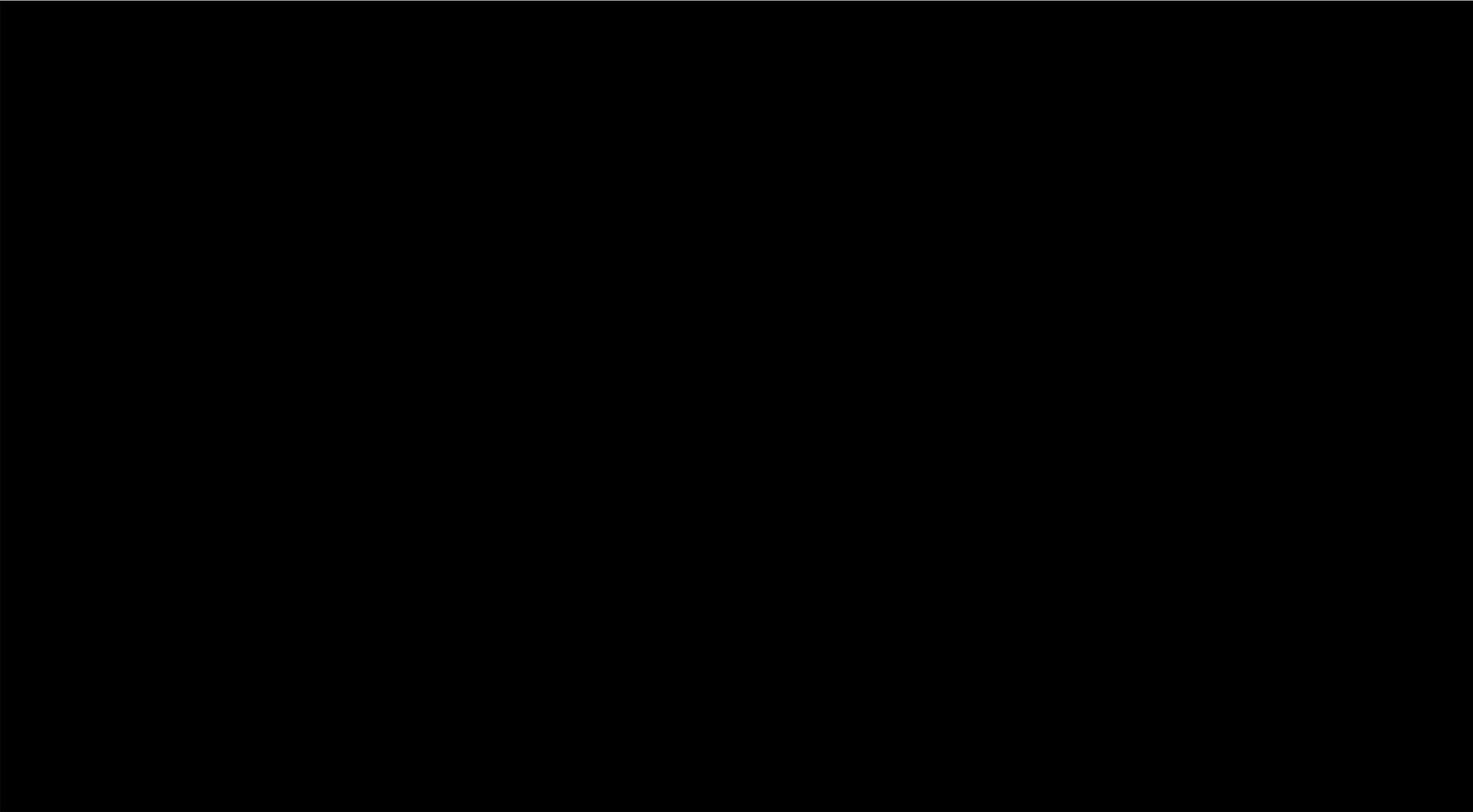














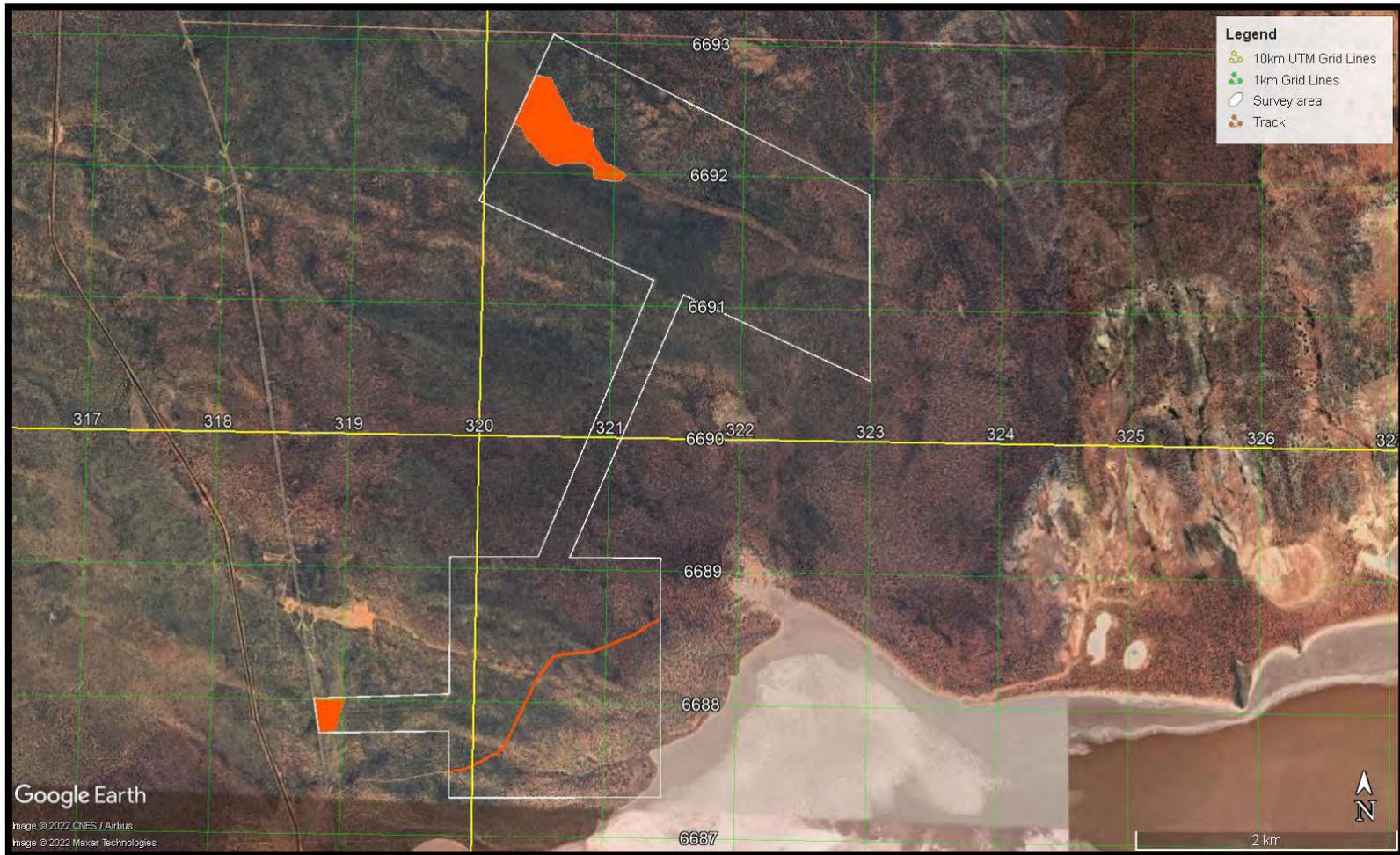
4.4 Condition of the Plant Communities

The vegetation in the area surveyed had been subjected to a variety of historical disturbances dating back to the discovery of gold in the area around 1894, (Wikipedia) and the subsequent requirement for mining timbers and condenser fuel. Sandalwood was also harvested from the area, and fence post cut to contain the sheep on the surrounding sheep stations. More recently, the mineral exploration boom of the late 1960's has left a number of old grid lines and drill sites throughout the area. Adjacent to the Goldfields Highway, which is within five kilometres of the furthest point of the survey area, some old borrow pits have been left to naturally revegetate. Sand has been mined from a now abandoned pit covering approximately 6.5 hectares which is located adjacent to the Goldfields Highway and within 500 m of this survey area

Near the north-western corner of the survey area, a bush fire, estimated to have occurred approximately 10 years ago, had burnt approximately 30 Ha of the survey area. The disturbance from the borrow pits covers approximately four hectares of the proposed southern haul road alignment. An additional 2.5 hectares has been classed as disturbed to cover the track passing through the southern part of the survey area, and only those grid lines which are still readily navigable on foot and discernable on Google Earth when viewed at a scale of approximately 1:13 000. Although these areas totalling 36.5 hectares or 4.7 % of the total survey area, have been disturbed, they are capable of regeneration and therefore not classified as Degraded.

Based on the vegetation condition scale adapted from Kieghery (1994) and Trudgen (1998), shown below, the condition of the vegetation in the area surveyed was classified as Good.

Map 23: Vegetation Condition



 Highlighted portions indicate disturbed areas

Table 5: Vegetation Condition Scale for Eremaean and Northern Botanical Provinces (Keighery 1994, Trudgen 1988) taken from EPA (2016)

Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

5. DISCUSSION

The WA Department of Agriculture's Technical Bulletin, No. 87 covers a survey area of 100 570 square kilometres. The Marmion Land System, within which this survey falls, occupies 4943 square kilometres or 4.9% of that area.

Six vegetation types were recorded and mapped within this Detailed Survey area of 774 hectares, which represents 0.16% of the land system.

Nine priority species were found growing in and around the survey area with the greatest concentration occurring where their populations overlapped in the southeast corner of the survey area. While some of these species are widespread regionally and abundant within

the survey area, one species, *Persoonia leucopogon* (P1) was restricted within the survey area to one small population of 27 stems in SACS (but within 50 metres of base of a dune) and three single stems, encountered elsewhere.

Given the nature of the proposed activity, i.e., shallow strip mining of sand, and associated haulage roads, any physical disturbance created would be confined to the Sand Dune Shrubland and Sandplain Acacia Shrubland vegetation types, with potential for indirect disturbance to the adjacent transition zones or vegetation types of Sandplain Gum Stratum and Mulga Wanderrie Grassland. As referred to below, the high concentration of Priority species between the existing access track in the south of the survey area and Lake Goongarrie must be considered to be under threat if mining operations extended in to this area.

Although falling outside the Detailed Survey area, a feature observed on the Google Earth image of the area (51J 321965 m E; 6690160 m S) which appeared anomalous within the surrounding vegetation type of Sandplain Acacia Shrubland, was investigated and found to be a saline depression covering approximately five hectares.

A relevé was conducted and recorded several species which had not been seen elsewhere during the survey.

It was subsequently determined that the depression was fed from a drainage tract funnelling water into it from the north-west, which, in turn, was fed from a broad valley, and that one of the proposed haulage roads would intersect that drainage tract approximately 600m up-slope from the depression.

Given the potential of the proposed haul road to divert the drainage and have a detrimental effect on the environment in and around this depression, consideration should be given to its construction in order to minimise any unintended consequences.

Photographs of the saline depression and a list of the species recorded around it are shown below, with those species not observed elsewhere marked with an asterisk:

Plate 17: View of Saline Depression from NE



Plate 18: *Eremophila glabra* subsp. *tomentosa* Growing in Saline Depression



Plate 19: Vegetation Fringing Saline Depression



List of species recorded in and around the saline depression located at 51J 321965 m E;
6690160 m S

Table 6: Species list for Saline Depression

Family	Genus	Species
Myrtaceae	<i>Melaleuca</i>	<i>halmaturorum*</i>
Frankeniaceae	<i>Frankenia</i>	<i>fecunda*</i>
Chenopodiaceae	<i>Tecticornia</i>	<i>indica</i> subsp. <i>bidens</i>
Asteraceae	<i>Angianthus</i>	<i>tomentosus</i>
Chenopodiaceae	<i>Atriplex</i>	<i>bunburyana</i>
Scrophulariaceae	<i>Eremophila</i>	<i>glabra</i> subsp. <i>tomentose*</i>
Asteraceae	<i>Senecio</i>	<i>pinnatifolius*</i>
Asteraceae	<i>Senecio</i>	<i>lacustrinus*</i>
Scrophulariaceae	<i>Eremophila</i>	<i>decipiens</i> subsp. <i>decipiens</i>
Chenopodiaceae	<i>Maireana</i>	<i>sedifolia</i>
Scrophulariaceae	<i>Eremophila</i>	<i>metallicorum</i>
Montiaceae	<i>Calandrinia</i>	<i>translucens*</i>
Solanaceae	<i>Lyceum</i>	<i>austral*</i>
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>
Chenopodiaceae	<i>Maireana</i>	<i>georgei*</i>
Pittosporaceae	<i>Pittosporum</i>	<i>angustifolium</i>
Proteaceae	<i>Grevillea</i>	<i>sarissa</i>
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>filifolia</i>
Fabaceae	<i>Acacia</i>	<i>jennerae</i>

*Observed only at this location

6. CONCLUSIONS AND RECOMMENDATIONS

A total of 215 species (including sub-species and varieties) from 40 families and 106 genera have been recorded in the survey area. The most prevalent families recorded were *Fabaceae* and *Myrtaceae* (Appendix C).

- No plant species gazetted as Threatened or Declared Rare Flora pursuant to subsection (2) of section 23F of the *Biodiversity Conservation Act 2016* (W. A.) were recorded.
- No plant species listed as Threatened pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (Department of Agriculture, Water, and the Environment) were recorded.
- No species listed as Declared by the Department of Agriculture and Food Western Australia under the *Biosecurity and Agricultural Management Act 2007* were recorded.
- No plant species listed as a Weed of National Significance (WoNS) under the *EPBC Act* were encountered in the survey area. Weeds of National Significance are considered by the States and Territories to pose a significant threat to biodiversity.
- Nine species identified as Priority species, listed by DBCA (2019) have been recorded.
- No TECs listed by the DBCA (2019) were recorded.
- No TECs listed by the Australian Government Department of Environment and Energy were identified.
- No PECs listed by the DBCA (2019) were recorded.

An Index of Biodiversity Surveys for Assessment (I.B.S.A.) data package has been prepared in accordance with the requirements of *the Environmental Protection Act of 1986*. and the priority flora report forms will be submitted.

The following recommendations are made to protect and enhance the conservation and botanical values in the Comet Vale Project area:

- Ground disturbance and clearing of vegetation should be limited to that which is essential for the development of the project.
- If this project is to proceed and disturbance to the Priority Flora identified is unavoidable, an application to impact Priority Flora should be submitted to the Regional DBCA office.

- Retain and stockpile cleared vegetation for use in the later rehabilitation of disturbed areas as per techniques previously employed at other MLG operated sites.
- Where possible, maintain existing drainage systems e.g., do not allow roads etc. to disrupt or divert historic flow patterns.
- Apply weed control measures.

7. PARTICIPANTS

Mr Phil Stanley Dip Cart, Dip Hort and Ms Paula Pavlovic BA, MA of Goldfields Landcare Services carried out the field work, plant identification, mapping, report and IBSA data preparation for this project. Flora Taking (Biological Assessment) Licence numbers: FB2000231 and FB62000232.

Statistical analysis was conducted by Dr Chris Hancock, BSc, PhD and GIS mapping by Mr Andrew Waters, BSc, GradCertGIS, AdvCertHort. of Woodgis.

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Appendix A: Species of Conservation Significance Database Search Result

Appendix A: Species of Conservation Significance recorded from DBCA data searches and DAWE Protected Matters Search. (See Key at bottom)

Taxon	Cons Code	WAHERB	TPFL	NatureMap	EPBCA	Protected Matters
<i>Acacia eremophila</i> var. <i>variabilis</i>	3	X		X		
<i>Alyxia tetanifolia</i>	3	X	X	X		
<i>Apatelantha insignis</i> (prev. AKA <i>Newcastelia insignis</i>)	2	X	X	X		
<i>Calandrinia quartzitica</i>	1	X		X		
<i>Chrysocephalum apiculatum</i> subsp. <i>norsemanense</i>	3	X		X		
<i>Elatine macrocalyx</i>	3	X		X		
<i>Eleocharis papillosa</i>	3	X		X	V	
<i>Eucalyptus educta</i>	2	X		X		
<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	4	X		X		Vulnerable
<i>Eutaxia rubricarina</i>	3	X		X		
<i>Gastrolobium graniticum</i>	T				T	Endangered
<i>Grevillea erectiloba</i>	4	X		X		
<i>Grevillea subterlineata</i>	3	X				
<i>Homalocalyx grandiflorus</i>	3	X	X	X		
<i>Hysterobaeckea ochropetala</i> subsp. <i>cometes</i>	3	X		X		
<i>Malleostemon</i> sp. <i>Adelong</i> (G.J. Keighery 11825)	2	X		X		
<i>Myriophyllum lapidicola</i>	T					Endangered
<i>Notisia intonsa</i>	3	X				
<i>Persoonia leucopogon</i>	1	X	X	X		
<i>Philothea coateana</i>	3	X	X	X		
<i>Ptilotus rigidus</i>	1	X		X		

Taxon	Cons_Code	WAHERB	TPFL	NatureMap	EPBCA	Protected Matters
<i>Ptilotus</i> sp. Kalgoorlie (J. Jackson & B. Moyle 260)	1	X				
<i>Rhodanthe uniflora</i>	1	X		X		
<i>Ricinocarpos brevis</i>	T				E	Endangered
<i>Sowerbaea multicaulis</i>	4	X		X		
<i>Tecticornia flabelliformis</i>	1				V	Vulnerable
<i>Thelimytra stellata</i>	T				E	Endangered
<i>Thryptomene eremaea</i>	2	X		X		

KEY:

T: Threatened (DBCAs)

P1, P2, P3, & P4: Priority rating (DBCAs)

EPBC: Environment Protection and Biodiversity Conservation Act 1999

E: Endangered (EPBC)

CE: Critically Endangered

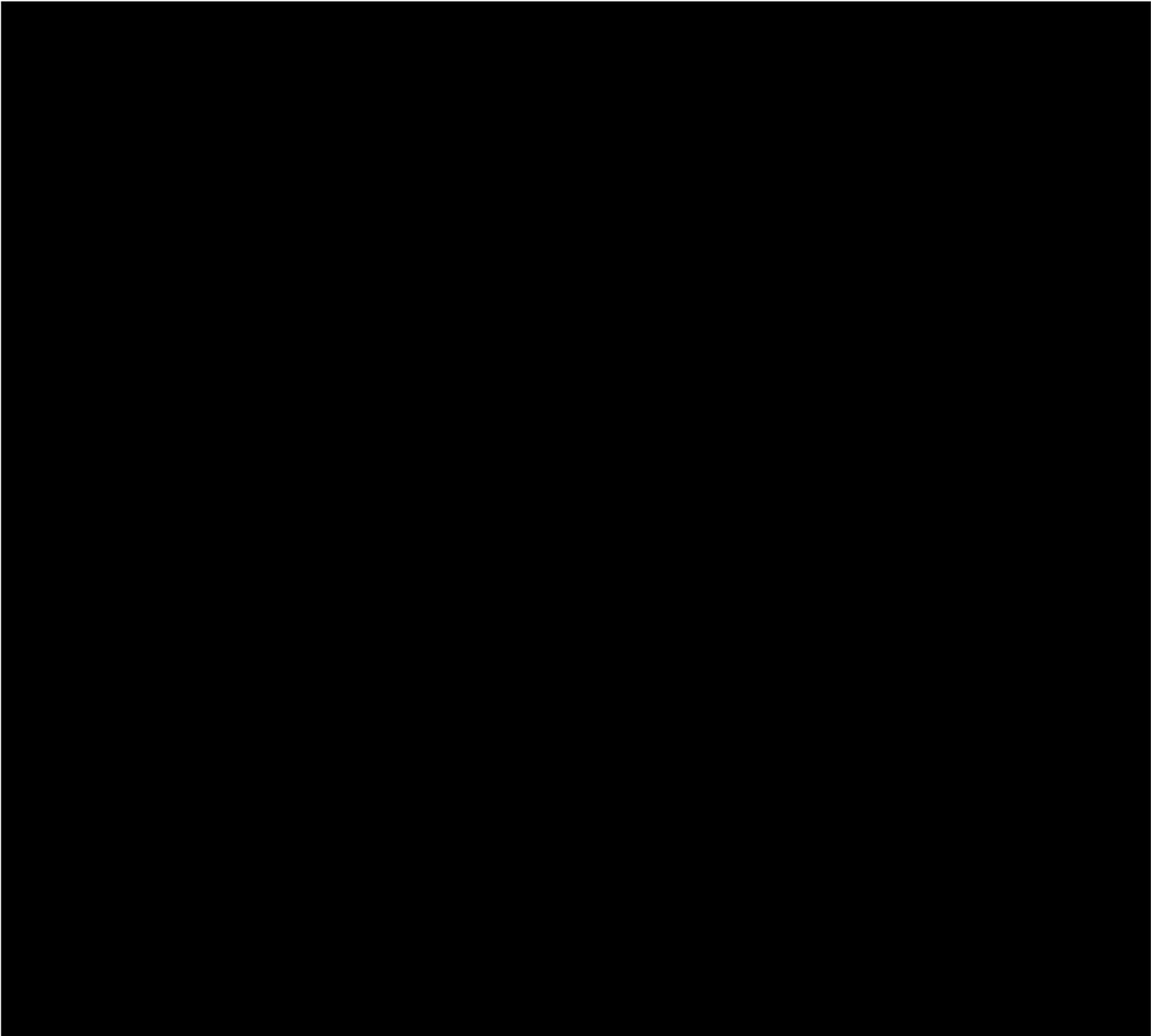
V: Vulnerable

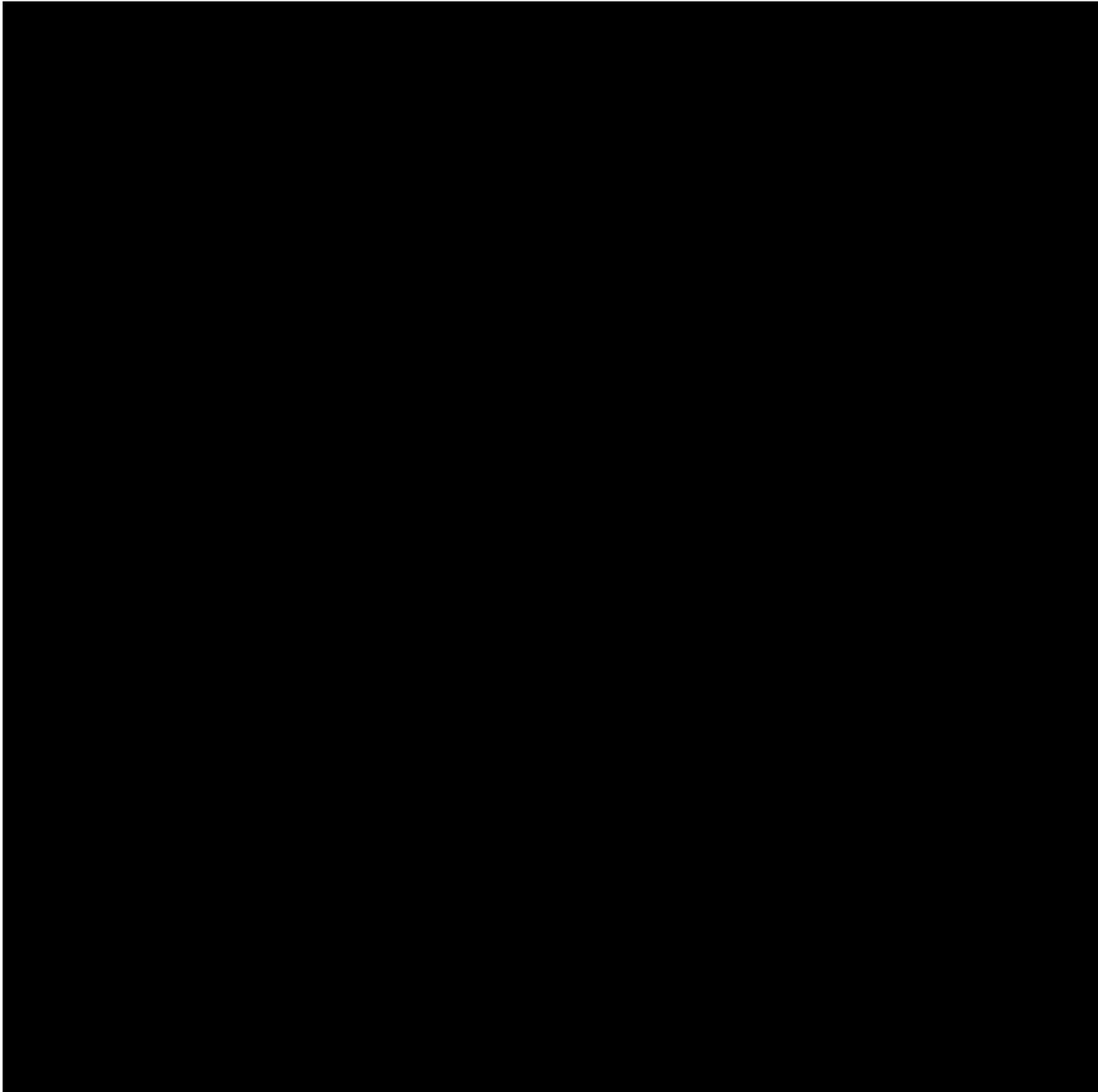
WAHerb: WA Herbarium Database (DBCAs)

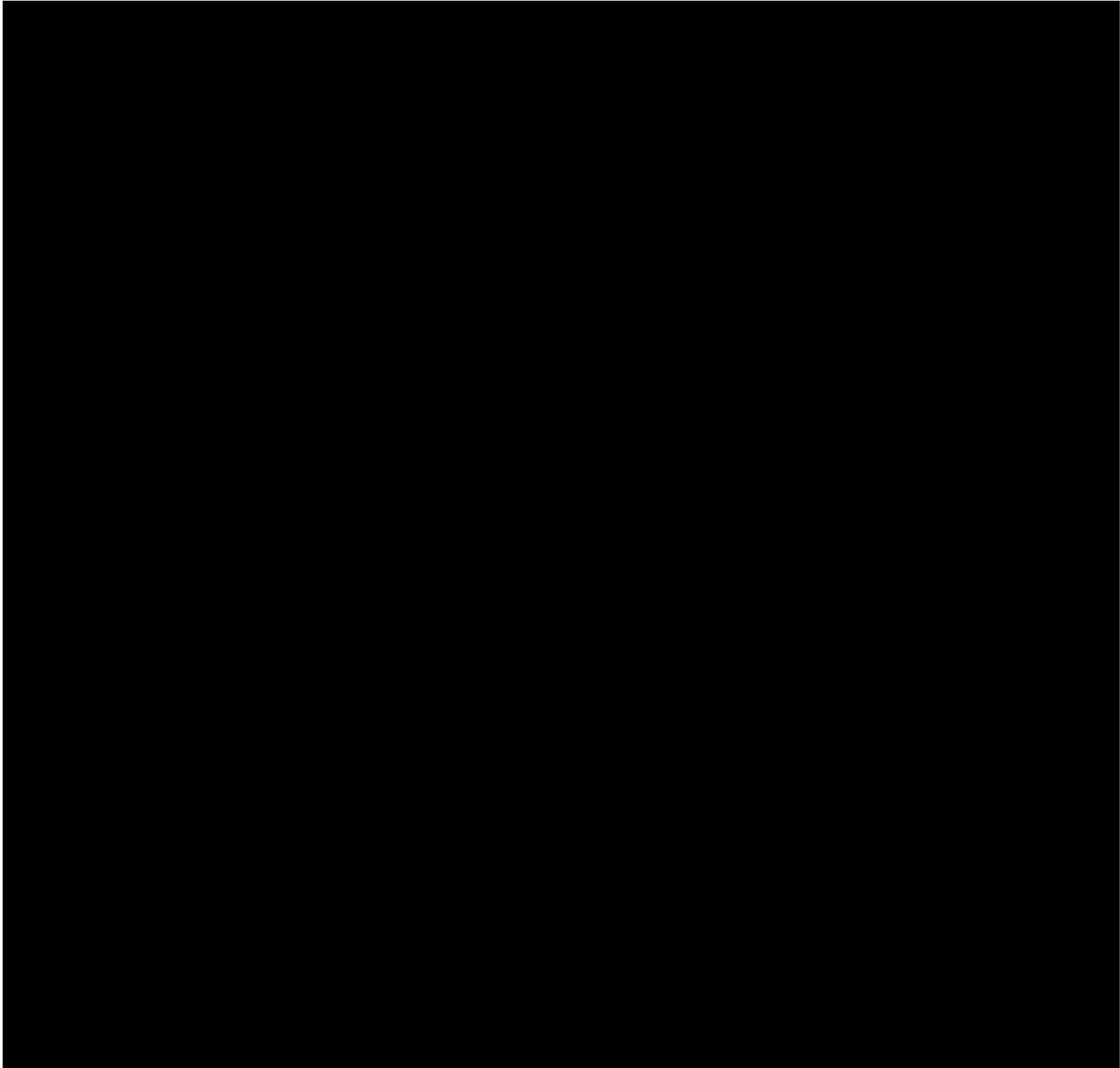
NatureMap: NatureMap (DBCAs)

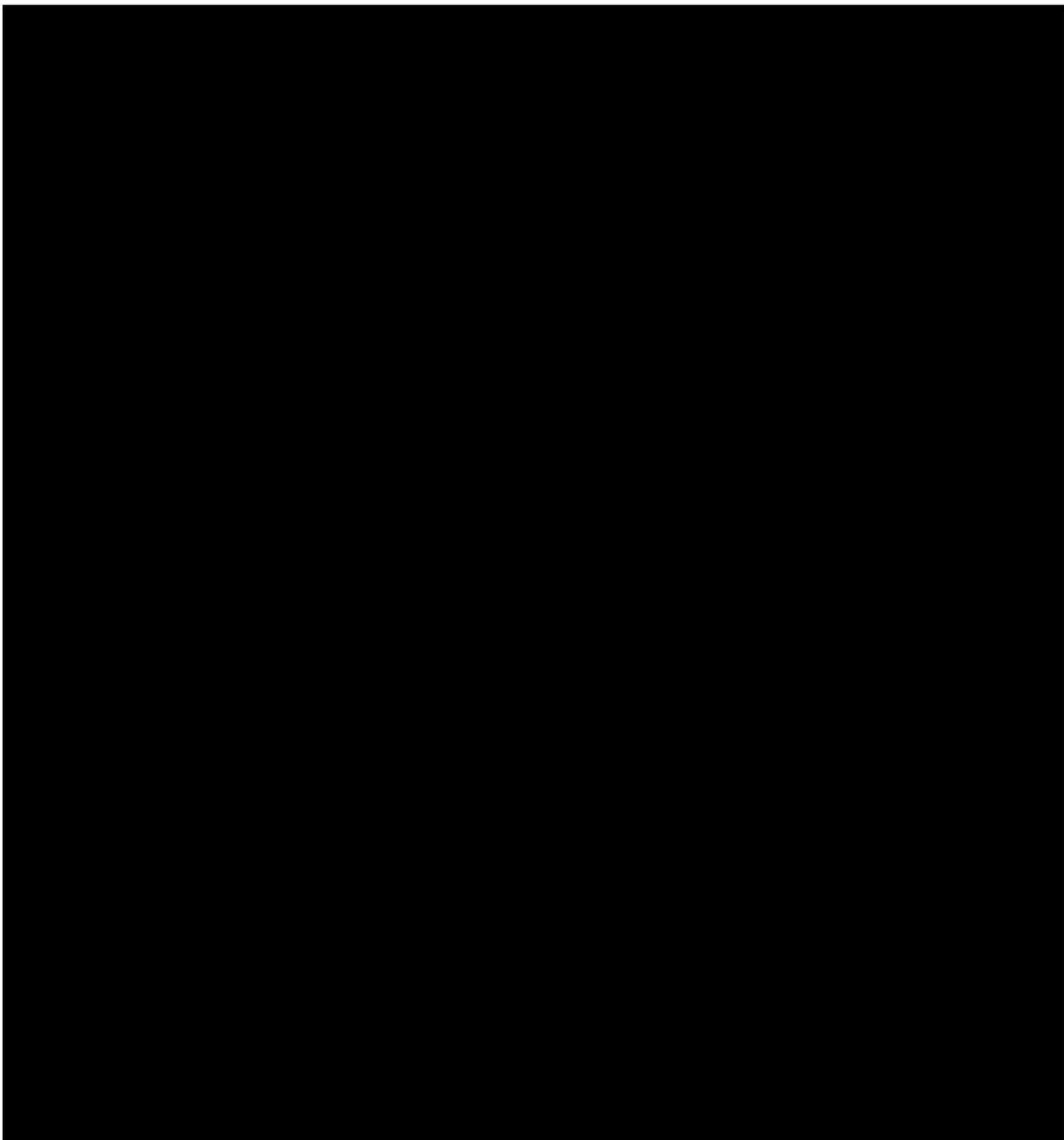
TPFL: Threatened and Priority Flora Database (DBCAs)

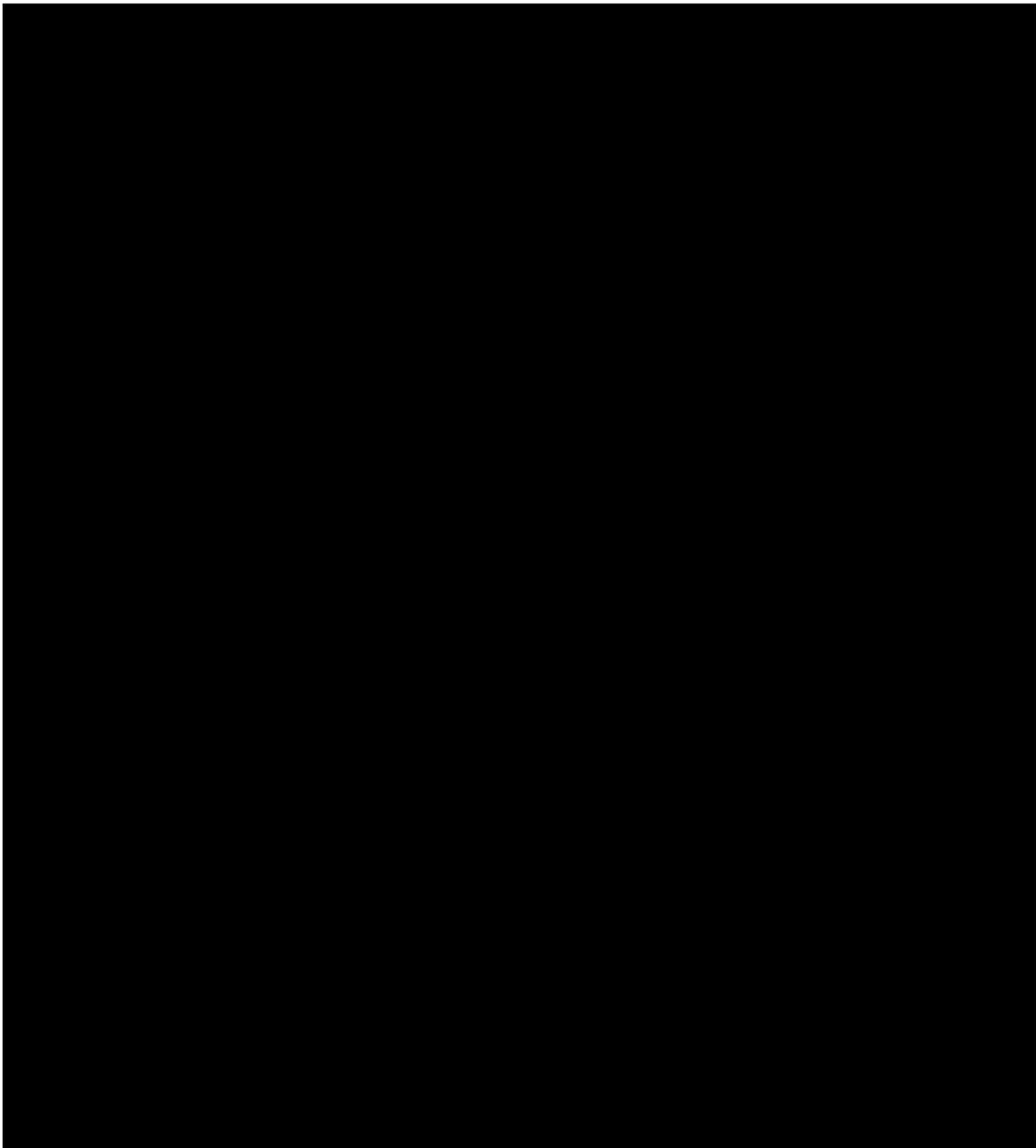


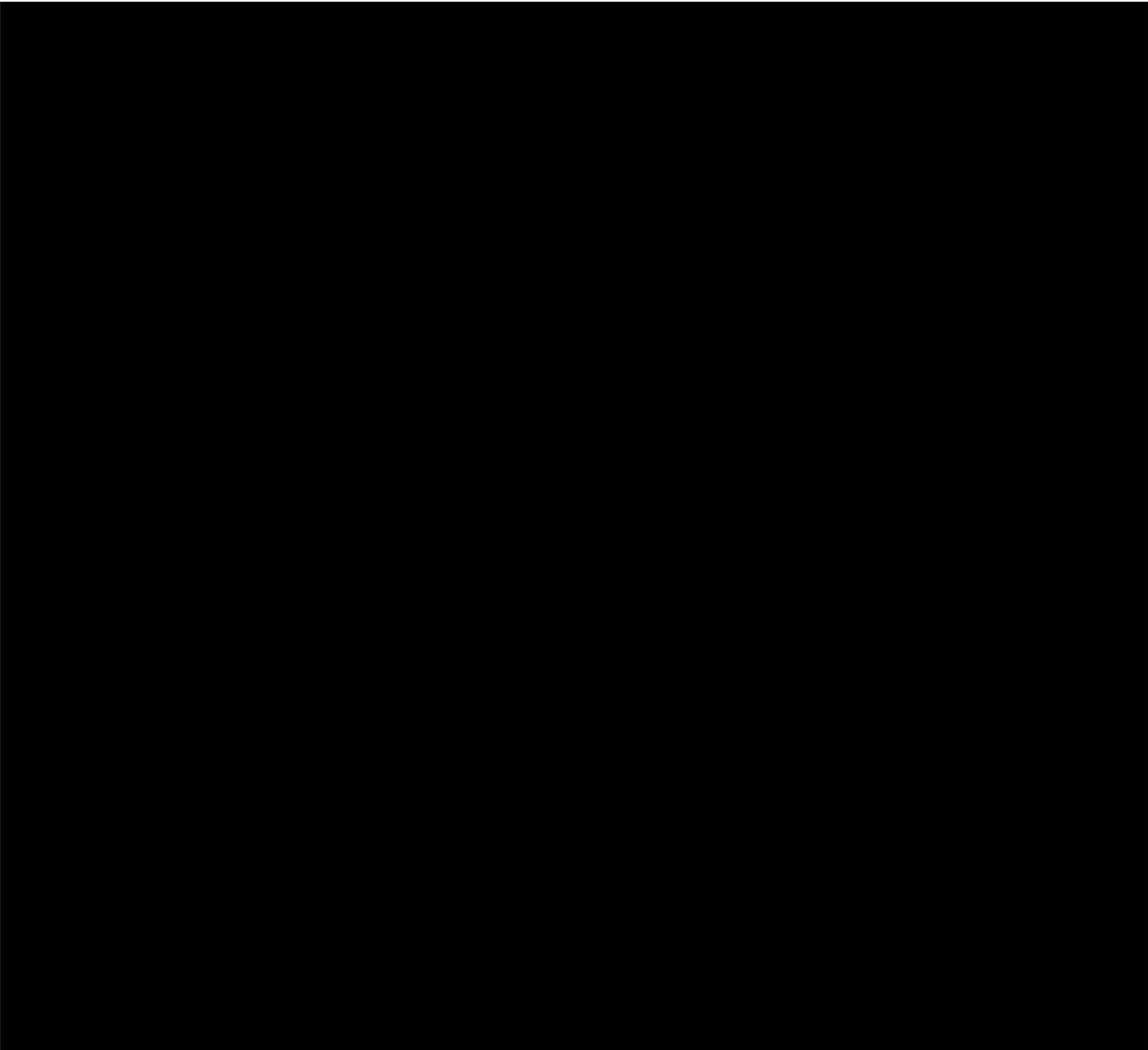






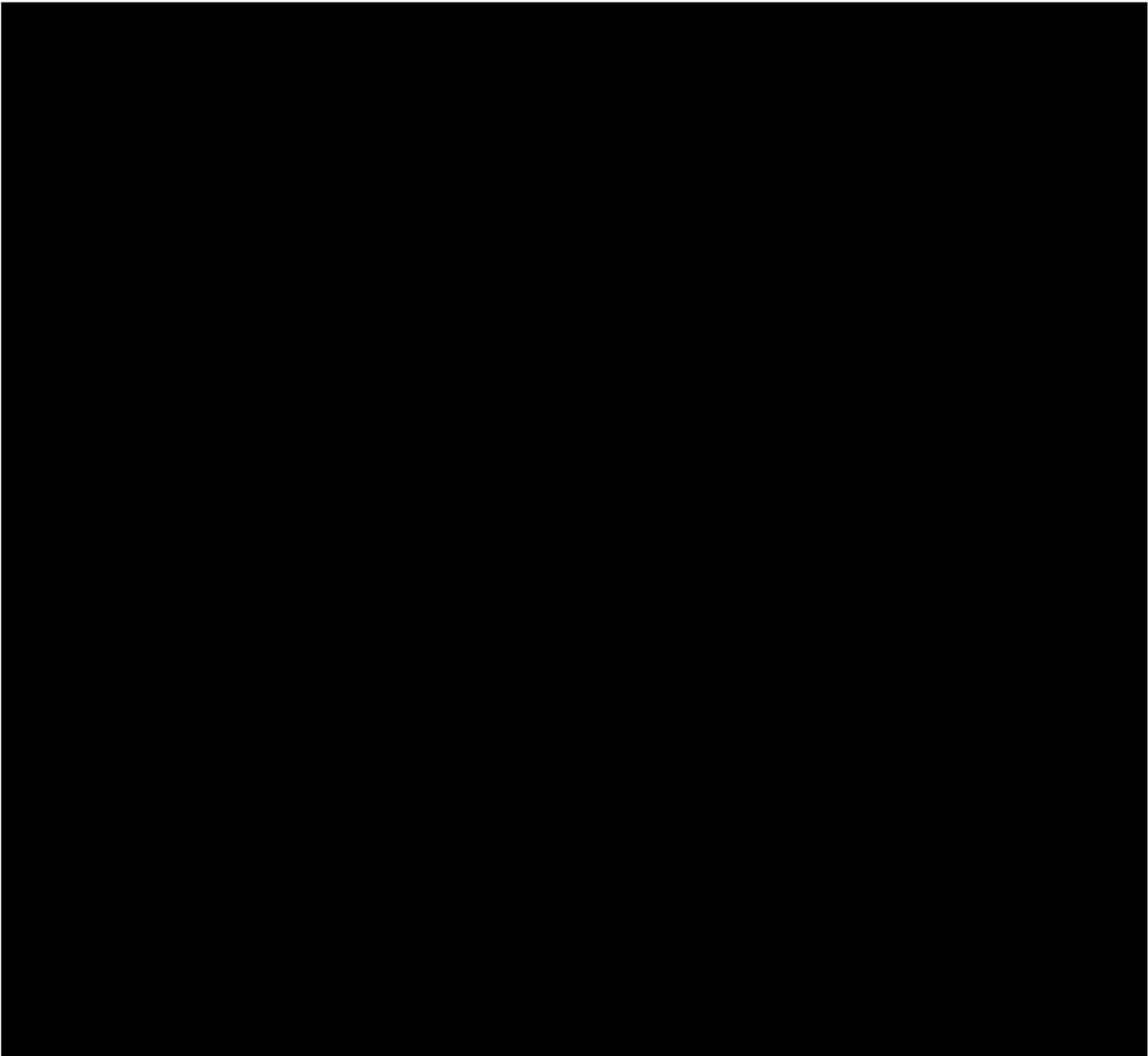


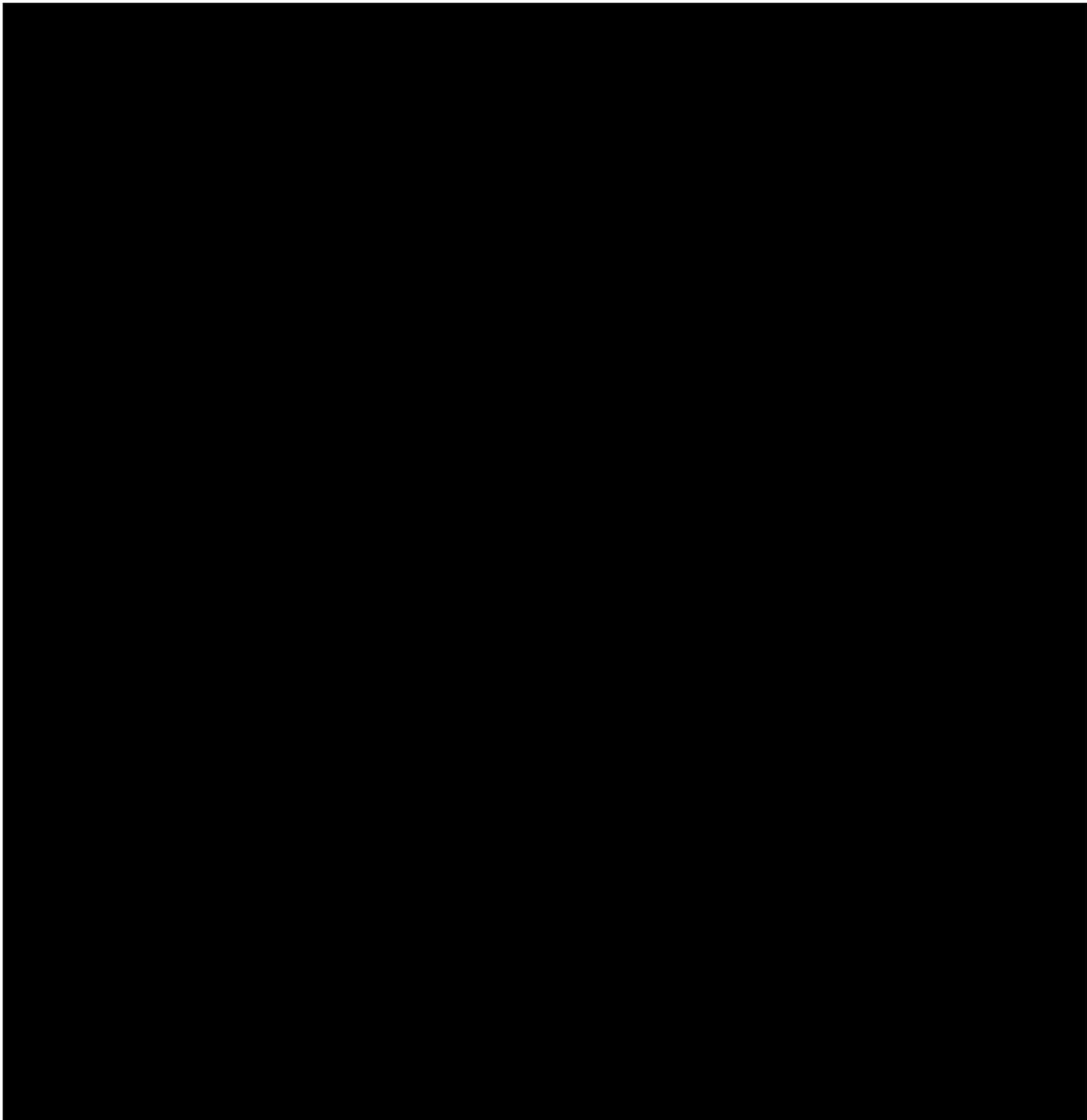


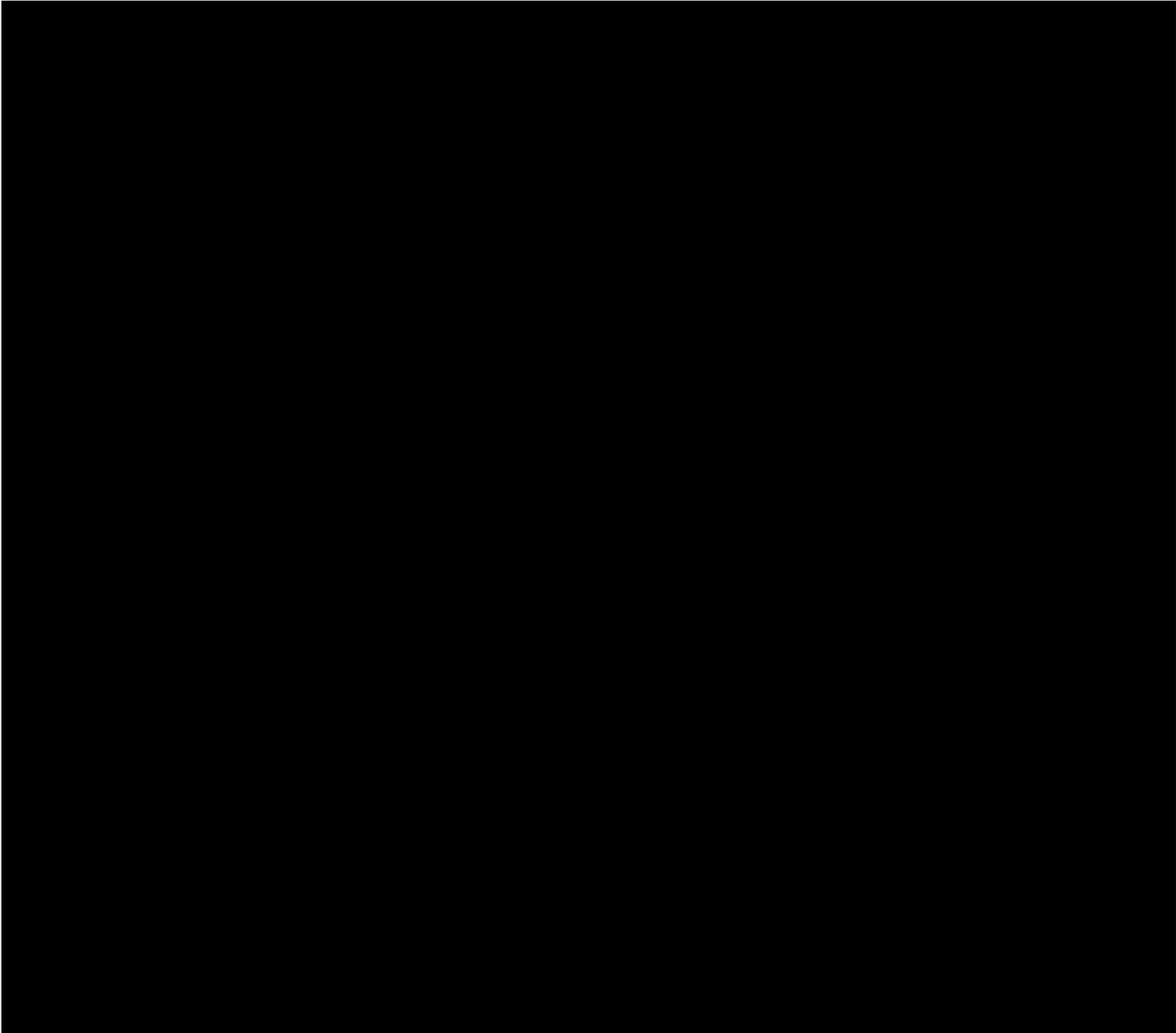




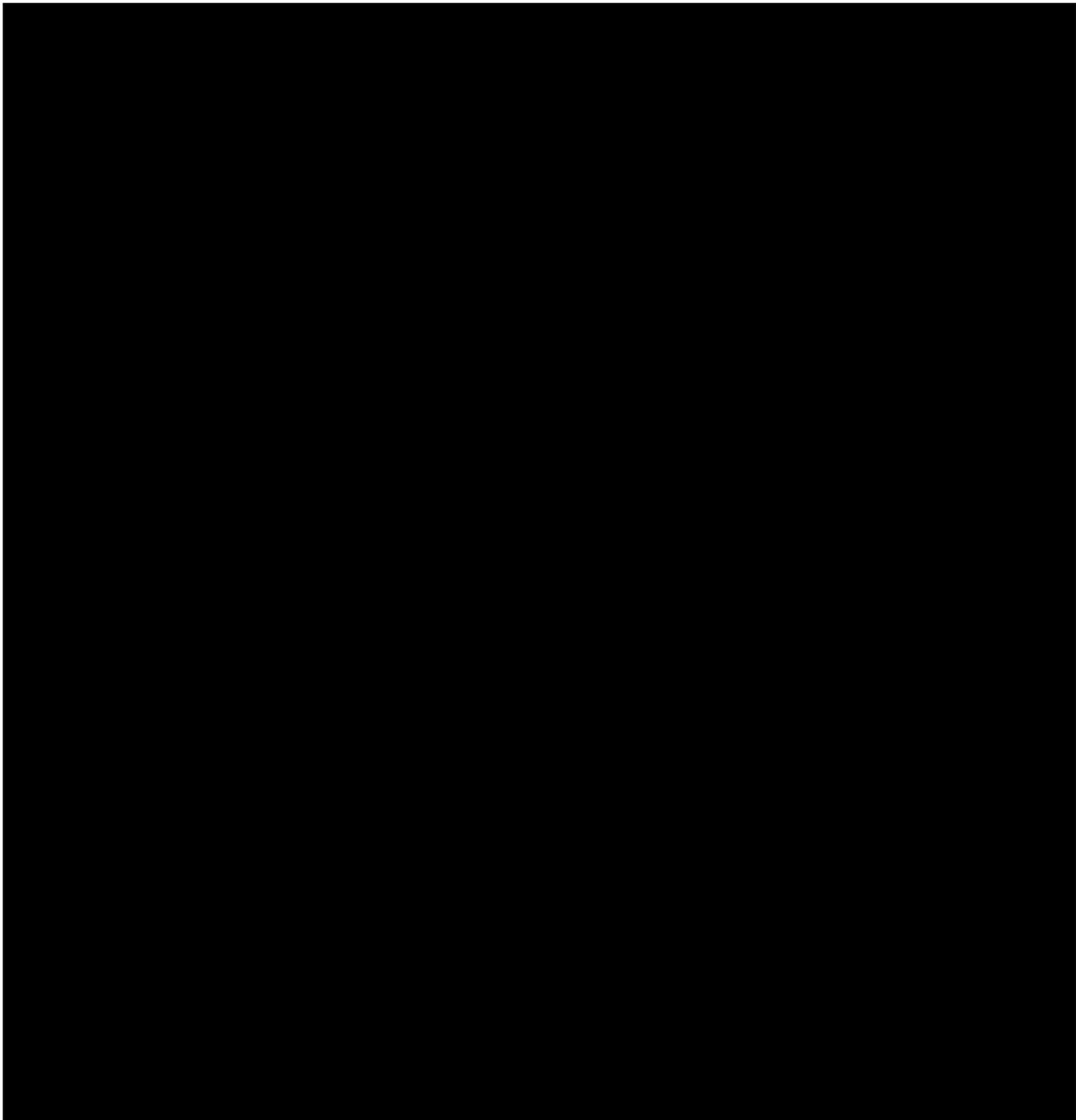


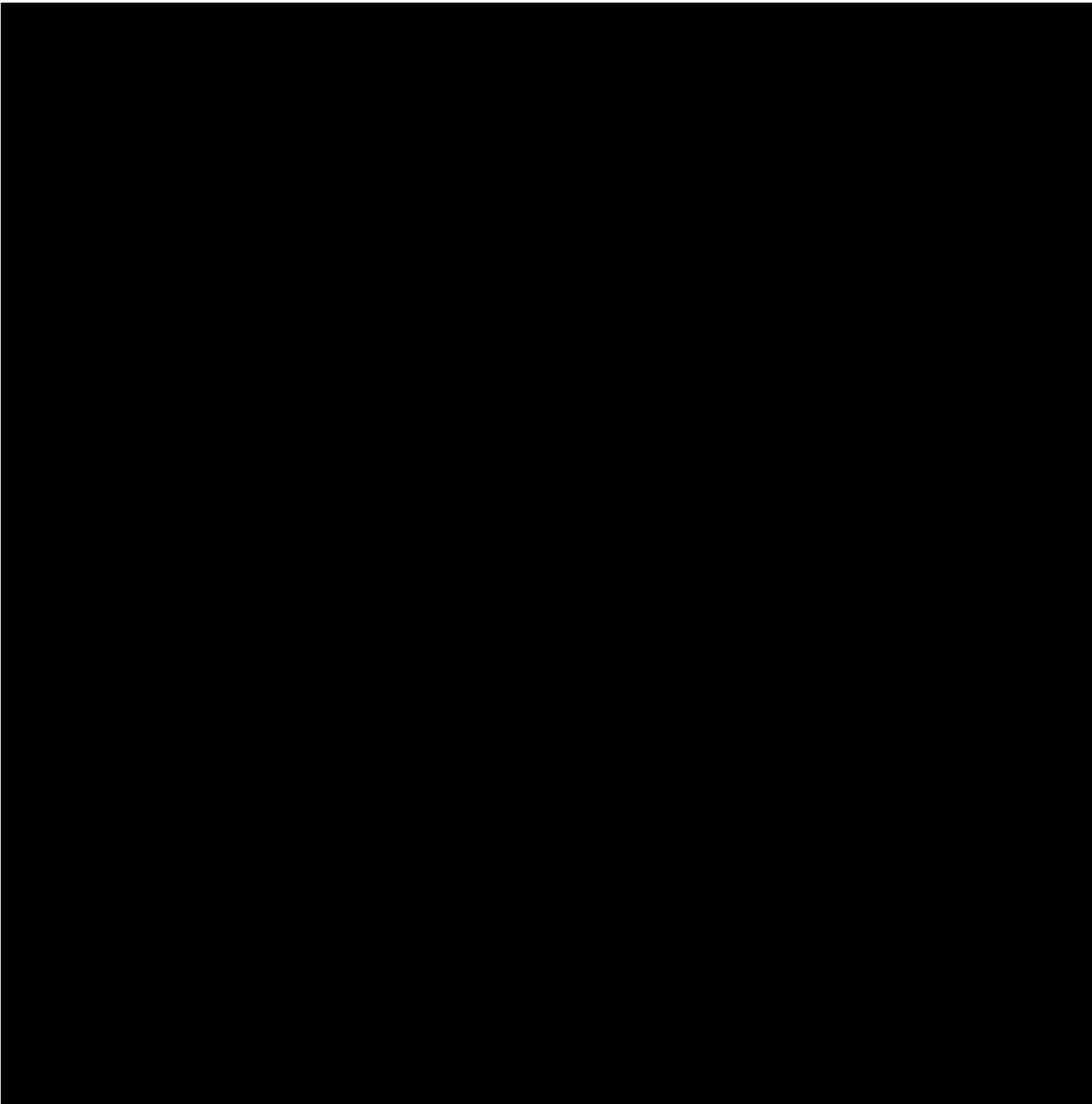




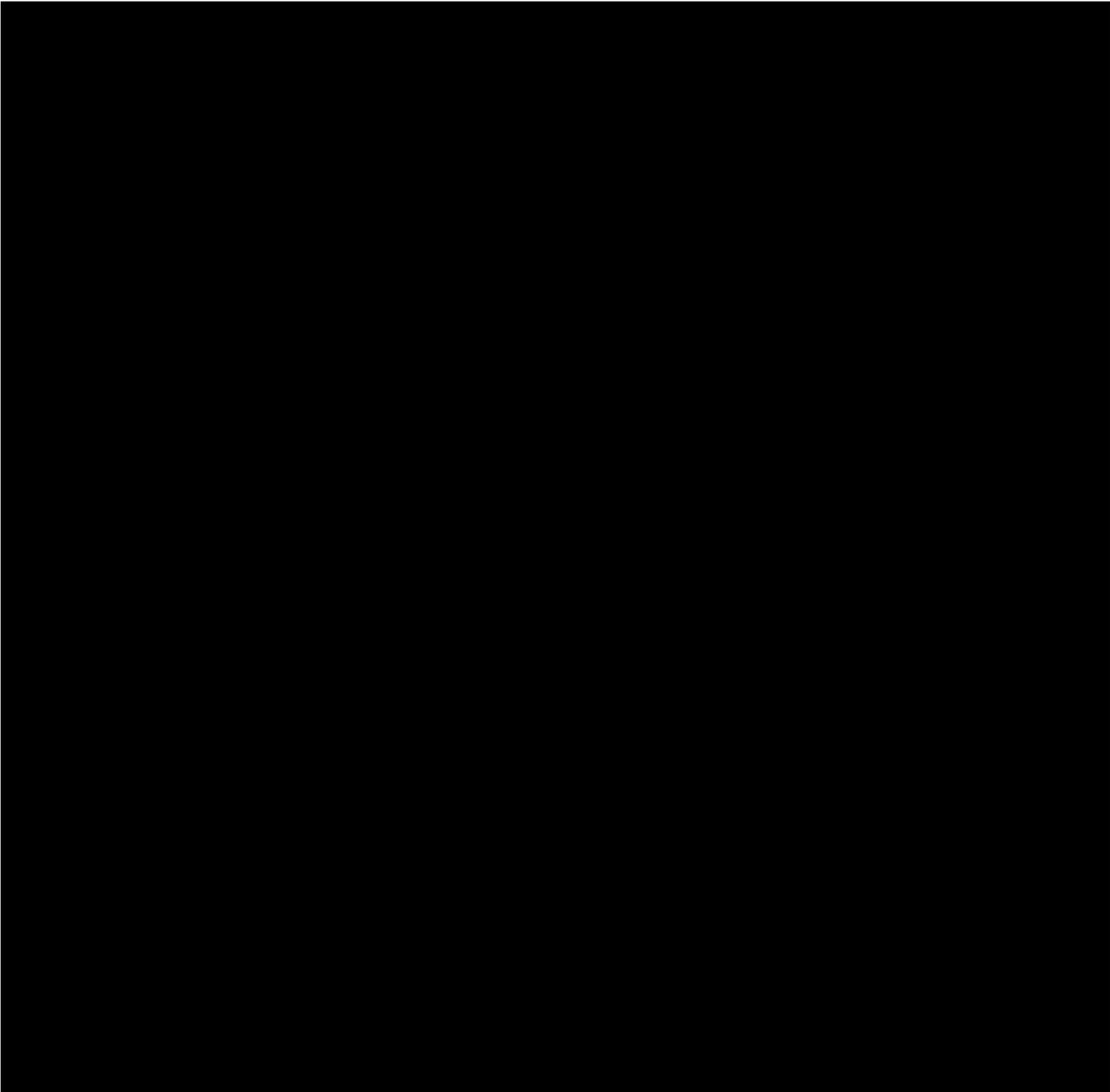


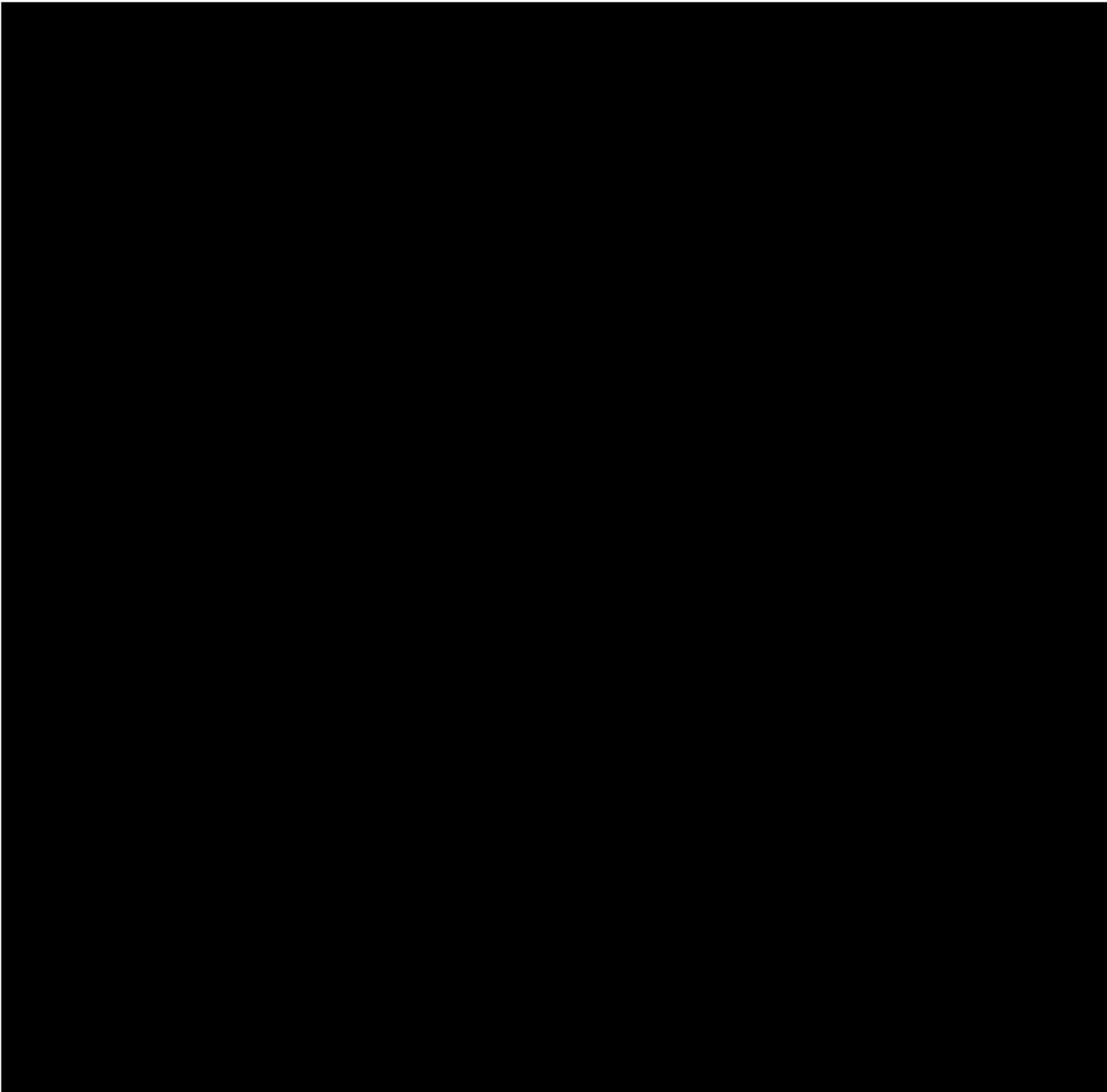


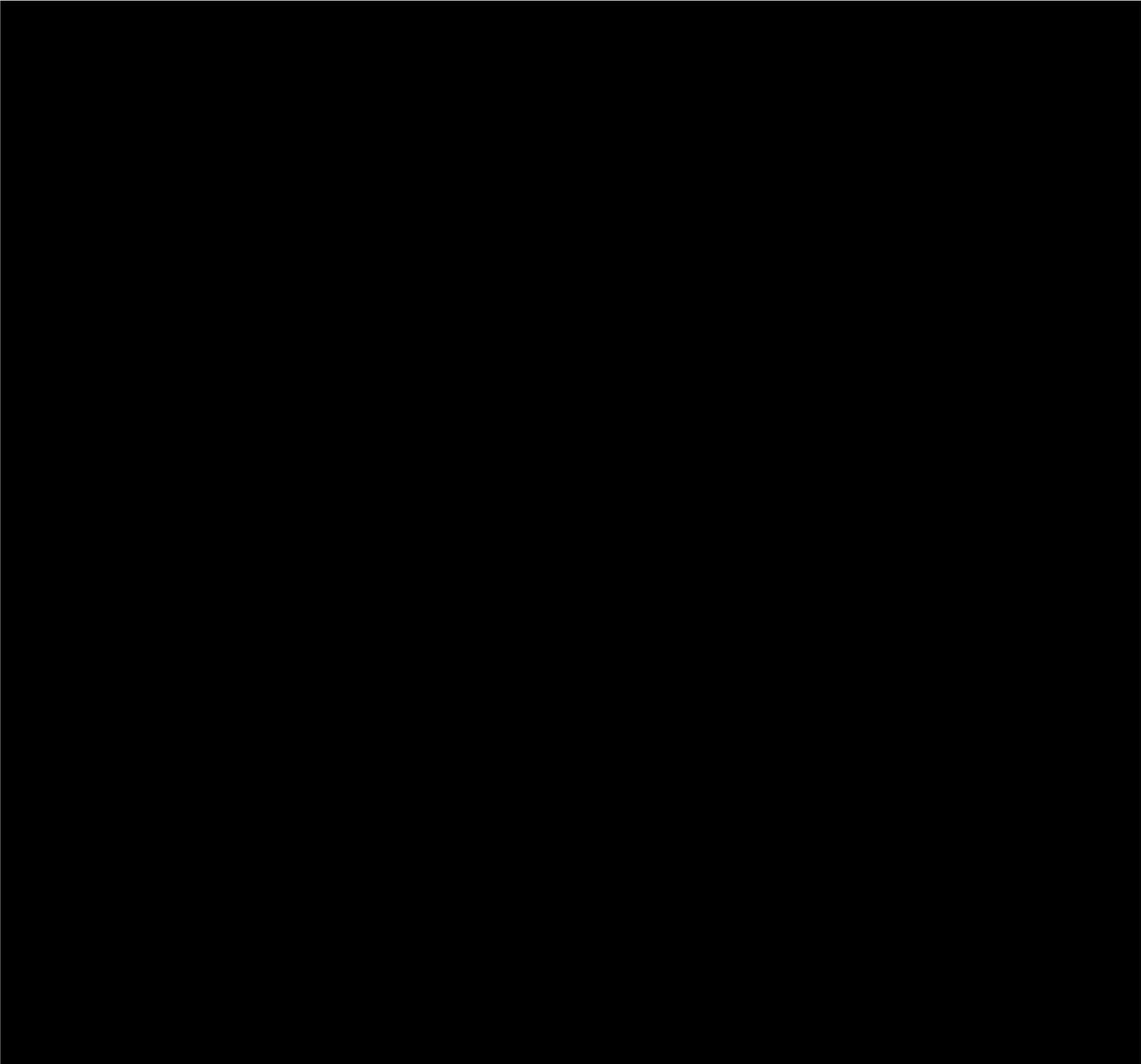


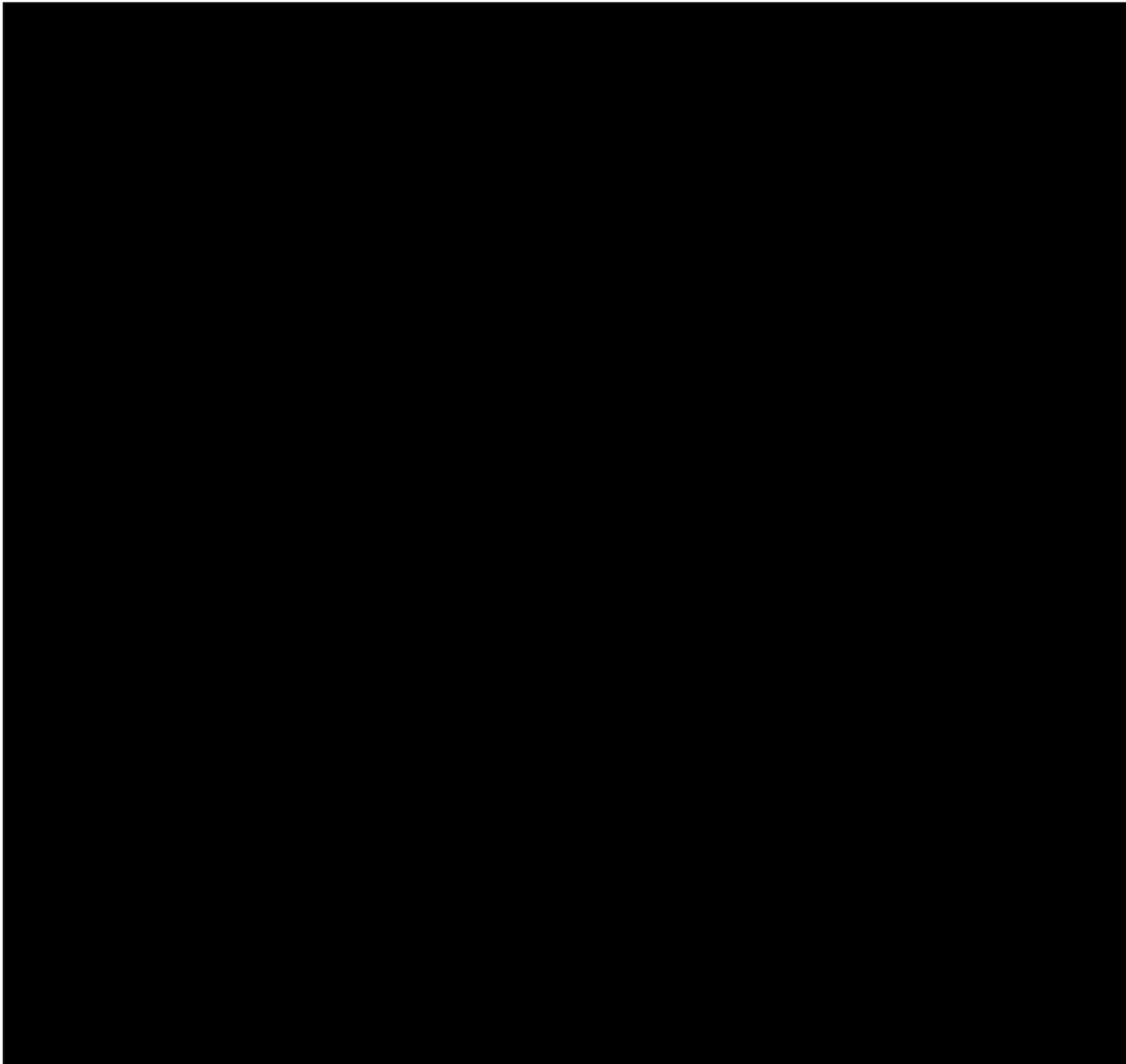


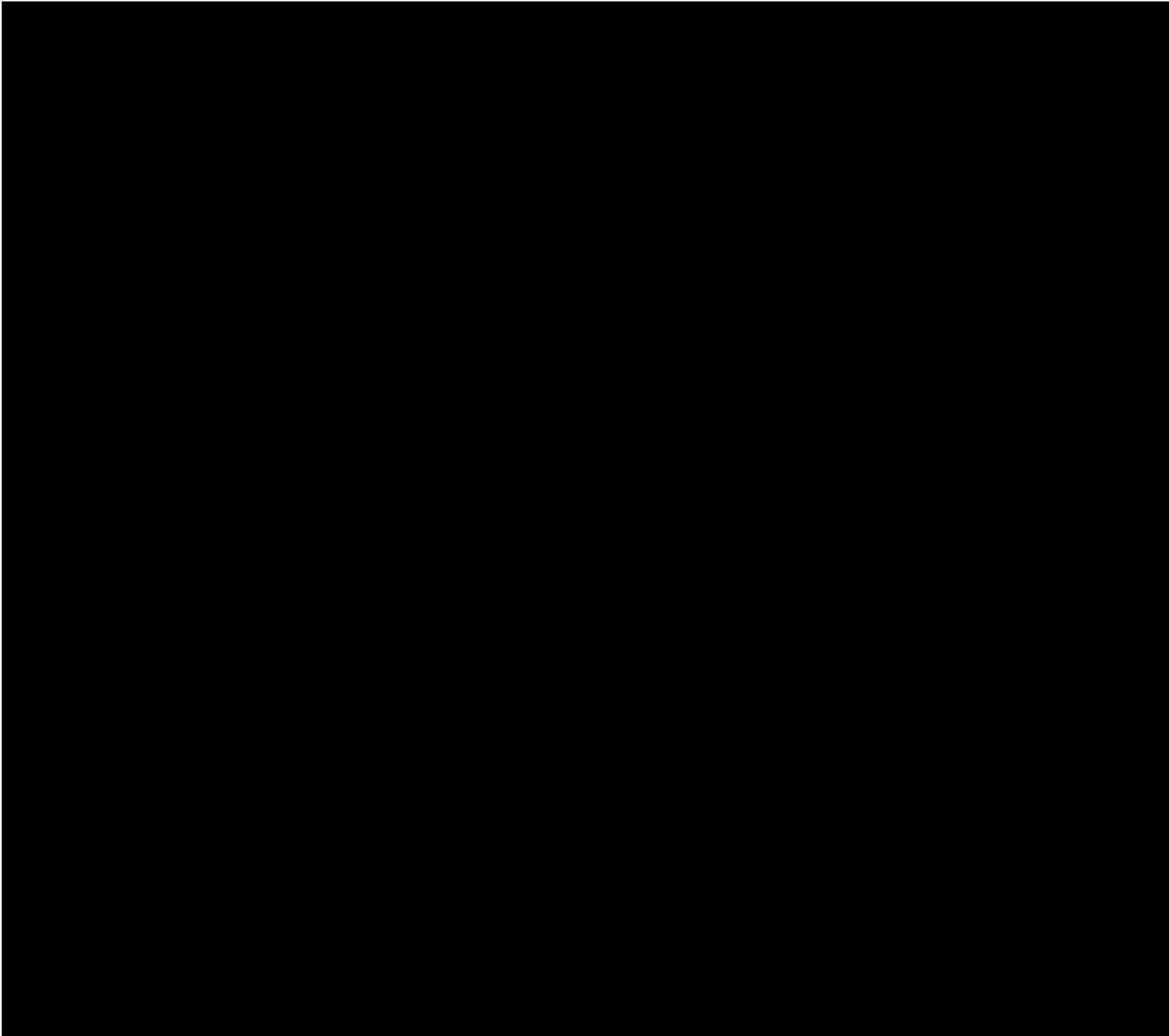


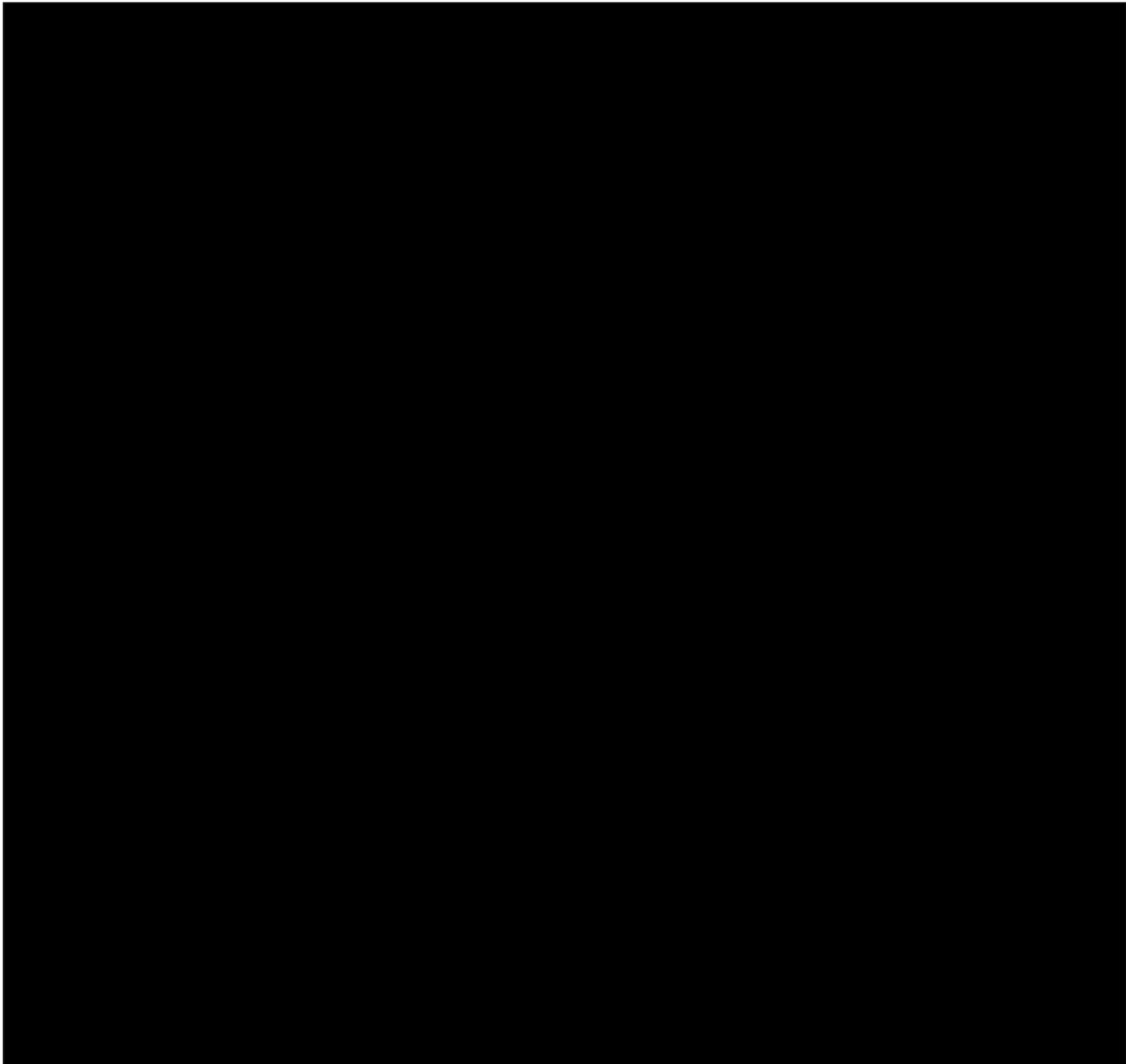


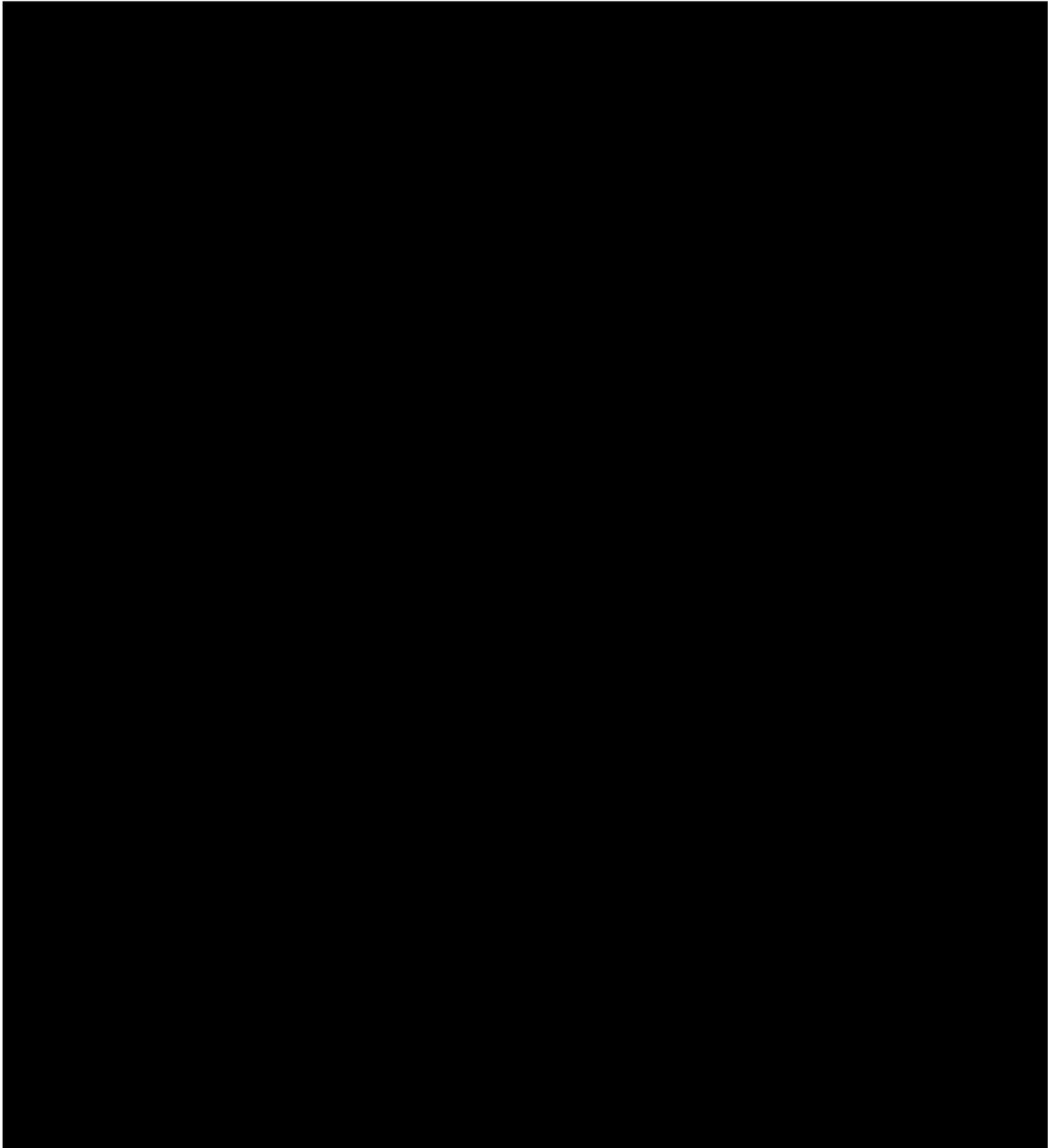












Appendix C: Species List by Vegetation Type

Appendix C: Species List by Vegetation Type

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Aizoaceae	<i>Gunniopsis</i>	<i>quadrifida</i>			X		X	X
Aizoaceae	<i>Gunniopsis</i>	<i>rodwayi</i>						X
Amaranthaceae	<i>Ptilotus</i>	<i>drummondii</i>			X			
Amaranthaceae	<i>Ptilotus</i>	<i>exultatus</i>			X			
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>			X	X		
Amaranthaceae	<i>Ptilotus</i>	<i>polystachyus</i>			X			
Amaranthaceae	<i>Surreya</i>	<i>diandra</i>						X
Apocynaceae	<i>Alyxia</i>	<i>buxifolia</i>	X	X	X	X	X	
Apocynaceae	<i>Alyxia</i>	<i>tetanifolia (P3)</i>	X		X		X	
Apocynaceae	<i>Leichhardtia</i>	<i>australis</i>	X		X			
Araliaceae	<i>Hydrocotyle</i>	<i>glochidiata</i>						X
Asparagaceae	<i>Thysanotus</i>	<i>manglesianus</i>		X		X		
Asteraceae	<i>Calocephalus</i>	<i>francisii</i>						X
Asteraceae	<i>Cratystylis</i>	<i>subspinescens</i>			X			
Asteraceae	<i>Olearia</i>	<i>lanuginosa</i>	X		X			
Asteraceae	<i>Olearia</i>	<i>meullerii</i>		X	X	X	X	
Asteraceae	<i>Olearia</i>	<i>ramosissima</i>	X					
Asteraceae	<i>Olearia</i>	<i>stuartii</i>			X			
Asteraceae	<i>Olearia</i>	<i>subspicata</i>	X	X	X			
Asteraceae	<i>Rhodanthe</i>	<i>floribunda</i>		X				
Asteraceae	<i>Waitzia</i>	<i>accuminata</i>				X		
Boraginaceae	<i>Halgania</i>	<i>cyanea</i> var. <i>Allambi Station</i>			X		X	

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Campanulaceae	<i>Lobelia</i>	<i>fissiflora</i>		X				
Casuarinaceae	<i>Allocasuarina</i>	<i>eriodlamys</i>	X					
Casuarinaceae	<i>Allocasuarina</i>	<i>helmsii</i>		X			X	
Casuarinaceae	<i>Allocasuarina</i>	Sp.				X		
Casuarinaceae	<i>Allocasuarina</i>	<i>spinosissima</i>	X		X			
Casuarinaceae	<i>Casuarina</i>	<i>pauper</i>			X		X	
Chenopodiaceae	<i>Atriplex</i>	<i>bunburyana</i>			X			X
Chenopodiaceae	<i>Atriplex</i>	<i>nana</i>						X
Chenopodiaceae	<i>Dysphania</i>	<i>rhadinostachya</i> subsp. <i>rhadinostachya</i>				X		
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>			X			
Chenopodiaceae	<i>Maireana</i>	<i>amoena</i>			X			X
Chenopodiaceae	<i>Maireana</i>	<i>glomerifolia</i>			X			
Chenopodiaceae	<i>Maireana</i>	<i>sedifolia</i>						X
Chenopodiaceae	<i>Rhagodia</i>	<i>drummondii</i>					X	X
Chenopodiaceae	<i>Salsola</i>	<i>australis</i>			X			
Chenopodiaceae	<i>Sclerolaena</i>	<i>parviflora</i>			X			
Chenopodiaceae	<i>Tecticornia</i>	<i>indica</i> subsp. <i>bidens</i>						X
Chenopodiaceae	<i>Tecticornia</i>	<i>peltata</i>						X
Chenopodiaceae	<i>Tecticornia</i>	<i>pergranulata</i> subsp. <i>pergranulata</i>						X
Chenopodiaceae	<i>Tecticornia</i>	<i>pterygosperma</i> subsp. <i>pterygosperma</i>						X
Chenopodiaceae	<i>Tecticornia</i>	<i>undulata</i>						X
Cupressaceae	<i>Callitris</i>	<i>columellaris</i>	X	X	X			
Cupressaceae	<i>Callitris</i>	<i>preissii</i>				X		

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Cyperaceae	<i>Chrysitrix</i>	<i>distigmata</i>			X			X
Cyperaceae	<i>Schoenus</i>	<i>subaphyllus</i>	X		X			
Ericaceae	<i>Leucopogon</i>	sp Coolgardie (M. Hislop & F. Hort MH 3917)	X					
Euphorbiaceae	<i>Bertya</i>	<i>dimerostigma</i>	X	X	X			
Fabaceae	<i>Acacia</i>	<i>accuminata</i>				X		
Fabaceae	<i>Acacia</i>	<i>aneura</i>					X	
Fabaceae	<i>Acacia</i>	<i>burkittii</i>	X	X		X	X	
Fabaceae	<i>Acacia</i>	<i>caesaneura</i>		X	X	X	X	
Fabaceae	<i>Acacia</i>	<i>collettioides</i>	X		X	X	X	
Fabaceae	<i>Acacia</i>	<i>coolgardiensis</i> subsp. <i>coolgardiensis</i>	X		X	X		
Fabaceae	<i>Acacia</i>	<i>craspedocarpa</i>	X			X		
Fabaceae	<i>Acacia</i>	<i>effusifolia</i>	X	X	X	X	X	
Fabaceae	<i>Acacia</i>	<i>eremophila</i> var. <i>variabilis</i> (P3)			X			
Fabaceae	<i>Acacia</i>	<i>erinaceae</i>					X	
Fabaceae	<i>Acacia</i>	<i>fragilis</i>		X	X			
Fabaceae	<i>Acacia</i>	<i>hemiteles</i>		X	X	X	X	
Fabaceae	<i>Acacia</i>	<i>heteroneura</i> var. <i>jutsonii</i>		X				
Fabaceae	<i>Acacia</i>	<i>incurvaneura</i>	X	X	X	X		
Fabaceae	<i>Acacia</i>	<i>jennerae</i>		X	X			
Fabaceae	<i>Acacia</i>	<i>ligulata</i>	X		X		X	X
Fabaceae	<i>Acacia</i>	<i>longispinea</i>	X	X	X		X	
Fabaceae	<i>Acacia</i>	<i>murrayana</i>		X				
Fabaceae	<i>Acacia</i>	<i>oswaldii</i>					X	

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Fabaceae	<i>Acacia</i>	<i>oswaldii</i>					X	
Fabaceae	<i>Acacia</i>	<i>prainii</i>		X	X		X	
Fabaceae	<i>Acacia</i>	<i>quadrimarginea</i>	X					
Fabaceae	<i>Acacia</i>	<i>ramulosa</i> var. <i>ramulosa</i>	X	X	X	X	X	X
Fabaceae	<i>Acacia</i>	<i>sibina</i>	X	X				
Fabaceae	<i>Acacia</i>	<i>sibirica</i>				X		
Fabaceae	<i>Acacia</i>	<i>steadmanii</i> subsp. <i>steadmanii</i>			X			
Fabaceae	<i>Acacia</i>	<i>stowardii</i>				X	X	
Fabaceae	<i>Acacia</i>	<i>tetragonaphylla</i>	X		X	X	X	
Fabaceae	<i>Bossiaea</i>	<i>walkeri</i>			X		X	
Fabaceae	<i>Daviesia</i>	<i>grahamii</i>			X			
Fabaceae	<i>Jacksonia</i>	<i>arida</i>	X		X		X	X
Fabaceae	<i>Leptosema</i>	<i>aculeatum</i>	X		X			
Fabaceae	<i>Leptosema</i>	<i>chambersii</i>	X					
Fabaceae	<i>Mirbelia</i>	<i>rhagodioides</i>	X		X		X	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>filifolia</i>	X	X	X	X	X	
Fabaceae	<i>Templetonia</i>	<i>incrassata</i>					X	
Frankeniaceae	<i>Frankenia</i>	<i>sessilis</i>						X
Goodeniaceae	<i>Brunonia</i>	<i>australis</i>	X	X				
Goodeniaceae	<i>Cooperhooikia</i>	<i>strophiolata</i>	X					
Goodeniaceae	<i>Dampiera</i>	<i>ramosa</i>	X					
Goodeniaceae	<i>Goodenia</i>	<i>berardiana</i>				X		
Goodeniaceae	<i>Goodenia</i>	<i>daviesii</i>		X				
Goodeniaceae	<i>Goodenia</i>	<i>havilandii</i>				X	X	

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUWA	GNEW	FRAN
Goodeniaceae	<i>Goodenia</i>	<i>rosea</i>				X		
Goodeniaceae	<i>Leschenaultia</i>	<i>striata</i>	X					
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>	X	X	X	X	X	
Gyrostemonaceae	<i>Gyrostemon</i>	<i>ramulosus</i>	X		X			
Haloragaceae	<i>Haloragis</i>	<i>odontocarpa</i>		X				
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>	X					
Lamiaceae	<i>Apatelantha</i>	<i>insignis (P2)</i>	X		X			
Lamiaceae	<i>Apatelantha</i>	<i>viscida</i>		X				
Lamiaceae	<i>Dampiera</i>	<i>lavandulaceae</i>			X			
Lamiaceae	<i>Hemigenia</i>	<i>brachyphylla</i>		X				
Lamiaceae	<i>Pityrodia</i>	<i>lepidota</i>	X					
Lamiaceae	<i>Pityrodia</i>	<i>loricata</i>		X				
Lamiaceae	<i>Prostanthera</i>	<i>althoferi</i> subsp. <i>althoferi</i>		X		X		
Lamiaceae	<i>Prostanthera</i>	<i>campbellii</i>	X	X	X	X		
Lamiaceae	<i>Prostanthera</i>	<i>grylloana</i>		X		X		
Lamiaceae	<i>Teucrium</i>	<i>teucriflorum</i>			X			
Lamiaceae	<i>Westringia</i>	<i>cephalantha</i>	X	X	X		X	
Lamiaceae	<i>Westringia</i>	<i>rigida</i>	X	X	X	X	X	
Loranthaceae	<i>Amyema</i>	<i>benthamii</i>				X		
Loranthaceae	<i>Amyema</i>	<i>fitzgeraldii</i>	X		X			
Loranthaceae	<i>Amyema</i>	<i>gibberula</i> var. <i>gibberula</i>				X		
Loranthaceae	<i>Amyema</i>	<i>linophylla</i>				X		
Malvaceae	<i>Brachychiton</i>	<i>gregorii</i>	X			X	X	
Malvaceae	<i>Hannafordia</i>	<i>quadrivalvis</i> subsp. <i>quadrivalvis</i>			X			

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Malvaceae	<i>Seringia</i>	<i>velutina</i>	X					
Myrtaceae	<i>Aluta</i>	<i>aspera</i> subsp. <i>aspera</i>	X	X		X	X	
Myrtaceae	<i>Calytrix</i>	<i>birdii</i>	X		X			
Myrtaceae	<i>Calytrix</i>	<i>watsonii</i>	X		X			
Myrtaceae	<i>Enekbatus</i>	<i>cryptandroides</i>		X				
Myrtaceae	<i>Enekbatus</i>	<i>eremaeus</i>	X	X				
Myrtaceae	<i>Eucalyptus</i>	<i>ceratocorys</i>	X		X			
Myrtaceae	<i>Eucalyptus</i>	<i>clelandiorum</i>					X	
Myrtaceae	<i>Eucalyptus</i>	<i>concinna</i>			X	X	X	
Myrtaceae	<i>Eucalyptus</i>	aff. <i>concinna</i>				X		
Myrtaceae	<i>Eucalyptus</i>	<i>hypolaena</i>			X			
Myrtaceae	<i>Eucalyptus</i>	<i>jutsonii</i> subsp. <i>jutsonii</i> (P4)	X	X	X		X	
Myrtaceae	<i>Eucalyptus</i>	<i>leptopoda</i>	X	X	X	X	X	
Myrtaceae	<i>Eucalyptus</i>	<i>moderata</i>		X	X			
Myrtaceae	<i>Eucalyptus</i>	<i>oldfieldii</i>	X	X	X		X	
Myrtaceae	<i>Eucalyptus</i>	<i>oleosa</i> subsp. <i>oleosa</i>			X	X		
Myrtaceae	<i>Eucalyptus</i>	<i>rigidula</i>	X	X	X	X	X	
Myrtaceae	<i>Eucalyptus</i>	<i>transcontinentalis</i>	X		X		X	
Myrtaceae	<i>Euryomyrtus</i>	<i>maidenii</i>		X				
Myrtaceae	<i>Homalocalyx</i>	<i>grandiflorus</i> (P3)	X	X	X			
Myrtaceae	<i>Homalocalyx</i>	<i>thryptomenoides</i>	X	X		X		
Myrtaceae	<i>Hysterobaeckea</i>	<i>ochropetala</i> subsp. <i>cometes</i> (P3)	X	X				
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>	X	X	X			

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Myrtaceae	<i>Leptospermum</i>	<i>fastigiatum</i>	X					
Myrtaceae	<i>Malleostemon</i>	<i>roseus</i>	X	X				
Myrtaceae	<i>Melaleuca</i>	<i>uncinata</i>	X	X	X		X	
Myrtaceae	<i>Micromyrtus</i>	<i>clavata</i>	X					
Myrtaceae	<i>Micromyrtus</i>	<i>flaviflora</i>		X	X	X		
Myrtaceae	<i>Micromyrtus</i>	<i>maidenii</i>		X				
Myrtaceae	<i>Micromyrtus</i>	<i>monotaxis</i>	X					
Myrtaceae	<i>Thryptomene</i>	<i>eremaea (P2)</i>				X		
Myrtaceae	<i>Thryptomene</i>	<i>urceolaris</i>	X	X	X		X	
Myrtaceae	<i>Verticordia</i>	<i>helmsii</i>	X		X	X		
Phyllanthaceae	<i>Poranthera</i>	<i>leiosperma</i>		X				
Pittosporaceae	<i>Bursaria</i>	<i>occidentalis</i>	X	X	X		X	
Pittosporaceae	<i>Marianthus</i>	<i>bicolor</i>	X		X			
Pittosporaceae	<i>Pittosporum</i>	<i>angustifolium</i>			X			
Poaceae	<i>Amphipogon</i>	<i>caricinus</i>		X	X			
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>			X	X		X
Poaceae	<i>Eragrostis</i>	<i>eriopoda</i>				X		
Poaceae	<i>Eragrostis</i>	<i>falcata</i>			X			X
Poaceae	<i>Eriopoda</i>	<i>dielsii</i>			X			
Poaceae	<i>Monachather</i>	<i>paradoxus</i>	X					
Poaceae	<i>Rytidosperma</i>	<i>caespitosum</i>	X	X	X	X		
Poaceae	<i>Triodia</i>	<i>basedowii</i>		X	X	X	X	X
Poaceae	<i>Triodia</i>	<i>schinzii</i>	X	X	X		X	

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUW A	GNE W	FRAN
Poaceae	<i>Triodia</i>	<i>schinzii</i>	X	X	X		X	
Proteaceae	<i>Banksia</i>	<i>elderiana</i>	X					
Proteaceae	<i>Grevillea</i>	<i>acacioides</i>	X	X				
Proteaceae	<i>Grevillea</i>	<i>berryana</i>		X	X	X		
Proteaceae	<i>Grevillea</i>	<i>didymobotrya</i> subsp. <i>didymobotrya</i>	X		X			
Proteaceae	<i>Grevillea</i>	<i>eremophila</i>	X		X			
Proteaceae	<i>Grevillea</i>	<i>extorris</i>	X	X				
Proteaceae	<i>Grevillea</i>	<i>juncifolia</i>	X	X	X			
Proteaceae	<i>Grevillea</i>	<i>oligomera</i>		X		X		
Proteaceae	<i>Grevillea</i>	<i>pterosperma</i>	X	X	X		X	
Proteaceae	<i>Grevillea</i>	<i>sarissa</i>	X		X		X	X
Proteaceae	<i>Grevillea</i>	<i>secunda</i> (P4)	X		X			
Proteaceae	<i>Grevillea</i>	<i>stenobotrya</i>	X					
Proteaceae	<i>Hakea</i>	<i>francisiana</i>	X	X	X		X	
Proteaceae	<i>Persoonia</i>	<i>coriaceae</i>			X			
Proteaceae	<i>Persoonia</i>	<i>leucopogon</i> (P1)	X	X	X			
Proteaceae	<i>Persoonia</i>	<i>saundersiana</i>	X		X			
Pteridaceae	<i>Cheilanthes</i>	<i>sieberi</i>				X		
Restionaceae	<i>Lepidobolus</i>	<i>deserti</i>	X					
Rhamnaceae	<i>Cryptandra</i>	<i>distigma</i>	X					
Rubiaceae	<i>Psydrax</i>	<i>suaveolens</i>			X	X		
Rutaceae	<i>Phebalium</i>	<i>canaliculatum</i>	X	X	X	X	X	
Rutaceae	<i>Phebalium</i>	<i>laevigatum</i>	X		X		X	

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUWA	GNEW	FRAN
Rutaceae	<i>Philotheca</i>	<i>brucei</i> subsp. <i>brucei</i>				X		
Rutaceae	<i>Philotheca</i>	<i>tomentella</i>	X			X		
Santalaceae	<i>Exocarpos</i>	<i>aphyllus</i>	X	X	X	X	X	X
Santalaceae	<i>Exocarpos</i>	<i>sparteus</i>			X			
Santalaceae	<i>Santalum</i>	<i>accuminatum</i>	X		X		X	
Santalaceae	<i>Santalum</i>	<i>spicatum</i>			X	X	X	
Sapindaceae	<i>Dodonaea</i>	<i>amblyophylla</i>	X		X			
Sapindaceae	<i>Dodonaea</i>	<i>lobulata</i>			X	X	X	
Sapindaceae	<i>Dodonaea</i>	<i>rigida</i>		X	X	X		
Sapindaceae	<i>Dodonaea</i>	<i>stenozyga</i>					X	
Sapindaceae	<i>Dodonaea</i>	<i>viscosa</i> subsp. <i>angustissima</i>	X		X		X	X
Scrophulariaceae	<i>Eremophila</i>	<i>alternifolia</i>					X	
Scrophulariaceae	<i>Eremophila</i>	<i>caperata</i>	X		X	X		
Scrophulariaceae	<i>Eremophila</i>	<i>clarkei</i>				X		
Scrophulariaceae	<i>Eremophila</i>	<i>decipiens</i> subsp. <i>decipiens</i>	X		X		X	X
Scrophulariaceae	<i>Eremophila</i>	<i>ericalyx</i>		X				
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>		X	X	X	X	
Scrophulariaceae	<i>Eremophila</i>	<i>glabra</i> subsp. <i>albicans</i>		X				
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>latrobei</i>			X	X		
Scrophulariaceae	<i>Eremophila</i>	<i>metallicorum</i>					X	
Scrophulariaceae	<i>Eremophila</i>	<i>miniata</i>					X	X
Scrophulariaceae	<i>Eremophila</i>	<i>oppositifolia</i>					X	
Scrophulariaceae	<i>Eremophila</i>	<i>platythamnos</i> subsp. <i>platythamnos</i>	X		X	X		

Appendix C: Species List by Vegetation Type (continued)

Family	Genus	Species	SDSH	SACS	SAGS	MUWA	GNEW	FRAN
Scrophulariaceae	<i>Eremophila</i>	<i>scoparia</i>			x		x	
Scrophulariaceae	<i>Eremophila</i>	sp. Mt Jackson (G.J. Keighery 4372)					x	
Solanaceae	<i>Anthotroche</i>	<i>pannosa</i>	x		x			
Solanaceae	<i>Duboisia</i>	<i>hopwoodii</i>	x					
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>	x		x	x		
Solanaceae	<i>Solanum</i>	<i>orbiculatum</i>						x
Stylideaceae	<i>Stylidium</i>	<i>warriedarens</i>				x		
Thymelaeaceae	<i>Pimelea</i>	<i>microcephala</i> subsp. <i>microcephala</i>			x			
Zygophyllaceae	<i>Zygophyllum</i>	<i>aurantiacum</i>					x	x

Key:

SDSH: Sand dune shrublands.

SACS: Sandplain acacia shrublands

SAGS: Sandplain gum stratum

MUWA: Mulga wanderrie grassy shrublands

GNEW: Greenstone hell eucalypt woodlands

FRAN: Frankenia low shrublands

Appendix D: Conservation Code Definitions

Appendix D1: Conservation Codes for Western Australian Flora and Fauna (Department of Biodiversity, Conservation and Attractions, 2016) Retrieved April 2022

Specially protected fauna and flora Code	Description
<p style="text-align: center;">T</p>	<p><u>Threatened species</u></p> <p>Threatened species Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act). Threatened fauna is that subset of ‘Specially Protected Fauna’ listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna. Threatened flora is that subset of ‘Rare Flora’ listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.</p>
<p style="text-align: center;">CR</p>	<p>Critically endangered species</p> <p>Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p>
<p style="text-align: center;">EN</p>	<p>Endangered species</p> <p>Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.</p>
<p style="text-align: center;">VU</p>	<p>Vulnerable species</p> <p>Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p>
<p style="text-align: center;">EX</p>	<p>Extinct species</p> <p>Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.</p>
<p style="text-align: center;">EW</p>	<p>Extinct in the wild species</p> <p>Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.</p>

Appendix D2: Conservation Codes for Western Australian Flora and Fauna (Department of Biodiversity, Conservation and Attractions, 2016) Retrieved April 2022 *continued*

Specially protected species	Description
<p style="text-align: center;">MI</p>	<p>Migratory species</p> <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>
<p style="text-align: center;">CD</p>	<p>Species of special conservation interest (conservation dependent fauna)</p> <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018..</p>
<p style="text-align: center;">OS</p>	<p>Other specially protected species</p> <p>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.</p>

Appendix D3: Conservation Codes for Western Australian Flora and Fauna (Department of Biodiversity, Conservation and Attractions, 2016) Retrieved April 2022*continued*

Priority Species Codes	Description
P1	<p>Priority 1: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
P2	<p>Priority 2: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
P3	<p>Priority 3: Poorly-known species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
P4	<p>Priority 4: Rare, Near Threatened and other species in need of monitoring</p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

Appendix D4: Definition of Threatened Flora Species (Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)) Retrieved April 2022

Category Code	Category
Ex	<p>Extinct</p> <p>Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.</p>
ExW	<p>Extinct in the Wild</p> <p>Species which is known only to survive in cultivation, in captivity or as a naturalized population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.</p>
CE	<p>Critically Endangered</p> <p>Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.</p>
E	<p>Endangered</p> <p>Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.</p>
V	<p>Vulnerable</p> <p>Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</p>
CD	<p>Conservation Dependent</p> <p>Species which at a particular time if, at that time: a) the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximized; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.</p>

Appendix D5: Definitions and Criteria of Threatened Ecological Communities (Department of Environment and Conservation 2013) Retrieved April 2022

Category Code	Category
<p style="text-align: center;">PD</p>	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:</p> <p>(i) Records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or;</p> <p>(ii) All occurrences recorded within the last 50 years have since been destroyed.</p>
<p style="text-align: center;">CE</p>	<p>Critically Endangered</p> <p>A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.</p> <p>B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.</p> <p>C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).</p>
<p style="text-align: center;">EN</p>	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):</p> <p>A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):</p> <p>i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);</p> <p>ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.</p> <p>B) Current distribution is limited, and one or more of the following apply (i, ii or iii):</p> <p>i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);</p> <p>ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;</p> <p>iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.</p> <p>C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).</p>
<p style="text-align: center;">VU</p>	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):</p> <p>A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.</p> <p>B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.</p> <p>C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.</p>

Appendix D6: Definitions and Criteria for Priority Ecological Communities (Department of Environment and Conservation 2013) Retrieved April 2022

Category Code	Category
P1	<p>Poorly-known ecological communities:</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2	<p>Poorly-known ecological communities:</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3	<p>Poorly known ecological communities:</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>6. Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Appendix E: Vegetation Classification System

Appendix E: Vegetation Classification System (Modified Muir 1977)

Form/Height	Canopy Cover				
	Dense 70-100%	Mid-Dense 30-70%	Sparse 10-30%	Very Sparse 2-10%	Scattered <2%
Trees >30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland	Scattered Tall Trees
Trees 15-30m	Dense Forest	Forest	Woodland	Open woodland	Scattered Trees
Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A	Scattered Low Trees A
Trees <5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B	Scattered Low Trees B
Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee	Scattered Tree Mallees
Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee	Scattered Shrub Mallees
Shrubs >2m	Dense Thicket	Thicket	Scrub	Open Scrub	Scattered Tall Shrubs
Shrubs 1-2m	Dense Heath	Heath	Low Scrub	Open Low Scrub	Scattered Shrubs
Shrubs <1m	Dense Low Heath	Low Heath	Dwarf Scrub	Open Dwarf Scrub	Scattered Low Shrubs
Mat plants, Bunch	Dense Mat Plants/	Mat Plants/Grass/	Open Mat Plants/	Very Open Mat Plants/	Scattered Mat Plants/
Grass, Hummock	Grass/Hummock	Hummock Grass/	Grass/Hummock	Grass/Hummock Grass/	Grasses/Hummock
Grass, Sedges, Herbs	Grass/Sedges/Herbs	Sedges/Herbs	Grass/Sedges/Herbs	Sedges/Herbs	Grasses/Sedges/Herbs

APPENDIX 5: AHIS HERITAGE REPORT

List of Registered Aboriginal Sites

Search Criteria

No Registered Aboriginal Sites in Mining Tenement - E 29/742

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

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List of Registered Aboriginal Sites

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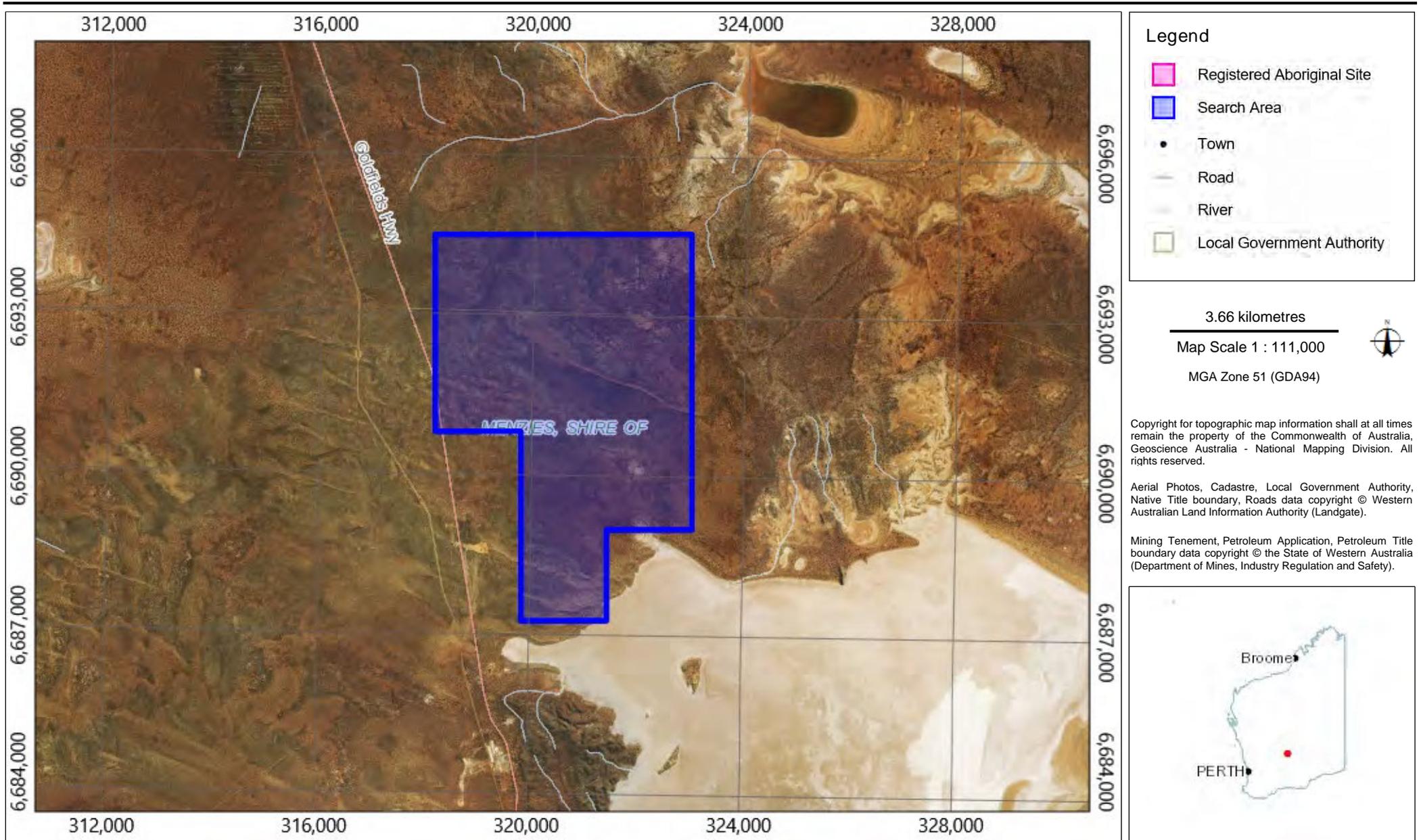
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Aboriginal Heritage Inquiry System

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Map of Registered Aboriginal Sites



Search Criteria

No Other Heritage Places in Mining Tenement - E 29/742

Disclaimer

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Aboriginal Heritage Inquiry System

List of Other Heritage Places

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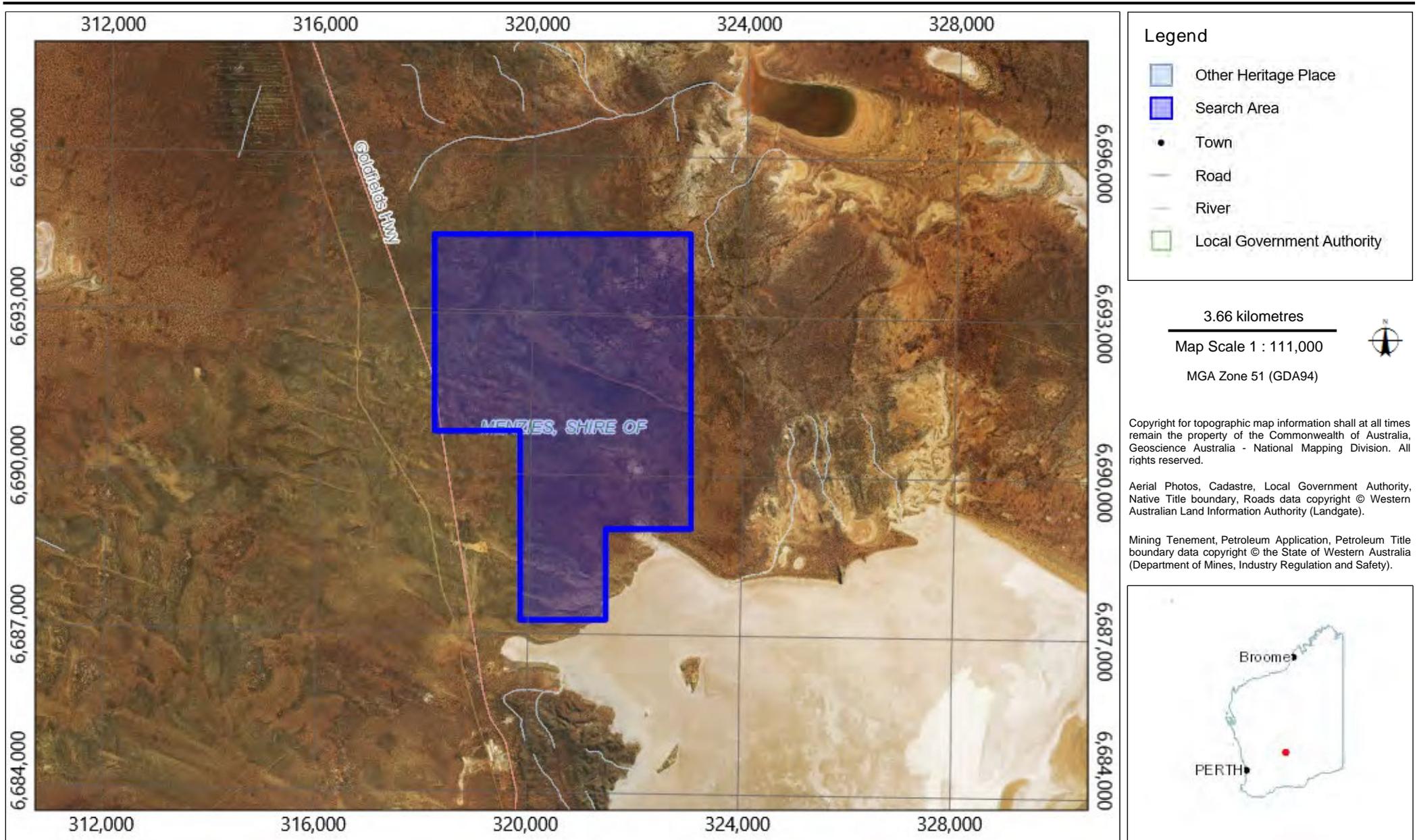
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Aboriginal Heritage Inquiry System

Map of Other Heritage Places

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APPENDIX 6: CLOSURE TASK REGISTER

Domain 1: Pits

Key Components

- Pit
- Pit walls / slopes

Closure Outcomes

- All excavation pits will be made safe by constructing the slopes to have gradients between 12° and 15°.
- Access to pit areas will be restricted by rehabilitating access roads.
- All excavation pits will be constructed, or remediated as far as practicable, to minimise erosion over the long term, including significant gulying, tunnelling, deflation, or movement, with slope angles at designed gradients.
- Landforms will be non-polluting with no measurable impacts to surface water quality or other receptors.
- Landforms will be rehabilitated to have a self-sustaining ecosystem that, in time, will be comparable to the surrounding area with respect to vegetation density and diversity.



Key Closure Planning Considerations and Issues

- Ensure drainage is adequate and will not compromise rehabilitation work.
- Ensure final slope angles are within design parameters.

Key Knowledge Gaps / Proposed Studies and Trials

There are no significant knowledge gaps that could impede the successful closure and rehabilitation of the Project.

Works Program for Planned Closure

Pit	<ul style="list-style-type: none"> • Push down stockpiled material (vegetation and topsoil) surrounding pit and reprofile to form final batters with angles of no more than 15°. • Reprofile and place 300 mm of growth medium (topsoil) over cleared areas, including the access ramp. • Rip all surfaces along the contour and seed with native, local species. • Paddock dump material across the pit ramp to prevent stormwater ingress. This should be at least 1 m high with a minimum 2.5 m basal width.
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Works Program for Unplanned Closure

Closure tasks for unplanned closure will be similar to planned closure, however the pit footprint may be smaller.

Performance Monitoring

Site specific rehabilitation monitoring	<p>Site specific rehabilitation monitoring using a combination of remote sensing and aspects of EFA to assess:</p> <ul style="list-style-type: none"> • Compliance aspects (area, elevations, slope angles). • Erosion aspects (gully formation). • Drainage (flow paths and catchments). • Vegetation (density/health, community, weeds).
---	--

Domain 2: Roads

Key Components

- Roads

Closure Outcomes

- Access to pit areas will be restricted by rehabilitating access roads.
- Landforms will be non-polluting with no measurable impacts to surface water quality or other receptors.
- Landforms will be rehabilitated to have a self-sustaining ecosystem that, in time, will be comparable to the surrounding area with respect to vegetation density and diversity.



Key Closure Planning Considerations and Issues

- Reinstatement of natural drainage as far as practicable.
- Control of weeds.

Key Knowledge Gaps / Proposed Studies and Trials

- There are no significant knowledge gaps that could impede the successful closure and rehabilitation of the Project.

Works Program for Planned Closure

Roads

- Respread windrows.
- Reprofile and reinstate natural drainage as far as practicable.
- Deep rip all surfaces and seed with native, local species.
- Place bunds (>1.5 m high by 2.5 m wide) across main access ways.

Works Program for Unplanned Closure

Closure tasks for unplanned closure will be similar to planned closure.

Performance Monitoring

Site Inspections

- Site inspections will be undertaken at least annually.