APPENDIX N

Protected Trees Assessment

REPORT

Protected Tree Assessment for the Proposed Turfvlakte Mining Project

Exxaro Coal (Pty) Ltd

Submitted to:

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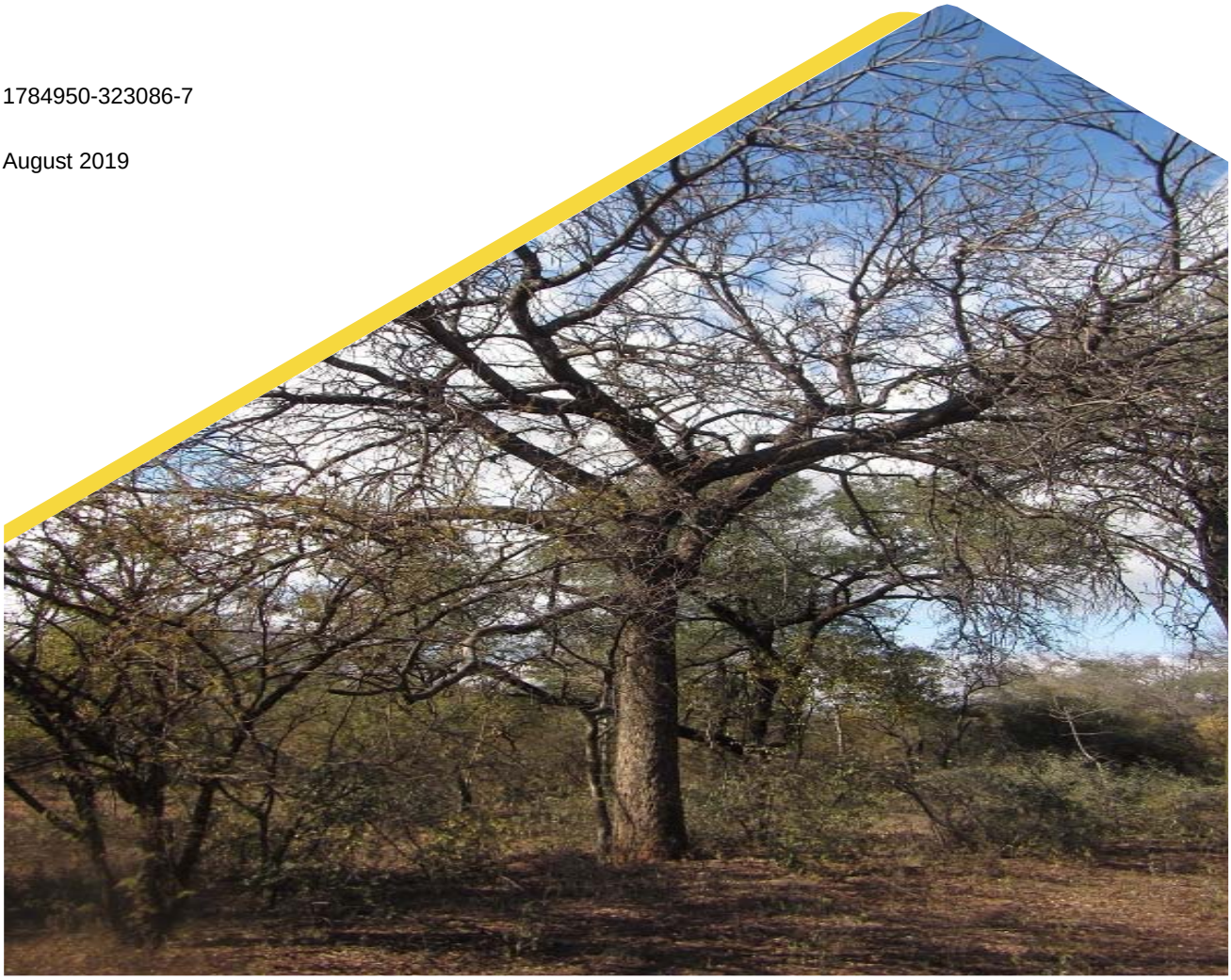

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1.0 INTRODUCTION

Golder Associates Africa (Pty) Ltd (Golder) was appointed by Exxaro Coal (Pty) Ltd (Exxaro) to conduct a protected tree survey of the sites associated with the proposed Turfvlakte Mining Project, at Grootegeluk Coal Mine near Lephalale in the Limpopo Province, South Africa. This document presents the findings of the protected tree assessment.

1.1 Location of Study Area

The farm Turfvlakte 463 is located approximately 16 km west of the town of Lephalale in the Limpopo Province (Figure 1). The entire farm is 965 ha in extent and is positioned at the centre of a development triangle formed by the neighbouring Grootegeluk Coal Mine, Eskom's Matimba and Medupi Power Stations, and various facilities associated with these operations.

2.0 CONTEXT OF STUDY

Exxaro intend to expand their mining operation at Grootegeluk Coal Mine to include a portion of the adjacent farm Turfvlakte 463. The farm forms part of the Exxaro-owned Manketti Game Reserve and is characterised by unmodified natural habitat.

During a 2018 assessment of the terrestrial ecology of the affected farm portion, which was conducted as part of the broader environmental impact assessment process, several protected tree species were recorded (Golder, 2018). It was thus necessary to conduct a focused protected tree assessment to determine the number of protected trees that may be impacted by the proposed mining project, and for which clearing permits would need to be obtained from the relevant authorities.

The total extent of the area under investigation for protected trees totals about 615 ha – shown in Figure 2. Of which, the proposed project layout indicates that about 265 ha will be developed.

2.1 Legislative Framework

Of particular relevance to the project is the National Forests Act (NFA) (Act No. 84 of 1998), and the Limpopo Environmental Management Act (LEMA) (Act No. 7 of 2003):

- Schedule A of the National Forests Act (1998) provides a gazetted list of South African protected trees. Amongst other things, listed trees may not be cut, disturbed, damaged or destroyed without a license granted by the responsible authority. Notice 690 of 2017 lists 47 species of protected trees for South Africa:
  - Seven nationally listed protected trees were recorded in the study area during a terrestrial ecology assessment – listed in Table 1 (Golder, 2018).
- Schedule 11 and 12 of the LEMA list plant species that are considered Specially Protected and Protected at a provincial level:
  - One species (*Spirostachys africana*) listed under Schedule 12 of the LEMA was recorded during a terrestrial ecology assessment (Golder, 2018).

Table 1: Protected tree species recorded during the terrestrial ecology assessment

Species (Scientific Name)	Common Names (English/Afrikaans)	Regional Red List Status	National Protected Tree Species (1998)	Limpopo Province - Protected Species (2003)
Boscia albitrunca	Shepherd's Tree/Witgat	-	Protected	-
Combretum imberbe	Lead Wood/Hardekool	-	Protected	-
Elaeodendron transvaalense	Bushveld Saffron/Bosveldsaffraan	Near Threatened	Protected	-
Sclerocarya birrea subsp. *caffra*	Marula/Maroela	-	Protected	-
Securidaca longepedunculata	Violet Tree/Krinkhout	-	Protected	-
Spirostachys africana	Tamboti/Tambotie	-	-	Protected
Vachellia erioloba	Camel Thorn/Kameeldoring	-	Protected	-

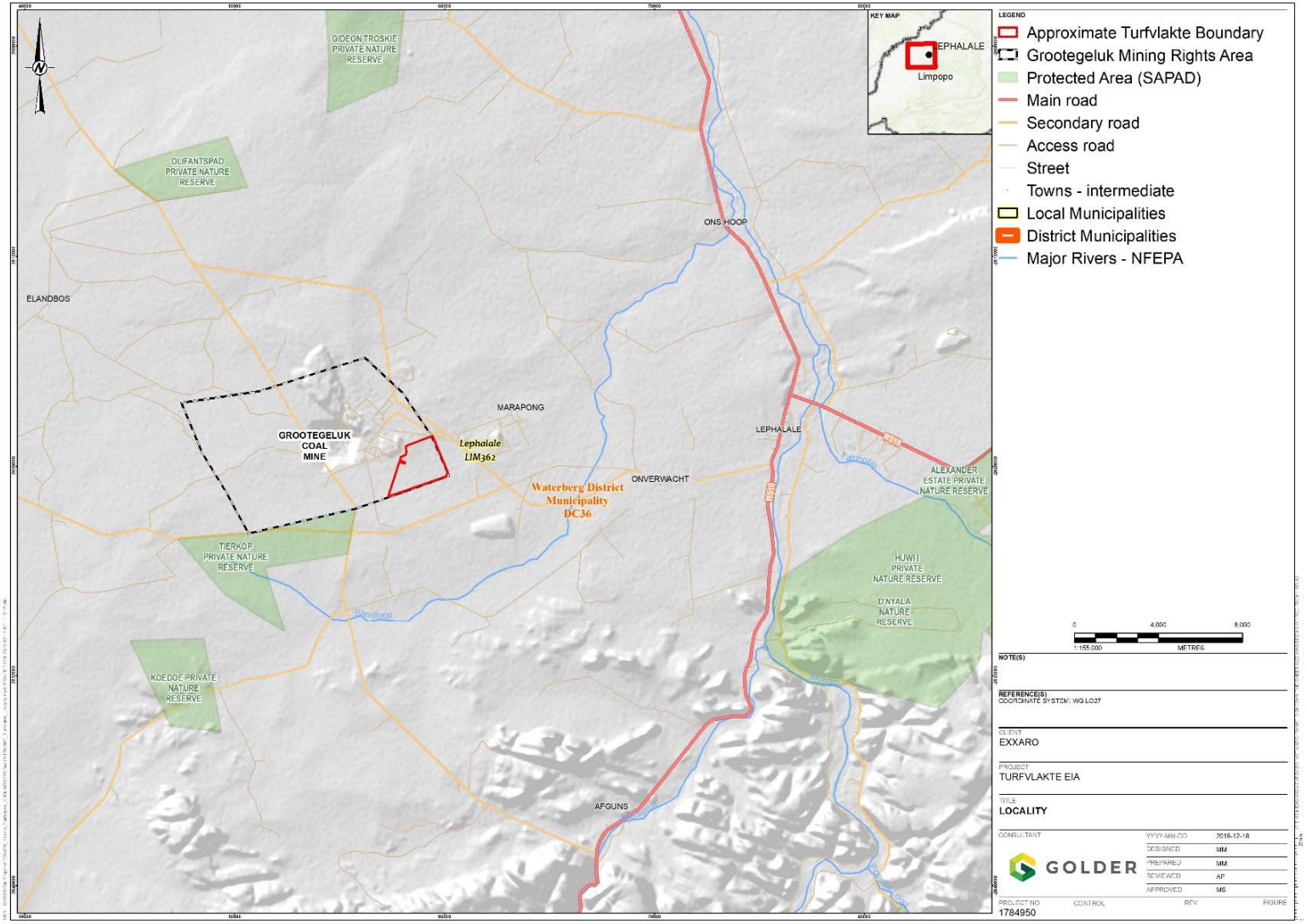

Figure 1: Regional location of Turfvlakte and Grootegeluk Coal Mine

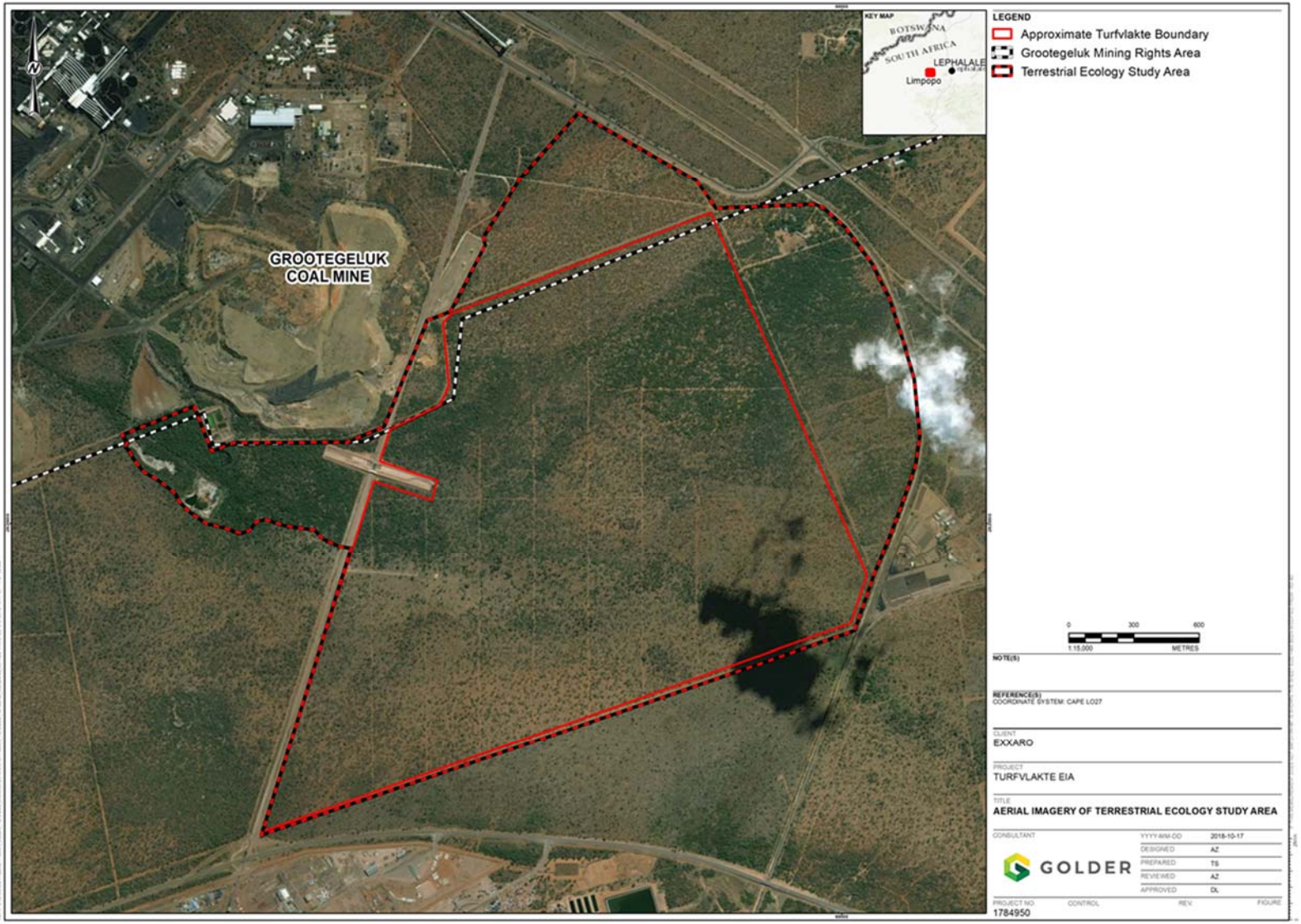

Figure 2: The Turfvlakte property and associated sites of proposed infrastructure

3.0 STUDY METHODS

3.1 Approach

Due to the size (615 ha) of the study area it was not practical to undertake a full count of all protected trees. We thus conducted a sample count and extrapolated collected data to determine the estimated number of protected trees that may be impacted. The field method and subsequent desktop calculations are summarised below:

3.2 Field Methods

Field sampling was conducted from the 11th to 15th June 2018.

3.2.1 Sample Count Field Methodology

- A transect method was used to sample protected trees on the Turfvlakte property. This method is based on recording all protected trees within a representative number of belt-transects;
- Prior to arriving in the field, GIS software was used to superimpose thirteen evenly-spaced transect lines across the study area;
- Transect lines were 250 m apart, orientated on a north-south axis, and traversed across all the vegetation communities identified during the 2018 terrestrial ecology assessment (Figure 3 and Table 4); and
- Taking into consideration vegetation density and structure, and the associated degree of general visibility, 30 m wide sampling belts (15 m either side of the transect lines) were used along each transect line. This ensured that all protected trees along each transect were readily visible and could be recorded. Transect length varied considerably, from 600 m to over 2 km.

3.2.2 Type of Collected Data

- At each tree or tree cluster location, the following data were recorded:
  - Tree species (i.e. identity);
  - Co-ordinate (using a hand-held GPS);
  - Number of trees (for clusters);
  - Approximate height and diameter; and
  - General Condition (health or unhealthy).

3.3 Data Analyses

- To calculate the estimated number of a protected tree species in areas sampled using the transect method (i.e. sample counts), the following method was followed:
  - The total area (ha) of each vegetation community that will be impacted by proposed project infrastructure was determined (**B** in formula below) using aerial imagery and the mine layout plans;
  - The area (ha) of each vegetation community that was sampled (**C** in formula below) was also determined using aerial imagery;
  - The number of protected trees observed along transects in each vegetation community (**D** in formula below) was recorded;

- The total impacted area of each vegetation community (**B**) was then divided by the sampled area of that community (**C**) to determine an extrapolation factor (**EF**), as follows:
  - **EF = B/C**
- The extrapolation factor (**EF**) was then multiplied by the number of trees (of a particular species) recorded in the sampled area of that vegetation community (**D**) to determine the estimated number of potentially impacted trees of each species in that community (**A**), as follows:
  - **A = D x EF**
  - The extrapolation factors used for each vegetation community are shown in Table 2.

The estimated number of trees of each species calculated as shown above was then summed with data obtained from the haul road full count to determine a total number of trees of each species that are likely to be affected by the proposed mining project.

Table 2: Extrapolation factors for the Turfvlakte vegetation communities

Vegetation Community	Total Impacted Area (ha) (B)	Sampled Area (Ha) (C)	Extrapolation Factor (EF = B/C)
Short Open *Vachellia tortilis* Bushveld	150	28.7	5.2
Tall *Senegalia nigrescens* Bushveld	44	11.8	3.7
Open *Combretum apiculatum – Terminalia sericea* Bushveld	18	8.16	2.2
Spirostachys africana - Vachellia grandicornuta Woodland	41	5.6	7.3
Euclea undulata Thicket	12	4.2	2.8

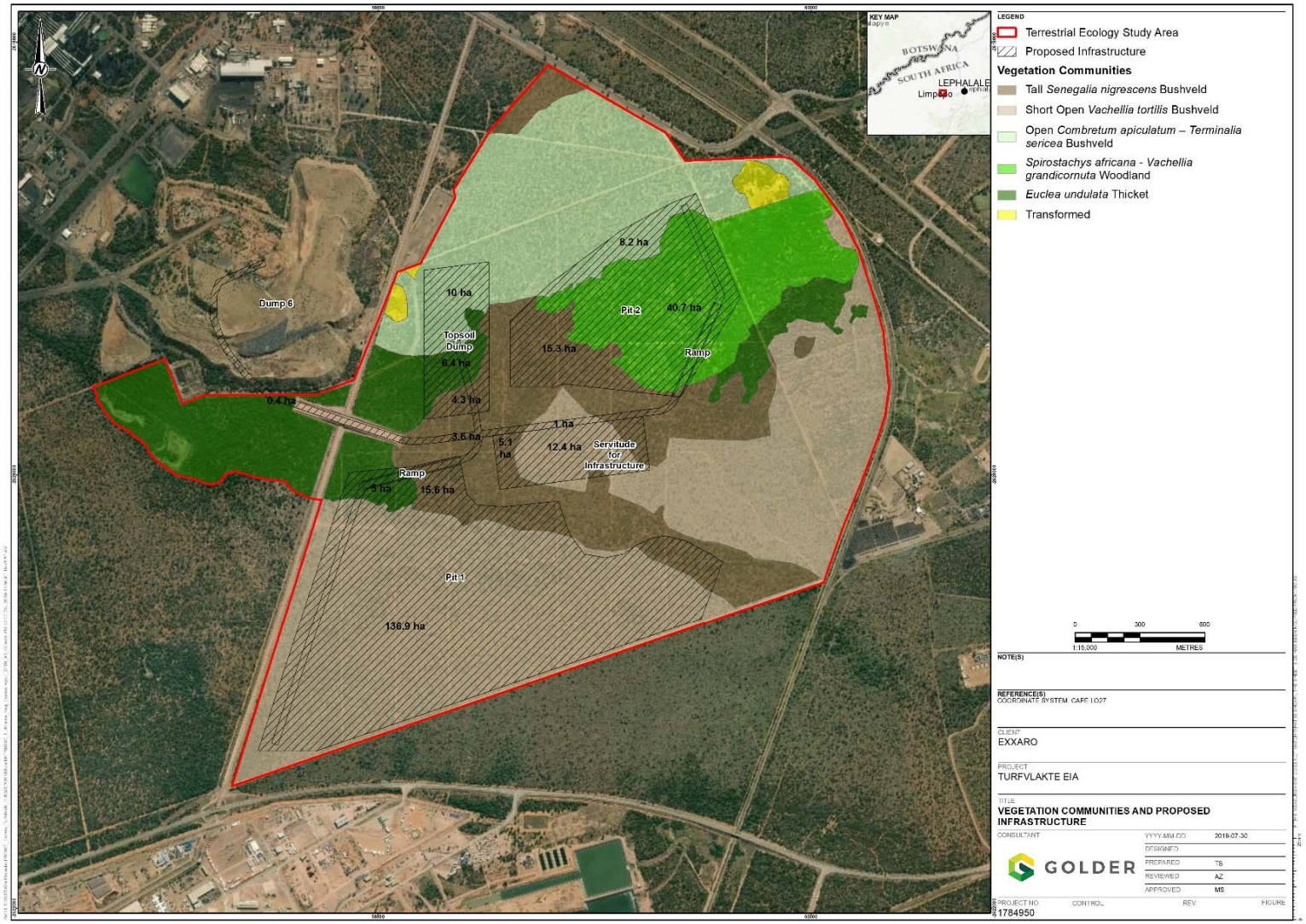

Figure 3: Overlay of proposed project infrastructure and respective impact areas, per vegetation community

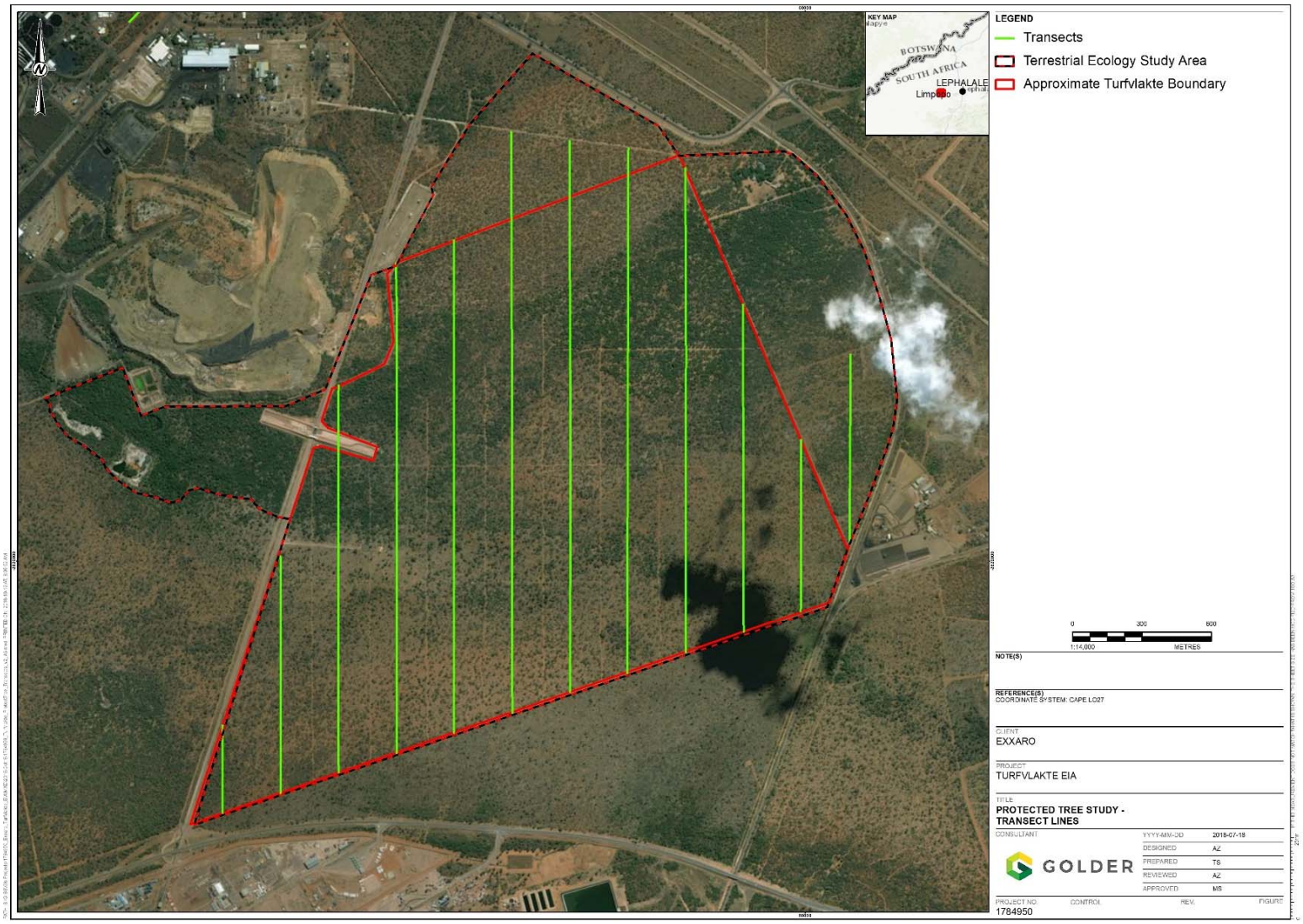

Figure 4: Location of transect lines superimposed onto the Turfvlakte property

4.0 RESULTS

The general findings of the protected tree assessment are summarised in section 4.1, with detailed results and interpretation presented in section 4.2.

4.1 General Findings - Collected Data

- A total of 1373 trees were recorded using the transect method. Table 3 presents a summary for each protected tree species, while Table 4 listed the number of each species recorded along transects in each vegetation community;
- The most abundant protected tree species recorded were *Vachellia erioloba* and *Spirostachys africana*:
  - *Vachellia erioloba* is the most widespread, occurring abundantly in most vegetation communities and areas sampled (n=660); and
  - *Spirostachys africana* is highly dominant in the *Spirostachys africana* - *Vachellia grandicornuta* Woodland vegetation community (n=579) but was rarely found in other communities.
- *Combretum imberbe* was the next most commonly recorded (n=96), and like *V. erioloba* occurred in most of the surveyed areas; and
- Three *Securidaca longepedunculata* trees were recorded in the Open *Combretum apiculatum* – *Terminalia sericea* Bushveld vegetation community during the wet season terrestrial ecology field survey. But it was not subsequently recorded while walking the protected tree transects.

Table 3: Number of trees sampled along transects during the 2018 protected tree assessment

Species (Scientific Name)	Number of Sampled trees (D)
Boscia albitrunca	15
Combretum imberbe	96
Elaeodendron transvaalense	22
Sclerocarya birrea subsp. *caffra*	1
Spirostachys africana	579
Vachellia erioloba	660
Total Sampled	**1373**

Table 4: Number of protected trees recorded along the transects in each of the vegetation communities

	Vachellia erioloba	***Boscia albitrunca***	***Combretum imberbe***	***Elaeodendron transvaalense***	***Spirostachys africana***	***Sclerocarya birrea* subsp. *caffra***
Euclea undulata Thicket	144		11			
Open *Combretum apiculatum – Terminalia sericea* Bushveld	129				1	1
Short Open *Vachellia tortilis* Bushveld	263	10	58			
Spirostachys africana - Vachellia grandicornuta Woodland	13	1	1	22	574	
Tall *Senegalia nigrescens* Bushveld	111	4	26		4	
Sub Total	**660**	**15**	**96**	**22**	**579**	**1**

4.2 Data Analysis and Interpretation

4.2.1 Extrapolation of Transect Data

- Table 5 presents the estimated number of each protected tree species occurring within the impacted area (ha) of the different vegetation communities based on extrapolation;
- The results of the transect method (aggregated sub-totals from Table 5) indicate that approximately 7440 protected trees are located within proposed Turfvlakte mine infrastructure footprints;
- *Vachellia erioloba* (n=2560)*, Spirostachys africana* (n=4207) and *Combretum imberbe* (n=436) are the most abundant impacted protected species, based on extrapolation – see Table 5;
- The approximate number of trees that will be impacted within each vegetation community by the various infrastructure components, based on extrapolation, is presented in APPENDIX A; and
- *Securidaca longepedunculata* was not recorded during the focused protected tree survey. However, three specimens were recorded in the Open *Combretum apiculatum – Terminalia sericea* Bushveld vegetation community during the field work for the terrestrial ecology assessment. As a precaution we have however, included it in the summary table (see Table 6). The total number of potentially impacted protected trees is thus 7443.

Table 5: Estimated number of protected trees occurring in impacted areas of each vegetation community using the extrapolation factors

Vegetation Community	*Vachellia erioloba*	*Boscia albitrunca*	*Combretum imberbe*	*Elaeodendron transvaalense*	*Spirostachys africana*	*Sclerocarya birrea* subsp. *caffra*
Euclea undulata Thicket	403		31			
Open *Combretum apiculatum – Terminalia sericea* Bushveld	284				2	2
Short Open *Vachellia tortilis* Bushveld	1368	52	302			
Spirostachys africana - Vachellia grandicornuta Woodland	95	7	7	161	4190	
Tall *Senegalia nigrescens* Bushveld	411	15	96		15	
Sub Total	**2560**	**74**	**436**	**161**	**4207**	**2**

Table 6: Summary of the approximate number of protected occurring within proposed Turfvlakte mine infrastructure footprints, incl. *Securidaca longepedunculata*.

Species (Scientific Name)	Approximate Number of Affected Trees
Boscia albitrunca	74
Combretum imberbe	436
Elaeodendron transvaalense	161
Sclerocarya birrea subsp. *caffra*	2
Securidaca longepedunculata	3[1]
Spirostachys africana	4207
Vachellia erioloba	2560
Total	**7443**

5.0 CONCLUSIONS AND RECOMMENDATIONS

Protected trees were generally abundant in all areas surveyed during the assessment, and it is expected that those occurring within proposed development footprints will need to be cleared during the construction phase of the proposed project. Predicated on the foregoing analysis, the proposed project will potentially impact 7443 protected trees.

It is therefore necessary to apply for a protected tree-clearing permit from the national authority, i.e. Department of Agriculture, Forestry and Fisheries (DAFF) for all species, except *Spirostachys africana,* and the provincial authority, i.e. Limpopo Department of Economic Development, Environment and Tourism (LEDET) for this species which is not permitted by DAFF.

Activities, as prescribed in the DAFF application, that are likely to require permitting in this regard include:

- Cut, disturb, damage or destroy protected trees;
- Prune or de-limb individual protected trees; and
- Disturb protected trees for buildings or earth moving operations.

We note that the timber/wood from a number of the recorded protected species has great human utility. *Spirostachys africana* (Tamboti) timber for example, is highly sought after by furniture makers, while *Vachellia erioloba* (Camel Thorn) is a valuable source of fuel (firewood and charcoal). It is thus strongly recommended that wherever possible, the wood from cleared trees be supplied to local communities for fuel use and / or furniture manufacturing, etc., rather than being allowed to decompose in a debris heap.

6.0 REFERENCES

Golder (2018) *Terrestrial Ecology Baseline for the Proposed Turfvlakte Project*. Midrand: Golder Report No. 1784950-318357-3.

Limpopo Environmental Management Act (2003) Schedule 2, 3, 11 & 12: Specialy Protected and Protected Fauna and Flora - Limpopo Environmental Management Act (Act No. 7 of 2003).

National Forests Act Notice of List of Protected Trees Species under the National Forests Act (Act No. 84 of 1998) (1998). Department of Water Affairs and Forestry, South Africa.

Signature Page

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APPENDIX A

Approximate Number of Impacted Trees per Infrastructure Component, based on Extrapolation.

Approximate number of impacted trees per infrastructure component, based on extrapolation

Vegetation Community	Infrastructure Component	Approx. Hectares	Approx. Number of Impacted Trees Based on Extrapolation					
			Vachellia erioloba	***Boscia albitrunca***	***Combretum imberbe***	***Elaeodendron transvaalense***	***Spirostachys africana***	***Sclerocarya birrea* subsp. *caffra***
Tall *Senegalia nigrescens* Bushveld	Topsoil Dump	4.3	40	1	9	0	1	0
	Pit 2	15.3	143	5	34	0	5	0
	Servitude for Infrastructure	5.1	48	2	11	0	2	0
	Pit 1	15.6	146	5	34	0	5	0
	Haul Road	3.6	34	1	8	0	1	0
	Sub-Totals	**44.0**	**410.7**	**15**	**96**	**0**	**15**	**0**
Open *Combretum apiculatum – Terminalia sericea* Bushveld	Topsoil Dump	10.0	155	0	0	0	1	1
	Pit 2	8.2	128	0	0	0	1	1
	Sub-Totals	**18.2**	**284**	**0**	**0**	**0**	**2**	**2**
Euclea undulata Thicket	Topsoil Dump	6.4	220	0	17	0	0	0
	Pit 1	5.0	171	0	13	0	0	0
	Haul Road	0.4	13	0	1	0	0	0
	Sub-Totals	**11.7**	**403**	**0**	**31**	**0**	**0**	**0**
	Pit 2	40.7	95	7	7	161	4190	0

Vegetation Community	Infrastructure Component	Approx. Hectares	Approx. Number of Impacted Trees Based on Extrapolation					
			Vachellia erioloba	***Boscia albitrunca***	***Combretum imberbe***	***Elaeodendron transvaalense***	***Spirostachys africana***	***Sclerocarya birrea* subsp. *caffra***
Spirostachys africana - Vachellia grandicornuta Woodland	**Sub-Totals**	**40.7**	**95**	**7**	**7**	**161**	**4190**	**0**
Short Open *Vachellia tortilis* Bushveld	Servitude for Infrastructure	12.4	112	4	25	0	0	0
	Pit 1	136.9	1246	47	275	0	0	0
	Haul Road	1.0	9	0	2	0	0	0
	Sub-Totals	**150.3**	**1368**	**52**	**302**	**0**	**0**	**0**

APPENDIX B

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GOLDER ASSOCIATES AFRICA (PTY) LTD

SPECIALIST DECLARATION

As required under Appendix 6 of the Environmental Impact Assessment Regulations, 2014 (as amended), I, **Andrew Zinn**, declare that:

- I act as an independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of Acts, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with all applicable Acts and Regulations in compiling this report;
- I have not, and will not engage in conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing:
  - any decision to be taken with respect to the application by the competent authority; and
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.

Signature of the specialist:

Golder Associates Africa (Pty) Ltd

Name of company (if applicable):

3 August 2019

Date:

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