Arboricultural Assessment
Precinct Structure Plan - 1080 - Kororoit.

Prepared for: Stephanie Harder
Growth Areas Authority

Prepared by: Bruce Callander | Tree Logic Pty Ltd

14 October 2013

treelogic
Tree management for the urban forest

Tree Logic Pty Ltd Unit 4, 21 Eugene Terrace Ringwood Vic 3134 Ph 03 9870 7700 **treelogic.com.au**

Contents.

Version control	Site	Date	Author		File No
Version 1	PSP 1080 - Kororoit	27/06/2013	Bruce Callander	Draft	13_4906
Version 2	PSP 1080 - Kororoit	30/08/2013	Bruce Callander	GAA parcel No's and map details.	13_4906
Version 3	PSP 1080 - Kororoit	14/10/2013	Bruce Callander	Correct GAA parcel No's Update map details.	13_4906

1 Executive summary

1.1 The tree population was sparse and generally unremarkable overall, both across the study area and within individual properties.

1.2 Two hundred and twenty five (225) tree features were inspected within the study area including one hundred and forty seven (147) individual trees and seventy eight (78) tree group features comprising approximately 2,698 additional trees, making a total of approximately 2,845 trees that were reviewed.

1.2.1 These figures do not include the countless smaller exotic conifers in numerous windrows around many of the house and property boundaries. Based on observations these trees were considered to be unremarkable features of low significance in the landscape and outside the scope of works.

1.3 Each of the assessed tree features was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health, structure & form) with tree amenity value and reflects the retention value of the tree(s). Refer to Table 1.

Table 1: Arboricultural rating	**Total trees**	**Total tree groups**	***Trees in tree groups***
High	46	7	*≈158*
Moderate	86	40	*≈1,275*
Low	15	30	*≈1,229*
None		1	*36*
Total	**147**	**78**	*≈2,845*

1.4 Indigenous trees that appeared to be naturally occurring were identified in a natural depression within the property parcel number 17 on the south side of Reed Court. These naturally occurring indigenous trees were associated with the flood plain of Koroiroit Creek to the south.

1.4.1 The trees provide visual, amenity, hydrological and ecological benefits to the site and are highly desirable to retain.

1.4.2 While all trees can shed limbs, River Red Gum trees have a well-documented propensity for limb shedding. It is recommended that when retaining such trees, a larger than normal tree protection zone is applied to protect the tree but also to exclude prolonged occupation of the area beneath the canopy to reduce the risk of personal injury or property damage were limbs to fall. The recommended tree protection zone for maturing River Red Gum trees includes protecting the canopy and excluding development from the canopy width plus 1 metre on all sides.

1.5 All other trees were specimens that had been planted for revegetation, ornamental or functional purposes such as wind breaks and screens. Tree protection zones that comply with AS4970-2009 must be applied.

1.6 Not all 'Moderate or Low' rated tree features should be dismissed as candidates poorly suited for retention, though overall, the retention of such trees should not compromise design intent. In general Moderate rated trees were of semi-mature age and size and could be readily replaced during development of the site. In certain landscape settings, smaller specimens in otherwise reasonable condition have the potential to offer an established tree resource, even if only as an interim measure. Low rated trees with health or structural deficiencies are generally not desirable candidates for retention. Windrows with health and structural defects should generally be removed.

1.7 All trees of Very High, High or Moderate arboricultural rating would benefit from some level of tree crown maintenance or reduction pruning to ensure they can be retained for the long term. Pruning can reduce the potential for further limb shed and thereby minimise problems associated limb failure and infection with decay organisms.

1.8 Trees attributed an arboricultural value of None were the least suited to retention on arboricultural grounds, having significant health and / or structural defects.

2 Client Brief

The Growth Areas Authority (GAA) commissioned Tree Logic to undertake an arboricultural survey of tree features within the area defined as Precinct 1080 – Kororoit region to inform the future precinct design process.

The tree study area, Precinct Structure Plan 1080 (PSP80), comprised approximately 11.7 square kilometres and is defined to the north by Taylors Road, to the south by Western highway, and nominated property boundaries to the west and east which is partially defined by the power line easement in the east. The study area is transected east to west by Kororoit Creek and the powerline easement runs north south along the eastern half of the study area. Refer to Plate 1.

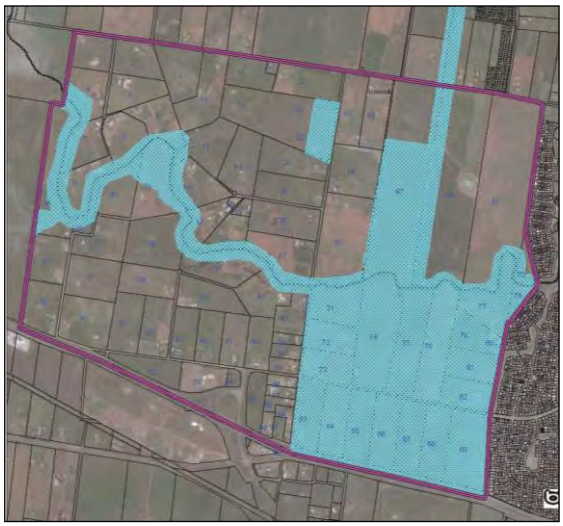


Plate 1: *KororoitPSP 1080 Area.*

Aerial image of tree study area showing areas in blue that were excluded from the survey area including the powerline easement.

The land is currently used for a variety of rural purposes and is zoned Urban Growth Zone with a number of overlays affecting parcels within the site. It is divided into 89 allotments of varying size from 0.5 to 110 hectares with the average being between 10 and 20 hectares.

3 Key Objectives:

The scope of the assessment included determining the species, origin, health and integrity of the trees within the precinct as well as the arboricultural value, landscape value and the ability to survive in an urban environment.

Whilst the assessment included reviewing all trees in the precinct, the scope was confined to recording only large and very large tree features that existed outside of the prescribed excluded and conservation areas. The assessment included trees in the road reserves as well.

Where access to private land was denied or unable to be obtained an assessment has been undertaken from the boundary to obtain a basic understanding of the trees value.

The purpose of the report is to identify the retention values of trees within the precinct.

- The arboricultural report tables the collected data, illustrating the retention value of all surveyed trees on a plan of the PSP area, and includes discussion and recommendations regarding suitability for retention in an urban environment, required protection zones (AS4970-2009) and strategies to maximise longer term viability, where relevant.

The assessment data supplied in Appendix 1 includes:

- Surveys for all trees within the precinct High or Very High retention value > 15cm trunk diameter.
- A unique identifying tree number
- Number of trees (when assessed as a group)
- Location (GPS/GIS co-ordinates in Latitude / Longitude)
- Species (botanical and common name)
- Tree origin (exotic, native, indigenous, planted)
- Dimensions (Diameter Breast Height (DBH), tree height, canopy width)
- Age class

- Health rating
- Structural rating
- Useful life expectancy
- Arboricultural retention value
- Tree Protection Zone based on Australian Standards (AS 4970-2009).
- Any relevant comments

- The report includes plans that locate the trees in conjunction with cadastral layers provided by the GAA as site plans attached as Appendix 2.

4 Method:

4.1. Site inspection methodology;

4.1.1 Site inspections were undertaken by Tree Logic staff over a two week period during May and June, 2013. The trees were inspected from the ground and observations made of the growing environment and surrounding area. The trees were not climbed, no samples of the trees or site soil were taken and no investigation of the root plate below ground was undertaken.

4.1.2 Individually assessed trees and tree group features were attributed with unique identifying numbers. Trees numbers used in this report and appearing in column 1 of the tree assessment tables in Appendix 1 correspond with unique identifying labels provided in the GIS data sets and plans compiled for the site.

4.1.3 Observations were made of the trees to determine age and condition, with measurements taken to establish tree height (measured with a height meter), crown width (paced) and trunk diameter (measured at 1.4m above grade unless otherwise stated). Definitions of arboricultural descriptors can be seen in Appendix 3.

4.1.4 Trees on public road reserves were recorded as “Street tree”.

4.1.5 Photographs of some trees and site conditions were taken for further reference and inclusion in the report.

4.1.6 Spatial data relating to tree locations was recorded measuring tool equipped ruggedised tablet computers using a combination of GIS surveying software (ArcPad), orthorectified site aerial imagery and property boundary cadastre data supplied by the GAA.

4.1.7 Where sufficient identifying characteristics were present trees were identified to species level. Trees were assessed to determine their age class, structure and condition. Tree height was measured using a height meter. Where groups of close spaced trees were assessed, sample heights within the stand were taken and the height of remaining trees estimated against the sample heights. Crown spread was estimated by pacing the crown widths on the widest axis.

4.1.8 Trunk diameter was measured using linear tape measures and diametric tape measures in 5cm increments. The default height for measurement was 1.4m above grade. Where short trunked trees forking at or below 1.4m above grade were assessed, trunk diameter was measured at the narrowest point of the single stem below the fork.

4.2. Field Survey Limitations

4.2.1. The study area comprised 89 separate titles. Not all properties were accessible for the purpose of this survey and many were not required to be accessed either because they fall within the exclusion zones or because it was clearly evident there were no trees that warranted further inspection other than from the roadside.

4.2.2. Twenty eight properties were accessed during the survey although tree entries were not necessarily recorded at all properties accessed due to lack of trees that met the project scope.

4.2.3. Seventeen properties, being Parcels 1, 3, 10, 11, 13, 22 & 23, 15, 21, 36, 40, 48, 50, 66, 67, 68 and 69 were found to have no significant trees that met the project scope.

4.2.4. Twenty properties were exempt from the study area as they are within the excluded zone being 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88 and 89.

4.2.5. Parts of Properties 22, 23 and 67 were also exempt as well sections of properties within approximately 25-50 metres of and abutting the Kororoit Creek.

4.2.6. Access was denied to 6 properties being parcels 3, 14, 15, 16, 24, 25, 82.

4.2.7. There were no contact details supplied for thirty of the remaining properties and despite a number of attempts to gain lawful access to the sites some could not be inspected other than from the property boundary.

4.2.8. Tree records were recorded from the boundaries of nine properties being parcels 38, 39, 44, 57, 58, 60, 64, 65, 66 due to restricted access. The assessments of trees and groups on these properties are limited to observations from the available vantage points external to the site.

4.2.9. Accurate assessment of dimensions, health and structure of these trees must be verified by closer arboricultural inspection prior to enacting any recommendations arising from this report.

4.1. Arboricultural assessment method;

4.1.1. The health and structural characteristics of each tree was assessed and each tree was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health, structure & form) with tree amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics within a built environment. The arboricultural rating in combination with other factors can assist the project team and planners in nominating trees suitable for retention. The five arboricultural ratings used by Tree Logic include:

- **Very High:** Tree of very high quality in good condition. Generally a prominent arboricultural feature. Tree is capable of tolerating changes in its environment if managed appropriately.
- **High:** Tree of high quality with generally sound structural condition and good health. Generally is or has the potential to become a prominent landscape feature.

Trees that were considered to have less than High retention value were not required to be surveyed.

Trees that are generally desirable for retention typically display the following attributes:

- Are of a healthy condition that would allow it to tolerate development-associated modifications to its growing environment and,
- Have a structure that was not predisposed to potential failure that could cause damage or injury and,
- Are of an age and/ or size that provide an immediate and ongoing obvious contribution to the landscape.

Conversely trees in poor health, with suspect or deficient structure, or subject to pest or disease infestation that was having a discernible negative impact on tree condition are generally not considered suitable for retention in an urban environment. Trees recognised as environmental weeds and known to be potentially invasive in the locale of the subject site are generally not considered suitable for retention. Small specimens that provide negligible contribution to the landscape, irrespective of condition should not impede reasonable land use.

Full tree descriptors are attached as Appendix 3.

4.2. Establishing Tree Protection Zones (TPZ);

4.2.1. To successfully retain suitable trees within or around a development site, consideration must be given to protecting the trunk, crown and roots of each specimen. Tree protection zones (TPZ's) are used to provide adequate space for the preservation of sufficient roots to maintain tree health (particularly important for mature trees) whilst providing a buffer zone between construction activity and the tree trunk and crown.

4.2.2. The method for determining tree protection zones adopted in this report is the Australian Standard for protection of trees on development sites (AS4970-2009). It provides a method

for establishing a TPZ area that is based on the trunk diameter measurement measured at 1.4m and multiplied by 12. The trunk of the tree is used as the centre point for the measurement.

4.2.3. TPZ measurements are included in the tree assessment data in Appendix 1.

4.2.4. The method employed in this document for assigning tree protection zones is a guide for planning purposes. Additional guidelines are outlined in Appendix 4 for establishment and maintenance of the tree protection

4.3. Documents reviewed include;

- Planning property reports and Melton City council planning overlays relevant to the sites including:
- Urban Growth Zone (UGZ).
- Rural Conservation Zone (RCZ)
- Urban Floodway Zone (UFZ)
- Land Subject to Inundation Overlay (LSO1)
- Environmental Significance Overlay and Schedule 2 and 5 of the Environmental Significance Overlay (ESO2) (ESO5).
    - Under the ESO5 a permit is required to remove native vegetation unless planted or grown for aesthetic or amenity purposes shelter belts, woodlots, street trees, gardens or the like.
- Public Acquisition Overlay (PAO)
- Clause 52.17 applies to sites greater than 4,000 m^2 in area.
  Under the clause it is a requirement to '*demonstrate the steps taken to;*
    - *Avoid the removal of vegetation native to Victoria.*
    - *Minimise the removal of native vegetation.*
    - *Appropriately offset the loss of native vegetation if required*.'

4.4. The arboricultural report and data supplied as Excel spreadsheet is provided to support ongoing planning of future development of the region. The project survey is delivered in the following formats to support this.

4.4.1. ESRI Shp files.

4.4.2. MapInfo TAB files.

4.4.3. CAD dwg files.

In each format a separate layer has been created to allow the tree features attributed an arboricultural rating of High or Very High to be displayed independently of the wider assessed tree population.

5 Observations

5.1 Site description.

The tree study area was generally flat land on the volcanic plains west of Melbourne which is highly disturbed and cleared of trees. It has a long history of previous land uses including farming for grazing and crop raising.

Kororoit Creek runs in an east west direction across the study area. An area of approximately 25 to 50 metres either side of the creek line was excluded from the survey area.

Away from the creek line the land was predominantly flat and featureless.

In general the properties comprised pasture for grazing and crop raising with trees generally confined to windrow plantings surrounding the paddocks and house lots. Numerous windrows existed around many of the house and property boundaries comprised of countless exotic conifers of relatively small

size. Based on observations these trees were considered to be unremarkable features of low significance in the landscape and outside the scope of works.

The existing tree cover was relatively sparse with the entire tree cover estimated to occupy less than 15% of the PSP area.

A number of naturally occurring indigenous River Red Gum (*Eucalyptus camaldulensis*), trees were found within the Kororoit Creek flood zone on property parcel 17 that are potentially significant for arboricultural, amenity and ecological reasons. There was natural recruitment of indigenous species associated with this pocket of trees. These trees would trigger permit requirement under ESO 5 and offset under Clause 52.17.

Apart from these indigenous trees all other assessed trees were planted specimens, predominantly installed for functional purposes as screens, windrows and shelterbelts and occurring along internal and boundary fence lines.

The plantings generally surrounding the house lots comprised close planted groups of exotic conifers too numerous to count and which in most cases were of relatively small size and low arboricultural condition and at spacing which has influenced the growth of the trees by overcrowding, shading or producing asymmetric form. These trees were generally not considered to fit within the scope of the tree study and are not included in the tree assessment out comes. Many of the conifers are susceptible to pest and disease such as cypress canker, drought stress and wind damage and many were displaying symptoms of decline or stress.

Trees in the roadside reserves were also inspected to assist in identifying opportunities for new roads linking to the Western Highway, Taylors Road or internal roads within the precinct.

With the exception of the aforementioned indigenous trees, the overall impression of the site was that vegetation comprised planted trees of assorted species, age and quality.

5.2 Tree population.

Approximately 2,845 trees were observed across the site and collected as 239 tree features comprising 147 individual trees and 78 tree groups comprising approximately 2,698 additional trees. The numerous exotic conifer windrows were not included in the assessment.

5.3 The species and origin of each tree was identified to determine whether any trees were locally indigenous or native to Victoria and is recorded in the tree data as “Origin”.

5.4 Twenty three (23) different species were identified during the site inspection. The most prevalent species of individual tree inspected are indicated in Table 2.

Table 2. Most prevalent species	Number of Trees /(Groups)	Origin
Eucalyptus camaldulensis	54 (7 groups)	Indigenous or planted
Eucalyptus cladocalyx	14 (25 groups)	Australian native
Eucalyptus globulus	13 (1 group)	Victorian native
Schinus areira	13 (2 groups)	Exotic evergreen
Eucalyptus cladocalyx 'Nana'	8 (24 groups)	Australian native
Corymbia maculata	6	Victorian native
Eucalyptus sideroxylon	6	Victorian native
Eucalyptus leucoxylon	5	Victorian native
Eucalyptus polyanthemos	4	Victorian native
Angophora costata	3	Australian native

5.4.1 The remainder of species comprise introduced utilitarian or ornamental species including fewer than 3 individual specimens.

5.1.1 The origin of the trees is indicated in Table 3.

Table 3: Origin	Individual tree Totals	Tree groups
Indigenous	8	1 group (8 trees)
Planted Indigenous	46	6 groups (134 trees)
Victorian Native	43	4 group (51 trees)
Australian Native	33	55 groups (1,698 trees)
Exotic Conifer	4	9 groups (755 trees)
Exotic Evergreen	13	2 groups (12 trees)
Mixed		1 group (40 trees)
Total	147	78

5.2 The indigenous trees were considered to be naturally occurring specimens of locally indigenous River Red Gum which extends through the western region especially associated with rivers, creeks and flood plains.

5.2.1 Forty seven (47) of the River Red Gum were considered to be planted specimens based on observations of spatial arrangement and similarities in age, size and condition.

5.2.2 The Victorian native trees included planted specimens of Yellow Gum varieties (*Eucalyptus leucoxylon* var.), Spotted Gum (*Corymbia maculata*), Red Ironbark (*Eucalyptus sideroxylon*) and Lightwood (*Acacia implexa*).

5.3 Tree health was assessed based on foliage colour, size and density as well as shoot initiation and elongation.

Table 4: Tree health	Total	Groups
Good	56	6
Fair	81	56
Fair - Poor	9	14
Poor	1	2
Total	147	78

5.3.1 The majority of trees (93% of trees and 79% of tree groups) displayed fair or better health considered to be typical of the species growing in the current conditions.

5.3.2 The most profound health deficiencies could be attributed to the previous decade of drought conditions, shading and competition for resources due to close planting and exposure to elements, primarily hot and strong winds.

5.4 Tree structure was assessed for defects and deficiencies, likelihood of failures and presence of targets.

Table 5: Tree structure	Total	Groups
Good	2	
Fair	117	36
Fair-poor	23	30
Poor	5	11
Very poor		1
Total	147	78

5.4.1 81% of the trees and 46% of tree groups were attributed a Fair rating for structure. 16% of trees and 38% of tree groups were attributed a rating of Fair-poor due to minor structural deficiencies or a history of limb failures.

5.4.2 Due to their age, large size and exposed locations, some of the larger indigenous trees had sustained some limb failures resulting in trunk or limb wounds that act as infection courts for decay organisms and fungal brackets.

5.4.3 Wood decay is frequently exploited by insects, mammal and birds that hollow out degraded wood tissue. Large decayed wounds also limit health by interrupting paths of water and nutrient uptake.

5.4.4 Many of the maturing trees, even those attributed a fair arboricultural rating for structure, would benefit from some level of tree crown maintenance or reduction pruning to ensure they can be retained for the long term. Pruning can reduce the potential for further limb shed.

5.4.5 River Red Gum Tree 70 was observed to have an elliptical trunk wound that may be a 'scar' associated with aboriginal cultural practices. The wound represents a minor arboricultural deficiency but was not impacting greatly on overall tree condition. The tree should be inspected by aboriginal cultural experts.

5.5 The stage of life of each tree was recorded.

Table 6: Tree age	Total	Groups
Over-mature	0	2
Maturing	38	21
Semi-mature	109	55
Total	147	78

5.5.1 The longevity of mature specimens of eucalypt species like River Red Gum and Sugar Gum could still span many decades and semi-mature to maturing specimens may grow on in excess of 100 years if left undisturbed.

5.6 In contrast many of the other species of trees may a comparatively short useful life due to the poor structural characteristics, inferior timber quality, structural characteristics and susceptibility to decay. An estimate of the useful life expectancy is included for each tree.

Table 7: Useful Life Expectancy (ULE)	Trees	Groups
< 5 Yrs	1	1
5_15 Yrs	9	9
15_25 Yrs	40	41
25_50 Yrs	55	23
>50 Yrs	42	4
Total	147	78

5.7 Each of the assessed trees was attributed an Arboricultural Rating. The arboricultural rating correlates the combination of tree condition factors (health, structure and form) with tree amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics within an urban landscape context and its ability to continue to provide these qualities into the medium to long term future. The arboricultural rating in combination with other factors can assist the project team and planners in nominating trees suitable for retention.
It should be noted that the arboricultural rating is different to the conservation/ecological values placed on trees by other professions. Refer to Table 4 for arboricultural rating and tree numbers.

Table 8. Arboricultural Rating	Total	Trees number
Very High	0	
High	46	4, 6, 7, 8, 9, 10, 12, 13, 14, 17, 24, 30, 31, 32, 36, 37, 40, 43, 44, 45, 49, 51, 59, 60, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72, 73, 74, 77, 79, 80, 83, 93, 103, 117, 118, 119, 120
Moderate	86	1, 2, 3, 5, 11, 15, 16, 18, 19, 20, 21, 22, 23, 25, 26, 28, 33, 34, 35, 38, 39, 41, 42, 46, 47, 48, 50, 52, 53, 54, 55, 56, 57, 58, 61, 70, 75, 76, 78, 81, 82, 84, 85, 86, 87, 88, 89, 91, 92, 95, 96, 97, 98, 99, 100, 101, 102, 104, 106, 107, 108, 110, 112, 113, 114, 116, 121, 122, 123, 124, 125, 127, 128, 130, 134, 136, 137, 138, 139, 140, 141, 143, 144, 145, 146, 147
Low	15	27, 29, 90, 94, 105, 109, 111, 115, 126, 129, 131, 132, 133, 135, 142
None	0	
Total	147	

Tree Groups Arboricultural rating	Total	Group Numbers
High	7	Gp1, Gp2, Gp5, Gp8, Gp12, Gp13, Gp30 (≈158 trees)
Moderate	40	Gp6, Gp9, Gp10, Gp15, Gp16, Gp17, Gp18, Gp19, Gp20, Gp22, Gp23, Gp24, Gp26, Gp29, Gp31, Gp32, Gp33, Gp34, Gp35, Gp36, Gp37, Gp38, Gp39, Gp40, Gp42, Gp44, Gp47, Gp48, Gp51, Gp52, Gp54, Gp56, Gp57, Gp58, Gp 67, Gp 68, Gp 75, Gp 76, Gp 77, Gp 78 (≈1,275 trees)
Low	30	Gp3, Gp4, Gp7, Gp11, Gp14, Gp21, Gp25, Gp27, Gp28, Gp41, Gp43, Gp45, Gp46, Gp49, Gp53, Gp55, Gp59, Gp60, Gp61, Gp 62, Gp 63, Gp 64, Gp 65, Gp 66, Gp 69, Gp 70, Gp 71, Gp 72, Gp 73, Gp 74 (≈1,229 trees)
None	1	Gp50 (≈36 trees)
Grand Total	78	78 groups (≈2,698 trees)

High and Moderate rated trees are suitable and desirable to retain but may require arboricultural management and input now and into the future.

Low rated trees are not worthy of being a constraint on reasonable site redevelopment. Not all Low rated trees should be disregarded as many could be retained as an established tree resource with appropriate management in situations where they do not present a risk or an impediment to reasonable design intent.

Trees rated None displayed health or structural defects that are beyond arboricultural amendment or are virulent weed species that are considered unsuitable to retain.

Definitions of arboricultural ratings can be seen in Appendix 3.

6 Discussion:

6.1 Indigenous Trees 63, 64, 65, 66, 67, 70 and 74 as well as Tree Group 12 were naturally occurring trees growing within the lower flood plain of Kororoit Creek in Parcel 17. They displayed fair health and structure and were attributed a High arboricultural rating with the potential to be medium to long term features of the landscape. The species is prevalent in other sections along the creek line and performing well. These trees should be retained and enhanced with further planting of the same species and intergraded with additional indigenous shrubs, grasses and forbs.

6.2 Additional planted River Red Gum and Victorian natives, Trees 68, 69, 71, 72, 73, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84 as well as Group 13 existed within the Parcel 17 and all were of Moderate to High arboricultural value and worthy of retention due to their fair to good condition and potential for being a long term component in the landscape.

6.3 Many of the River Red Gum tree within the study area could be considered for retention within public open space or larger private open space accompanied by recruitment of new trees and new plantings of indigenous shrubs and grasses.

6.4 The high rated trees were distributed across 12 different parcels, namely

- 1 tree each in Parcels 30, 28, 11,
- 2 trees in Parcels 32, 12,
- 3 trees in Parcels 41 and 9,
- 4 trees in Parcel 27,
- 9 trees in Parcel 33, and
- 15 trees in Parcel 17.
- 4 River Red Gum trees were growing in the road reserve in front of Parcel 64 being trees117, 118, 119, 120.

6.5 High rated groups of trees were distributed through the tree study area within Parcels 30, 27, 32, 17 and 8. The groups generally comprised planted semi-mature specimens of River Red Gum, Bushy Sugar Gum.

6.5.1 Groups 1, 2, 5, 13 and 30 were linear groups planted partly for windbreak purposes.

6.5.2 Group 5 was a linear group of 47 Bushy Sugar Gum trees along the eastern boundary of parcel 27 flanking Sinclairs Road. As individual trees they are of moderate value but as an established group that extend some 240 metres along a through road they provide a tree feature of high landscape value with a potentially long useful life expectancy.

6.5.3 Group 8 comprised a mixture of locally native species planted in random arrangement for purposes of regeneration.

6.6 *Eucalyptus camaldulensis* species (River Red Gum) is indigenous to the area adjacent to the Kororoit Creek and its various tributaries. It is generally desirable to retain trees of this kind wherever possible and State legislation (Victoria's Native Vegetation Management – A Framework for Action) also outlines the importance of indigenous/remnant vegetation and specific guidelines are provided for preservation and management of such vegetation.

6.6.1 The importance of preserving River Red Gums associated with the waterways and rivers in the City of Melton would be considered under the Environmental Significant Overlay-Schedule 2 and 5.

6.6.2 The retention and management of River Red Gums can create significant issues in urban settings, which are best addressed by assigning generous tree protection distances. It is well known and well documented that maturing River Red Gums can shed large limbs without warning, and without signs of defect. All tree species have the potential to shed branches or limbs, but maturing River Red Gums have a much greater propensity for this than most common urban trees. This characteristic is probably more evident with River Red Gums because of their prominence in Melbourne's developing outer suburbs, their large size and their ultimate age.

6.6.3 It could be argued that the likelihood of further branch failure is a matter of when rather than if for many mature River Red Gums. In contrast to this antisocial tendency, the positive characteristics of the species would include its variable form and its ability to decline and recover from drought and flood. These abilities highlight the resilience of the species and reflect the essence of its rugged and desirable landscape character.

6.6.4 A further challenge with this species is that the most ecologically significant trees; those trees containing many hollows for habitat (most hollows forming from major limb failures), are potentially more hazardous, when we consider the trees might be retained in an urban setting.

6.6.5 The establishment of tree protection zones for River Red Gums must therefore meet the needs of tree protection and also the obligation of protecting people and property from any individual tree. On this basis, the tree protection zones should be more extensive than the normal requirements for other tree species. Whilst the nominated TPZ area is likely to be sufficient to sustain tree health, it is recommended that a TPZ area equivalent to the edge of the canopy dripline plus one metre is implemented to provide greater protection to the mature River Red Gums as well as excluding placement of high value targets beneath the tree crown where there is potential for damage from limb shed. Landscape treatments that effectively excludes targets reduces the level of exposure to risk as well as the perception of risk to persons and property which could lead to trees being removed prematurely.

6.6.6 The TPZ distances generated by using the AS4970 trunk ratio formula method are provided for all trees, in Appendix 1.

However, these distances may need to be modified to account for asymmetric tree crowns. Where necessary the protection distance should be extended to one metre beyond the crown, if and when this is not provided for by the tree protection method in AS4970.

This may result in a tree protection zone that is oddly shaped.

An example is provided in Diagram 1.

No	Common Name (*Species*)	DBH (cm)	Height (m)	Width (m) (N,S,E,W)
#	River Red Gum	147	9	15 (5,6,5,10)

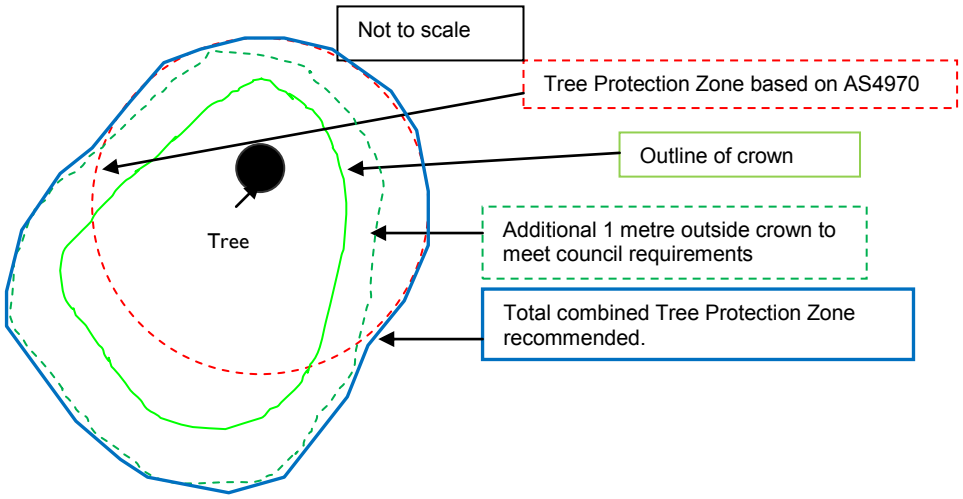


Diagram 1. recommended Tree protection zone for mature River Red Gum

6.7 Principles of water sensitive urban design should be adopted when designing around these large old River Red Gum trees with landscape treatments that reduce the opportunity for targets to exist beneath the tree crown.

6.8 Not all 'Moderate' rated tree features should be dismissed as candidates poorly suited for retention, though overall, the retention of such trees should not compromise design intent. In certain landscape settings, smaller specimens in otherwise reasonable condition have the potential to offer an established tree resource, even if only as an interim measure.

6.9 Low rated trees with health or structural deficiencies are generally not desirable candidates for retention.

6.10 Trees attributed an arboricultural value of None were the least suited to retention on arboricultural grounds, having significant health and / or structural defects. Such trees are unlikely to provide a useful tree resource insofar as providing established canopy in future development even where risk levels associated with their retention can be managed to an acceptable level.

6.11 Windrows with health and structural defects should generally be removed.

6.11.1 The older Sugar Gum windrows such as Group 3, Group 4, Group 11, Group 14, Group 27, Group 28, Group 46, Group 49, Group 59, Group 60, Group 61, Group 62, Group 63, Group 64, Group 70, Group 72, Group 73 comprised trees that had been planted at close spacing and had been variously lopped and coppiced for practical agricultural purposes such as fuel and fence posts harvesting. The trees have an ability to rapidly grow back and produce more fuel or posts but the tree is forever damaged and has intrinsically poor structure as a result. Such trees are unsuitable to consider for retention in any future urban setting due to the inherent structural defects.

6.11.2 As a response to the close grown planting and competition for available light resources, many of the trees have developed bifurcations of the trunk with included bark. These included bark forks have the potential to split as the trees mature or if they become exposed to new wind forces.

6.11.3 Fragmentation of groups of close grown trees can expose individual trees with structural deficiencies to altered environmental conditions and wind loading resulting in increased failure rates among retained trees. Therefore, fragmentation should only occur where retained trees provide sufficient ongoing mutual protection to maintain stand integrity. If the

group is overly fragmented it is unlikely the trees will acclimatise to the increased wind loading of previously protected limbs and limb failure and premature decline will result.

6.12 The assessment included a useful life expectancy component. The useful life expectancy estimation provides an indicative range of potential functional longevity before anticipated health, structural or age related attrition renders trees inappropriate in the context of an urban setting. Given the scale of the development and potential settings for trees, the useful life expectancy rating has obvious limitations. In a natural or semi-natural situation and in the absence of people or property, the life expectancy of a tree ends when it collapses and completely decomposes. In an urban setting the useful life expectancy of an individual tree or group of trees is measured by its ability to provide ongoing amenity and is therefore highly dependent on context. Another obvious challenge with assigning useful life expectancies is that it presumes some consistency of environmental conditions. Development can irrevocably alters site conditions that have a deleterious effect on tree condition and natural lifespan. Therefore attributing a meaningful useful life expectancy in the absence of design plans that contextualizes the trees setting and environmental changes relies on many assumptions and may be misleading. The useful life expectancy attributed in this assessment, should not therefore be interpreted in isolation from other assessment criteria.

6.13 All trees nominated for retention will require periodic inspection and appropriate arboricultural maintenance and pruning. All pruning must be undertaken by suitably trained and experienced arborists and comply with Australian Standard 4373-2007 - Pruning of Amenity trees.

6.14 No form of excavation for footings or trenching for installation of underground services is permitted within the nominated Tree Protection Zone (TPZ) areas due the risk of severing roots vital to the stability and continued health of the trees. Smothering of tree roots by raising soil levels by more than 200mm within the TPZ area can also cause trees to decline.

6.15 In the absence of site design plans, it is not appropriate to speculate on which trees are most appropriate for retention, beyond the general guide provided by the arboricultural ratings attributed to each tree feature. Retention suitability correlates with the future landscape setting of retained trees, which will vary given the scale of the intended development. The following recommendations are provided for consideration in the design process.

6.15.1 On the basis of tree quality and potential amenity, preference should be given to retaining trees of Very High, High and Moderate arboricultural rating in built areas, or areas of increased target potential.

6.15.2 Trees of Low arboricultural value should not compromise reasonable design intent.

6.15.3 Small trees of Moderate or Low arboricultural value that are otherwise in reasonable condition may offer a potential established tree resource, even if only as an interim measure.

6.15.4 Low rated trees with health or structural deficiencies could generally be considered for removal.

6.15.5 Principles of risk management should be adopted to appropriately locate large maturing River Red Gum trees that are to be retained in any future development.

6.15.6 Avoid fragmenting retained windrows. Fragmentation should only be considered when the fragments retain sufficient trees to largely negate the change in the trees' environment that may otherwise result in deterioration of retained specimens.

6.15.7 Position retained windrows in large areas of open space, where the target potential is low and the trees can continue to grow in relatively undisturbed conditions.

6.15.8 Windrows of Low arboricultural value with health and structural defects should be removed.

6.16 Under the Native Vegetation Framework act section 52.17 appropriate steps must be demonstrated to avoid, minimise or offset the removal of naturally occurring vegetation that is native to Victoria.

6.16.1 Exemptions apply to trees planted for ornamental or windbreak purposes or as street trees.

6.16.2 This exemption does not apply if public funding was provided to assist in planting or managing the native vegetation. Apart from road reserve trees, including trees 3, 4 and 5, it is unlikely that any of the trees inspected within private property would have been planted with public funds or would trigger permit requirement.

6 Photographic catalogue:

1

2

3

4

5

6

1 Shows the relative size, condition and location of High rated River Red Gum Tree 70 located within Parcel 17. The tree had an elliptical wound on the main trunk (arrow) with incipient decay present.

2 Shows the relative size, condition and location of High rated indigenous River Red Gum trees on the wider flood plains of Kororoit Creek within Parcel 17.

3 Shows the relative location, size and condition of high rated Peppercorn tree 44 within open pasture of Parcel no 41.

4 Shows an example of the generally poor condition of Sugar Gum tree groups that comprise close planted trees with trunk wounds, dieback and decay. (Group 4 in Parcel no 37)

5 Shows the view of tree group 10 in Parcel 16 as seen from the roadside in Reed Court. Access to the site was denied. The trees were located outside the Kororoit Creek exclusion zone. They display characteristics of River Red Gum trees and warrant further examination prior to any future planning.

6 Shows the relative location, size and condition of indigenous trees planted for regeneration purposes along a drainage line that crosses Deanside Drive through Parcel 32. Such trees should be retained and enhanced with further planting of indigenous trees, shrubs and natural recruitment.

8 Conclusion and Recommendations:

8.1 Tree Logic, acting on behalf of The Growth Areas Authority, surveyed and assessed trees within the Kororoit Precinct identified as PSP1080. The survey was commissioned primarily for the purpose of providing information on the arboricultural merit of larger trees onsite to inform the design process.

8.2 The tree population was generally unremarkable both across the site and within individual properties.

8.3 Two hundred and twenty five (225) tree features were inspected within the study area including one hundred and forty seven (147) individual trees and seventy eight (78) tree group features comprising approximately 2,698 additional trees.

8.4 Each of the assessed tree features was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health, structure & form) with tree amenity value and reflects the retention value of the tree(s). Refer to Table 1.

8.4.1 46 trees and 7 groups were attributed an arboricultural rating of High.

8.4.2 86 trees and 40 groups were attributed an arboricultural rating of Moderate.

8.4.3 The remainder were attributed arboricultural rating of Low or None and do not meet the scope of the project brief nor are they considered worthy of being a constraint on any reasonable future development.

8.5 Indigenous trees that appeared to be naturally occurring were identified in the lower flood zone of Kororoit Creek within the property parcel number 17 on the south side of Reed Court.

8.5.1 The trees provide visual, amenity, hydrological and ecological benefits to the site and are highly desirable to retain.

8.6 All other trees were specimens that had been planted for revegetation, ornamental or functional purposes such as wind breaks and screens. Tree protection zones that comply with AS4970-2009 must be applied.

8.7 In the absence of site design plans, it is not appropriate to speculate on which trees are most appropriate for retention, beyond the general guide provided by the arboricultural ratings attributed to each feature. Retention suitability correlates with the future landscape setting around retained trees, which will vary given the scale of the intended development. Therefore, on the basis of tree quality and potential amenity, preference should be given to retaining trees of Very High or High arboricultural rating that have relatively long lifespan in built areas, or areas of increased target potential.

8.8 Areas of public open space are best suited for the retention of High and Very high rated quality trees, but also provides an opportunity to retain trees of Moderate or Low arboricultural quality either as interim canopy until such time as new landscape is established or as longer term landscape elements in areas where risk associated with the retention of such trees is acceptable.

8.9 Dimensions of tree protection zones for all trees are included in the tree assessment table attached as Appendix 1. Tree protection zone guidelines are attached in Appendix 4.

8.10 While all trees can shed limbs River Red Gum trees have a well documented propensity for limb shedding. It is recommended that when retaining such trees, a larger than normal tree protection zone is applied to protect the tree but also to exclude prolonged occupation of the area beneath the canopy to reduce the risk of personal injury or property damage were limbs to fall. The recommended tree protection zone for maturing River Red Gum trees includes protecting the canopy and excluding development from the canopy width plus 1 metre on all sides. Design modification must therefore allow for the protection of the TPZ as well as the tree canopy in the case of the indigenous trees.

I am available to answer any questions arising from this report.

No part of this report is to be reproduced unless in full.

Bruce Callander

Consulting Arborist

Certificate V-Horticulture (Arboriculture)

Treelogic P/L

T 03 9870 7700 F 03 9870 8177

M 0425 872 007 E bruce.callander@treelogic.com.au

References:

Australian Standard (4970-2009) Protection of Trees on development sites.
Standards Australia, Sydney NSW Australia

Mattheck, C & Breloer, H. (1997) Body language of trees. A handbook for failure analysis. The Stationary Office, London.

Harris, R.W, Clark, J.R. & Matheny, N.P. (2004), Arboriculture: Integrated Management of Landscape trees, shrubs and vines, Prentice Hall, New Jersey.

Clark, J.R. & Matheny, N.P (1998), Trees and Development: A technical guide to preservation of trees during land development. ISA , Champaign, Illinois.

Standards Australia (2007), Australian Standard (4373-2007) - Pruning of Amenity trees, Standards Australia, Homebush, NSW.

Appendix 1A: Individual Tree assessment details: PSP 1080 - Kororoit

Refer to following 7 pages.

DBH = Diameter at Breast Height (measured in centimetres at 1.3m above ground unless otherwise stated).

H x W = Height x Width of crown (measured in metres).

TPZ = Tree Protection Zone (metre radius). Radius distances measured in metres from the centre of the trunk.

ULE = Useful Life Expectancy (Estimated)

For tree location and numbering refer to plans at Appendix 2. See Appendix 3 for tree descriptors.

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
1	Schinus areira	Peppercorn Tree	Exotic Evergreen	53		10	13	Maturing	Good	Fair	Moderate	25_50 Yrs	Wire fence through trunk. 2 trees.	6.4	Yes	33
2	Eucalyptus cladocalyx	Sugar Gum	Australian Native	45	@1.0m	15	14	Maturing	Fair	Fair	Moderate	15_25 Yrs		5.4	No	58
3	Angophora costata	Smooth-barked Apple	Australian Native	35	@1.0m	8	11	Semi-mature	Good	Fair	Moderate	25_50 Yrs	Acute Branch union.	4.2	No	66
4	Schinus areira	Peppercorn Tree	Exotic Evergreen	50		7	11	Maturing	Good	Fair	High	25_50 Yrs		6	Yes	30
5	Angophora floribunda	Rough-barked Apple	Australian Native	30		9	6	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3.6	Yes	33
6	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	34		12	8	Semi-mature	Fair	Fair	High	25_50 Yrs	Past Power line clearance.	4.1	Yes	33
7	Corymbia maculata	Spotted Gum	Victorian Native	24		6	6	Semi-mature	Good	Fair	High	>50 Yrs		2.9	Yes	33
8	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	46		14	8	Semi-mature	Fair	Fair	High	25_50 Yrs	Past Power line clearance.	5.5	Yes	33
9	Corymbia maculata	Spotted Gum	Victorian Native	39		14	8	Semi-mature	Fair	Fair	High	25_50 Yrs	Past Power line clearance.	4.7	Yes	33
10	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	40		10	9	Semi-mature	Good	Fair	High	25_50 Yrs	Past Power line clearance.	4.8	Yes	33
11	Eucalyptus cladocalyx	Sugar Gum	Australian Native	20		10	5	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.4	Yes	33
12	Angophora costata	Smooth-barked Apple	Australian Native	20		5	6	Semi-mature	Good	Fair	High	>50 Yrs		2.4	Yes	33
13	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	30		9	9	Semi-mature	Fair	Fair	High	>50 Yrs	Past Power line clearance.	3.6	Yes	33
14	Corymbia maculata	Spotted Gum	Victorian Native	19		9	5	Semi-mature	Good	Fair	High	>50 Yrs		2.3	Yes	33
15	Angophora costata	Smooth-barked Apple	Australian Native	15		4	5	Semi-mature	Good	Fair	Moderate	>50 Yrs		2	Yes	33
16	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	18		6	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs		2.2	Yes	33
17	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	44		14	10	Semi-mature	Fair	Fair	High	>50 Yrs		5.3	Yes	33
18	Schinus areira	Peppercorn Tree	Exotic Evergreen	55	@0.5m	8	13	Maturing	Fair	Fair	Moderate	25_50 Yrs		6.6	Yes	33
19	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	37		10	10	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.4	Yes	33
20	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	30		10	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.6	Yes	33
21	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	33		12	11	Maturing	Fair	Fair	Moderate	15_25 Yrs		4	Yes	27
22	Eucalyptus cladocalyx	Sugar Gum	Australian Native	26,26		11	13	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		4.4	Yes	27
23	Eucalyptus melliodora	Yellow Box	Victorian Native	25		13	6	Semi-mature	Good	Fair	Moderate	25_50 Yrs	Acute Branch union.	3	Yes	27
24	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	45		15	11	Maturing	Good	Fair	High	15_25 Yrs		5.4	Yes	27

Prepared by Bruce Callander
Consultant arborist
Tree Logic Pty. Ltd.

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
25	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	30		16	6	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3.6	Yes	27
26	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	40		16	9	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		4.8	Yes	27
27	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	35		11	8	Semi-mature	Poor	Poor	Low	< 5 Yrs		4.2	Yes	27
28	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	35		14	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		4.2	Yes	27
29	Eucalyptus botryoides	Southern Mahogany	Victorian Native	38		11	9	Semi-mature	Fair - Poor	Poor	Low	5_15 Yrs		4.6	Yes	27
30	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	35		14	10	Semi-mature	Good	Fair	High	15_25 Yrs		4.2	Yes	27
31	Eucalyptus melliodora	Yellow Box	Victorian Native	27	@0.75m	10	7	Semi-mature	Good	Fair	High	25_50 Yrs		3.2	Yes	27
32	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	55		20	12	Maturing	Good	Fair	High	15_25 Yrs		6.6	Yes	27
33	Eucalyptus botryoides	Southern Mahogany	Victorian Native	50		12	13	Maturing	Fair	Fair	Moderate	25_50 Yrs		6	Yes	27
34	Eucalyptus saligna	Sydney Blue Gum	Australian Native	33		11	11	Semi-mature	Good	Fair	Moderate	25_50 Yrs		4	Yes	27
35	Eucalyptus viminalis	Manna Gum	Victorian Native	35		11	12	Semi-mature	Good	Fair - Poor	Moderate	25_50 Yrs	Borer damage.	4.2	Yes	27
36	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	30		12	6	Semi-mature	Good	Fair	High	>50 Yrs		3.6	Yes	28
37	Angophora floribunda	Rough-barked Apple	Australian Native	44		14	8	Maturing	Good	Fair	High	25_50 Yrs		5.3	Yes	32
38	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	60		14	13	Maturing	Fair - Poor	Fair	Moderate	15_25 Yrs		7.2	Yes	28
39	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	48		14	10	Maturing	Fair	Fair	Moderate	15_25 Yrs		5.8	Yes	32
40	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	29		10	9	Semi-mature	Good	Fair	High	>50 Yrs		3.5	Yes	32
41	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	15		8	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs		2	Yes	32
42	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	19		8	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs		2.3	Yes	32
43	Schinus areira	Peppercorn Tree	Exotic Evergreen	43,58,37,22,25		10	17	Maturing	Good	Good	High	25_50 Yrs		10.5	Yes	41
44	Schinus areira	Peppercorn Tree	Exotic Evergreen	70	@0.5m	10	13	Maturing	Good	Good	High	25_50 Yrs		8.4	Yes	41
45	Schinus areira	Peppercorn Tree	Exotic Evergreen	85,44,54,39,28		11	17	Maturing	Good	Fair	High	25_50 Yrs	2 smaller trees within 2 m and combined canopy.	14.4	Yes	41
46	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	32	@0.75m	10	7	Semi-mature	Fair	Fair	Moderate	>50 Yrs		3.8	Yes	12
47	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	23		9	6	Semi-mature	Fair	Fair	Moderate	>50 Yrs		2.8	Yes	12
48	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	44	@0.1m	9	8	Semi-mature	Fair - Poor	Fair	Moderate	>50 Yrs		5.3	Yes	12

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
49	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	35		10	8	Semi-mature	Good	Fair	High	>50 Yrs		4.2	Yes	12
50	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	39,35	@0.5m	11	6	Semi-mature	Fair	Fair	Moderate	>50 Yrs		6.3	Yes	12
51	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	50		11	11	Semi-mature	Good	Fair	High	>50 Yrs		6	Yes	12
52	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	27		9	7	Semi-mature	Fair	Fair	Moderate	>50 Yrs		3.2	Yes	12
53	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	25		10	6	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3	Yes	12
54	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	25		9	5	Semi-mature	Fair - Poor	Fair	Moderate	25_50 Yrs		3	Yes	12
55	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	25		9	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs		3	Yes	12
56	Eucalyptus leucoxylon	Yellow Gum	Victorian Native	21,14		6	8	Semi-mature	Good	Fair	Moderate	15_25 Yrs		3	Yes	12
57	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	23,22		9	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.8	Yes	12
58	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	19		7	5	Semi-mature	Fair - Poor	Fair	Moderate	25_50 Yrs		2.3	Yes	12
59	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	35		10	10	Semi-mature	Good	Fair	High	>50 Yrs		4.2	Yes	9
60	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	35		14	10	Semi-mature	Good	Fair	High	>50 Yrs		4.2	Yes	9
61	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	35		10	10	Semi-mature	Good	Fair	Moderate	25_50 Yrs		4.2	Yes	9
62	Corymbia maculata	Spotted Gum	Victorian Native	35		10	8	Semi-mature	Good	Fair	High	>50 Yrs		4.2	Yes	9
63	Eucalyptus camaldulensis	River Red Gum	Indigenous	33		9	13	Semi-mature	Good	Fair	High	>50 Yrs	Naturally occurring.	4	Yes	17
64	Eucalyptus camaldulensis	River Red Gum	Indigenous	34,26,22		8	11	Semi-mature	Good	Fair	High	>50 Yrs	Naturally occurring.	5.8	Yes	17
65	Eucalyptus camaldulensis	River Red Gum	Indigenous	44,44		9	16	Maturing	Good	Fair	High	>50 Yrs	Naturally occurring.	7.5	Yes	17
66	Eucalyptus camaldulensis	River Red Gum	Indigenous	90		10	18	Maturing	Good	Fair	High	>50 Yrs	Naturally occurring.	10.8	Yes	17
67	Eucalyptus camaldulensis	River Red Gum	Indigenous	75,85		10	20	Maturing	Good	Fair	High	>50 Yrs	Limb Decay. Naturally occurring.	13.6	Yes	17
68	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	25,19		10	9	Semi-mature	Fair	Fair	High	>50 Yrs		3.8	Yes	17
69	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	29		11	11	Semi-mature	Good	Fair	High	>50 Yrs		3.5	Yes	17
70	Eucalyptus camaldulensis	River Red Gum	Indigenous	100		9	16	Maturing	Fair	Fair - Poor	Moderate	25_50 Yrs	Trunk Decay. Naturally occurring. Trunk Scar Tree?	12	Yes	17
71	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	38		11	10	Semi-mature	Good	Fair	High	>50 Yrs		4.6	Yes	17
72	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	25		9	7	Semi-mature	Good	Fair	High	>50 Yrs		3	Yes	17

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
73	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	48	@1.0m	10	11	Semi-mature	Good	Fair	High	>50 Yrs		5.8	Yes	17
74	Eucalyptus camaldulensis	River Red Gum	Indigenous	54	@0.5m	11	15	Semi-mature	Good	Fair	High	>50 Yrs		6.5	Yes	17
75	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	15		5	6	Semi-mature	Fair	Fair	Moderate	>50 Yrs		2	Yes	17
76	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	45	@0.5m	9	11	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs	Borer damage.	5.4	Yes	17
77	Eucalyptus melliodora	Yellow Box	Victorian Native	20		7	7	Semi-mature	Good	Fair	High	>50 Yrs		2.4	Yes	17
78	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	35		10	9	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs	Borer damage.	4.2	Yes	17
79	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	32		12	8	Semi-mature	Good	Fair	High	>50 Yrs		3.8	Yes	17
80	Eucalyptus polyanthemos	Red Box	Victorian Native	30		9	7	Semi-mature	Good	Fair	High	25_50 Yrs		3.6	Yes	17
81	Eucalyptus leucoxylon	Yellow Gum	Victorian Native	33	@0.5m	6	9	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		4	Yes	17
82	Eucalyptus leucoxylon	Yellow Gum	Victorian Native	30	@0.1m	6	7	Semi-mature	Good	Fair	Moderate	15_25 Yrs		3.6	Yes	17
83	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	27		8	8	Semi-mature	Fair	Fair	High	>50 Yrs		3.2	Yes	17
84	Eucalyptus polyanthemos	Red Box	Victorian Native	20		8	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.4	Yes	17
85	Eucalyptus cladocalyx	Sugar Gum	Australian Native	33		11	9	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs	Canker Wounds. Street tree	4	Street Tree	68
86	Eucalyptus maideni	Maiden's Gum	Victorian Native	65		15	10	Maturing	Fair	Fair	Moderate	15_25 Yrs		7.8	Yes	2
87	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	34		14	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.1	Yes	2
88	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	40		12	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.8	Yes	2
89	Eucalyptus cladocalyx	Sugar Gum	Australian Native	45		15	14	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs	Borer damage. Trunk wound.	5.4	Yes	2
90	Eucalyptus cladocalyx	Sugar Gum	Australian Native	37		14	14	Semi-mature	Fair - Poor	Poor	Low	5_15 Yrs	Borer damage.	4.4	Yes	2
91	Eucalyptus polyanthemos	Red Box	Victorian Native	24		8	7	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.9	Yes	2
92	Eucalyptus polyanthemos	Red Box	Victorian Native	28		9	6	Semi-mature	Good	Fair	Moderate	25_50 Yrs		3.4	Yes	2
93	Eucalyptus cladocalyx	Sugar Gum	Australian Native	42		15	10	Semi-mature	Good	Fair	High	25_50 Yrs		5	Yes	2
94	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	28		7	6	Semi-mature	Fair - Poor	Fair - Poor	Low	15_25 Yrs		3.4	Yes	2
95	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	32		9	10	Semi-mature	Good	Fair	Moderate	25_50 Yrs		3.8	Yes	2

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
96	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	42	@0.5m	10	11	Maturing	Good	Fair	Moderate	25_50 Yrs		5	Yes	2
97	Acacia implexa	Lightwood	Victorian Native	50	@0.5m	8	12	Maturing	Good	Fair - Poor	Moderate	15_25 Yrs	Acute Branch union. Multistemmed.	6	Yes	5
98	Eucalyptus platypus	Round-leaved Moort	Australian Native	35	@0.1m	5	8	Maturing	Fair	Fair - Poor	Moderate	5_15 Yrs	Same tree to west has collapsed.	4.2	Yes	5
99	Schinus areira	Peppercorn Tree	Exotic Evergreen	94	@1.0m	10	14	Maturing	Good	Fair	Moderate	25_50 Yrs		11.3	Yes	6
100	Schinus areira	Peppercorn Tree	Exotic Evergreen	50		9	9	Maturing	Fair	Fair	Moderate	25_50 Yrs		6	Yes	6
101	Schinus areira	Peppercorn Tree	Exotic Evergreen	77		9	13	Maturing	Fair	Fair	Moderate	25_50 Yrs	Basal Wound.	9.2	Yes	6
102	Schinus areira	Peppercorn Tree	Exotic Evergreen	76	@0.75m	9	14	Maturing	Good	Fair	Moderate	25_50 Yrs		9.1	Yes	33
103	Eucalyptus leucoxylon	Yellow Gum	Victorian Native	40	@0.75m	8	12	Semi-mature	Good	Fair	High	15_25 Yrs		4.8	Yes	11
104	Corymbia maculata	Spotted Gum	Victorian Native	34		13	8	Semi-mature	Good	Fair	Moderate	25_50 Yrs		4.1	No	57
105	Eucalyptus cladocalyx	Sugar Gum	Australian Native	50		20	17	Maturing	Fair - Poor	Poor	Low	5_15 Yrs		6	No	60
106	Corymbia maculata	Spotted Gum	Victorian Native	36	@1.0m	13	11	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.3	Yes	49
107	Eucalyptus cladocalyx	Sugar Gum	Australian Native	36,37		15	14	Maturing	Fair	Fair	Moderate	25_50 Yrs	Street tree	6.2	No	44
108	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	38		13	13	Semi-mature	Good	Fair	Moderate	25_50 Yrs		4.6	No	44
109	Eucalyptus nicholii	Narrow-leaved Peppermint	Australian Native	30		9	8	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Acute Branch union.	3.6	Yes	51
110	Eucalyptus camaldulensis	River Red Gum	Indigenous	55	@1.0m	15	14	Maturing	Fair	Fair - Poor	Moderate	25_50 Yrs	Acute Branch union.	6.6	No	65
111	Eucalyptus cladocalyx	Sugar Gum	Australian Native	50		18	13	Maturing	Fair	Fair - Poor	Low	15_25 Yrs	Trunk Decay.	6	No	64
112	Eucalyptus cladocalyx	Sugar Gum	Australian Native	40		16	14	Maturing	Good	Fair	Moderate	15_25 Yrs	Partly Suppressed. Crown Bias-East.	4.8	No	64
113	Eucalyptus globulus	Tasmanian Blue Gum	Victorian Native	40		13	13	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs	Partly Suppressed. Crown Bias-Nth.	4.8	Yes	63
114	Eucalyptus cladocalyx	Sugar Gum	Australian Native	42		12	13	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs	Trunk wound.	5	Street Tree	64
115	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	26		11	8	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Basal Wound.	3.1	Street Tree	64
116	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	36		13	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.3	Street Tree	64
117	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	44		9	10	Semi-mature	Good	Fair	High	>50 Yrs		5.3	Street Tree	64
118	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	49		9	11	Semi-mature	Good	Fair	High	>50 Yrs		5.9	Street Tree	64

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
119	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	38		14	7	Semi-mature	Good	Fair	High	>50 Yrs		4.6	Street Tree	64
120	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	42		14	7	Semi-mature	Fair	Fair	High	>50 Yrs		5	Street Tree	64
121	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	27		14	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs		3.2	Street Tree	64
122	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	40		12	5	Semi-mature	Fair	Fair	Moderate	25_50 Yrs	In swale.	4.8	Street Tree	64
123	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	22,18		7	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.4	Street Tree	64
124	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	30,25		14	9	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs	Included Bark Fork.	4.7	No	44
125	Eucalyptus leucoxylon	Yellow Gum	Victorian Native	35		12	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		4.2	No	44
126	Melaleuca armillaris	Bracelet Honey-myrtle	Victorian Native	17,15,17		7	10	Maturing	Fair	Fair - Poor	Low	5_15 Yrs		3.4	No	44
127	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	42		14	11	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		5	No	44
128	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	37		15	10	Semi-mature	Fair	Fair	Moderate	25_50 Yrs	Codominant stems	4.4	No	44
129	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	29	@1.0m	8	9	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Lost main leader. Group of 3 x trees.	3.5	No	44
130	Schinus areira	Peppercorn Tree	Exotic Evergreen	55, 60, 50		9	14	Maturing	Fair	Fair	Moderate	15_25 Yrs		11.5	Yes	34
131	Schinus areira	Peppercorn Tree	Exotic Evergreen	55, 30		9	12	Semi-mature	Fair - Poor	Fair	Low	15_25 Yrs	Dieback Crown.	7.5	Yes	34
132	Schinus areira	Peppercorn Tree	Exotic Evergreen	35, 32		9	18	Semi-mature	Fair	Fair - Poor	Low	5_15 Yrs	Deadwood.	5.7	Yes	34
133	Eucalyptus sp.	Gum Tree	Australian Native	25		8	4	Semi-mature	Fair	Fair - Poor	Low	5_15 Yrs		3	No	38
134	Eucalyptus sp.	Gum Tree	Australian Native	30		11	6	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3.6	No	38
135	Eucalyptus sp.	Gum Tree	Australian Native	30, 25		9	6	Semi-mature	Fair	Poor	Low	5_15 Yrs	Lost main leader.	4.7	No	38
136	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	27		6	10	Maturing	Fair	Fair	Moderate	15_25 Yrs		3.2	Yes	43
137	Pinus radiata	Monterey Pine	Exotic Conifer	20		10	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	39
138	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	18		10	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.2	No	39
139	Eucalyptus cladocalyx	Sugar Gum	Australian Native	20		10	10	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.4	No	39
140	XCupressocyparis leylandii	Leyland Cypress	Exotic Conifer	20	@0.5m	9	9	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	39
141	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	15		11	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2	No	39
142	Eucalyptus cladocalyx	Sugar Gum	Australian Native	20		11	6	Semi-mature	Fair	Fair - Poor	Low	5_15 Yrs		2.4	No	39

Prepared by Bruce Callander
Consultant arborist
Tree Logic Pty. Ltd.

Tree no	Botanic name	Common_Name	Origin	DBH (cm)	DBH Height	Height (m)	Crown Width (m)	Life_Stage	Health	Structure	Retention _Value	ULE	Comments	TPZ	Site Accessed	PSP 80 Ref Num
143	Eucalyptus cladocalyx 'Nana'	Bushy Sugar Gum	Australian Native	35		12	14	Maturing	Fair	Fair	Moderate	15_25 Yrs	Over-extended Limbs.	4.2	No	39
144	Pinus radiata	Monterey Pine	Exotic Conifer	25	@1.0m	10	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3	No	39
145	Eucalyptus sideroxylon	Red Ironbark	Victorian Native	20		14	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	39
146	XCupressocyparis leylandii	Leyland Cypress	Exotic Conifer	20		11	12	Maturing	Fair	Fair	Moderate	15_25 Yrs		2.4	No	39
147	Eucalyptus camaldulensis	River Red Gum	Planted Indigenous	15		11	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2	No	39

Appendix 1B: Individual Tree assessment details: PSP 1080 - Kororoit

Refer to following 3 pages.

DBH = Diameter at Breast Height (measured in centimetres at 1.3m above ground unless otherwise stated).

H x W = Height x Width of crown (measured in metres).

TPZ = Tree Protection Zone (metre radius). Radius distances measured in metres from the centre of the trunk.

ULE = Useful Life Expectancy (Estimated)

For tree location and numbering refer to plans at Appendix 2. See Appendix 3 for tree descriptors.

Group No	Predominant_species	Other_Species	Other_Species	Type	Avg_DBH	No_stems	Avg_Height	Avg_Width	Life_Stage	Avg_Health	Avg_Structure	Retention_ value	ULE	Comments	Avg_TPZ	Site_Access	GAA Prop ref
Group 1	Eucalyptus camaldulensis	Allocasuarina verticillata		Planted indigenous	20	35	9	7	Semi-mature	Fair	Fair	High	25_50 Yrs	Linear windbreak	2.4	Yes	30
Group 2	Mixed eucalypts	Eucalyptus camaldulensis	Eucalyptus cladocalyx	Australian native	18	30	9	7	Semi-mature	Fair	Fair	High	>50 Yrs	Linear windbreak	2.2	Yes	30
Group 3	Eucalyptus cladocalyx			Australian native	70	7	13	13	Over Mature	Fair	Poor	Low	5_15 Yrs	Trunk decay	8.4	Yes	
Group 4	Eucalyptus cladocalyx			Australian native	55	7	15	10	Maturing	Fair - Poor	Poor	Low	5_15 Yrs	Trunk / limb decay.	6.6	Yes	
Group 5	Eucalyptus cladocalyx 'Nana'			Australian native	24	47	8	8	Semi-mature	Good	Fair	High	25_50 Yrs	Linear windbreak	2.9	Yes	27
Group 6	Xcuppressocyparis leylandii			Exotic conifers	24	120	10	8	Semi-mature	Fair	Fair	Moderate	15_25 Yrs	2-3m spacing.	2.9	Yes	
Group 7	Exotic conifers	Ornamental species & palms.	Fruit trees.	Exotic conifers	22	100	5	5	Semi-mature	Fair - Poor	Fair	Low	15_25 Yrs		2.6	Yes	
Group 8	Eucalyptus microcarpa	Eucalyptus camaldulensis		Victorian native	19	23	7	6	Semi-mature	Good	Fair	High	>50 Yrs	Planted for regeneration	2.3	Yes	32
Group 9	Eucalyptus camaldulensis	Eucalyptus sideroxylon	Corymbia maculata	Planted indigenous	30	15	10	8	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs	All planted in raised bed subject to erosion. Exposed roots.	3.6	Yes	
Group 10	Eucalyptus microcarpa			Victorian native	22	4	10	7	Semi-mature	Fair	Fair	Moderate	25_50 Yrs	All planted in raised bed subject to erosion.	2.6	Yes	
Group 11	Eucalyptus cladocalyx	Pinus radiata		Australian native	25	170	10	7	Semi-mature	Fair - Poor	Fair - Poor	Low	15_25 Yrs		3	Yes	
Group 12	Eucalyptus camaldulensis			Indigenous	22	8	8	6	Semi-mature	Good	Fair	High	>50 Yrs	Naturally occurring group of saplings.	2.6	Yes	17
Group 13	Eucalyptus camaldulensis			Planted indigenous	40	7	15	11	Semi-mature	Good	Fair	High	25_50 Yrs	Linear windbreak	4.8	Yes	17
Group 14	Eucalyptus cladocalyx			Australian native	40	36	16	9	Maturing	Fair - Poor	Fair - Poor	Low	15_25 Yrs	Stem failures, trunk wounds / decay & borer damage.	4.8	No	
Group 15	Mixed natives	Ornamental species & palms.		Australian native	34	90	10	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4.1	No	
Group 16	Mixed natives.	Ornamental species & palms.		Australian native	30	85	9	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.6	No	
Group 17	Mixed natives.	Ornamental species & palms.		Australian native	25	60	8	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3	No	
Group 18	Eucalyptus globulus			Victorian native	33	9	11	7	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		4	Yes	
Group 19	Eucalyptus cladocalyx 'Nana'			Australian native	30	5	10	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.6	Yes	
Group 20	Eucalyptus cladocalyx 'Nana'			Australian native	32	6	10	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.8	Yes	
Group 21	Eucalyptus cladocalyx 'Nana'	Eucalyptus cladocalyx		Australian native	34	5	11	8	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Borer damage.	4.1	Yes	
Group 22	Eucalyptus cladocalyx 'Nana'			Australian native	20	29	10	9	Maturing	Fair - Poor	Fair - Poor	Moderate	15_25 Yrs	Borer damage.	2.4	Yes	
Group 23	Eucalyptus cladocalyx 'Nana'			Australian native	24	12	7	6	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs	Branch failures.	2.9	Yes	
Group 24	Eucalyptus cladocalyx 'Nana'			Australian native	26	31	7	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.1	Yes	
Group 25	Exotic conifers	Fruit trees.		Exotic conifers	20	70	6	6	Semi-mature	Fair - Poor	Fair - Poor	Low	15_25 Yrs		2.4	Yes	
Group 26	Eucalyptus cladocalyx 'Nana'	Eucalyptus conferruminata		Australian native	28	44	10	9	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs		3.4	Yes	

Prepared by Bruce Callander
Consultant arborist
Tree Logic Pty. Ltd.

Group No	Predominant_species	Other_Species	Other_Species	Type	Avg_DBH	No_stems	Avg_Height	Avg_Width	Life_Stage	Avg_Health	Avg_Structure	Retention_ value	ULE	Comments	Avg_TPZ	Site_Access	GAA Prop ref
Group 27	Eucalyptus cladocalyx			Australian native	40	22	18	15	Maturing	Fair - Poor	Poor	Low	15_25 Yrs	Lopped, trunk wounds, borer damage.	4.8	Yes	
Group 28	Eucalyptus cladocalyx			Australian native	45	6	14	14	Maturing	Fair - Poor	Poor	Low	15_25 Yrs	Lopped, trunk wounds, borer damage.	5.4	No	
Group 29	Mixed exotic, ornamental and mixed natives.			Mixed	20	40	10	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		2.4	Yes	
Group 30	Eucalyptus cladocalyx	Corymbia maculata		Australian native	34	8	14	7	Semi-mature	Good	Fair	High	25_50 Yrs	Linear windbreak	4.1	Yes	8
Group 31	Eucalyptus cladocalyx	Eucalyptus camaldulensis		Australian native	30	7	11	8	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3.6	Yes	
Group 32	Schinus ariera			Exotic evergreen	80	8	7	10	Maturing	Fair	Fair	Moderate	25_50 Yrs	Multi-stemmed.	9.6	Yes	
Group 33	Eucalyptus scoparia	Mixed natives		Australian native	20	15	10	6	Semi-mature	Fair	Fair	Moderate	25_50 Yrs	Eucalyptus scoparia x 9. Mixed natives x 6	2.4	Yes	
Group 34	Eucalyptus camaldulensis			Planted indigenous	18	32	8	5	Semi-mature	Fair	Fair	Moderate	>50 Yrs	Associated with natural depression and water course.	2.2	No	
Group 35	Eucalyptus cladocalyx 'Nana'	Eucalyptus cladocalyx		Australian native	25	56	11	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3	Yes	
Group 36	Eucalyptus cladocalyx 'Nana'			Australian native	20	10	8	9	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	
Group 37	Eucalyptus cladocalyx			Australian native	45	10	17	17	Maturing	Fair	Fair	Moderate	15_25 Yrs		5.4	No	
Group 38	Eucalyptus cladocalyx			Australian native	42	11	18	12	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		5	No	
Group 39	Eucalyptus cladocalyx	Pinus radiata		Australian native	33	9	15	9	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		4	No	
Group 40	Eucalyptus cladocalyx 'Nana'	Eucalyptus cladocalyx x37	Exotic conifers	Australian native	44	50	20	14	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		5.3	No	
Group 41	Eucalyptus cladocalyx 'Nana'			Australian native	20	23	6	5	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs		2.4	Yes	
Group 42	Eucalyptus cladocalyx 'Nana'			Australian native	33	18	13	13	Maturing	Fair	Fair	Moderate	15_25 Yrs		4	No	
Group 43	Eucalyptus cladocalyx 'Nana'			Australian native	22	13	8	7	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Past power line clearance.	2.6	No	
Group 44	Eucalyptus cladocalyx 'Nana'			Australian native	25	9	9	9	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3	No	
Group 45	Eucalyptus cladocalyx 'Nana'	Exotic conifers		Australian native	30	30	8	8	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs		3.6	No	
Group 46	Eucalyptus cladocalyx			Australian native	30	70	18	9	Semi-mature	Fair	Fair - Poor	Low	15_25 Yrs	Close grown group.	3.6	No	
Group 47	Mixed natives including Yellow Gum, RRG, Sug gum			Victorian native	20	15	8	6	Semi-mature	Good	Fair	Moderate	25_50 Yrs		2.4	No	
Group 48	Eucalyptus cladocalyx	Mixed natives.		Australian native	27	30	15	8	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		3.2	No	
Group 49	Eucalyptus cladocalyx			Australian native	35	23	18	13	Maturing	Fair	Fair - Poor	Low	15_25 Yrs	Branch failures.	4.2	No	
Group 50	Eucalyptus cladocalyx 'Nana'			Australian native	20	36	2	3	Semi-mature	Fair	Very Poor	None	15_25 Yrs	Lopped.	2.4	No	
Group 51	Eucalyptus cladocalyx 'Nana'			Australian native	22	38	9	7	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.6	No	
Group 52	Eucalyptus cladocalyx 'Nana'			Australian native	20	34	7	7	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	
Group 53	Mixed conifers	Mixed natives		Exotic conifers	25	40	8	7	Semi-mature	Fair - Poor	Fair - Poor	Low	15_25 Yrs	Mixed natives x 2	3	No	
Group 54	Eucalyptus camaldulensis	Mixed natives.		Planted indigenous	30	35	8	5	Semi-mature	Fair - Poor	Fair - Poor	Moderate	15_25 Yrs	At edge of road reserve.	3.6	No	
Group 55	Mixed natives			Australian native	20	38	8	6	Semi-mature	Fair - Poor	Fair - Poor	Low	15_25 Yrs		2.4	No	

Prepared by Bruce Callander
Consultant arborist
Tree Logic Pty. Ltd.

Group No	Predominant_species	Other_Species	Other_Species	Type	Avg_DBH	No_stems	Avg_Height	Avg_Width	Life_Stage	Avg_Health	Avg_Structure	Retention_ value	ULE	Comments	Avg_TPZ	Site_Access	GAA Prop ref
Group 56	Eucalyptus cladocalyx			Australian native	44	13	18	10	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		5.3	No	
Group 57	Exotic conifers	Eucalyptus cladocalyx 'Nana'		Exotic conifers	20	15	8	8	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs		2.4	No	
Group 58	Eucalyptus camaldulensis			Planted indigenous	50	10	18	9	Semi-mature	Fair	Fair - Poor	Moderate	25_50 Yrs	Planted? Close growing.	6	No	
Group 59	Eucalyptus cladocalyx			Australian native	38	25	18	9	Maturing	Poor	Poor	Low	15_25 Yrs	Close grown. Dieback.	4.6	No	
Group 60	Eucalyptus cladocalyx			Australian native	45	18	17	7	Maturing	Fair - Poor	Fair - Poor	Low	15_25 Yrs	Close grown. Dieback.	5.4	No	
Group 61	Eucalyptus cladocalyx			Australian native	35	35	18	8	Maturing	Fair - Poor	Fair - Poor	Low	15_25 Yrs		4.2	No	
Group 62	Eucalyptus cladocalyx			Australian native	43	14	23	14	Semi-mature	Fair	Poor	Low	5_15 Yrs	Deadwood, trunk decay.	5.2	Yes	
Group 63	Eucalyptus cladocalyx			Australian native	50	13	21	10	Semi-mature	Fair	Poor	Low	5_15 Yrs	Trunk decay, deadwood.	6	Yes	
Group 64	Eucalyptus cladocalyx			Australian native	40	20	18	13	Semi-mature	Fair	Poor	Low	5_15 Yrs	Deadwood.	4.8	No	
Group 65	Cupressus macrocarpa			Exotic conifers	45	7	12	10	Over Mature	Poor	Poor	Low	<5 yrs	In decline. Several trees collapsed.	5.4	No	
Group 66	Schinus ariera			Exotic evergreen	20	4	6	6	Semi-mature	Fair	Fair - Poor	Low	5_15 Yrs	Dbh 20, 20, 25.	2.4	No	
Group 67	Eucalyptus cladocalyx 'Nana'			Australian native	17	39	8	8	Semi-mature	Fair	Fair - Poor	Moderate	15_25 Yrs		2	No	
Group 68	Pinus radiata			Exotic conifers	25	120	12	9	Semi-mature	Fair	Fair	Moderate	25_50 Yrs		3	Yes	
Group 69	Pinus radiata			Exotic conifers	25	200	12	7	Semi-mature	Fair - Poor	Fair	Low	15_25 Yrs	Dieback throughout stand.	3	Yes	
Group 70	Eucalyptus cladocalyx			Australian native	40	37	20	14	Maturing	Fair	Poor	Low	5_15 Yrs	Trunk decay, deadwood.	4.8	Yes	
Group 71	Pinus radiata	Eucalyptus cladocalyx 'Nana'		Exotic conifers	20	83	10	5	Semi-mature	Fair	Fair - Poor	Low	5_15 Yrs	Branch dieback	2.4	Yes	
Group 72	Eucalyptus cladocalyx			Australian native	40	80	22	14	Maturing	Fair	Poor	Low	5_15 Yrs	Deadwood, trunk decay.	4.8	Yes	
Group 73	Eucalyptus cladocalyx	Acacia pycnantha		Australian native	15	14	7	6	Semi-mature	Fair	Fair	Low	25_50 Yrs	Self seeded.	1.8	Yes	
Group 74	Eucalyptus cladocalyx 'Nana'			Australian native	25	19	9	11	Maturing	Fair	Fair - Poor	Low	15_25 Yrs		3	Yes	
Group 75	Eucalyptus cladocalyx 'Nana'			Australian native	23	50	9	11	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		2.8	No	
Group 76	Eucalyptus cladocalyx 'Nana'			Australian native	25	16	10	11	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		3	No	
Group 77	Eucalyptus cladocalyx 'Nana'	Cupressus sp.		Australian native	23	45	10	10	Maturing	Fair	Fair - Poor	Moderate	15_25 Yrs		2.8	No	
Group 78	Eucalyptus cladocalyx	Eucalyptus siderloxylon		Australian native	20	30	12	10	Semi-mature	Fair	Fair	Moderate	15_25 Yrs		2.4	No	

Prepared by Bruce Callander
Consultant arborist
Tree Logic Pty. Ltd.

Appendix 2: Tree numbers & locations: PSP 1080 - Kororoit

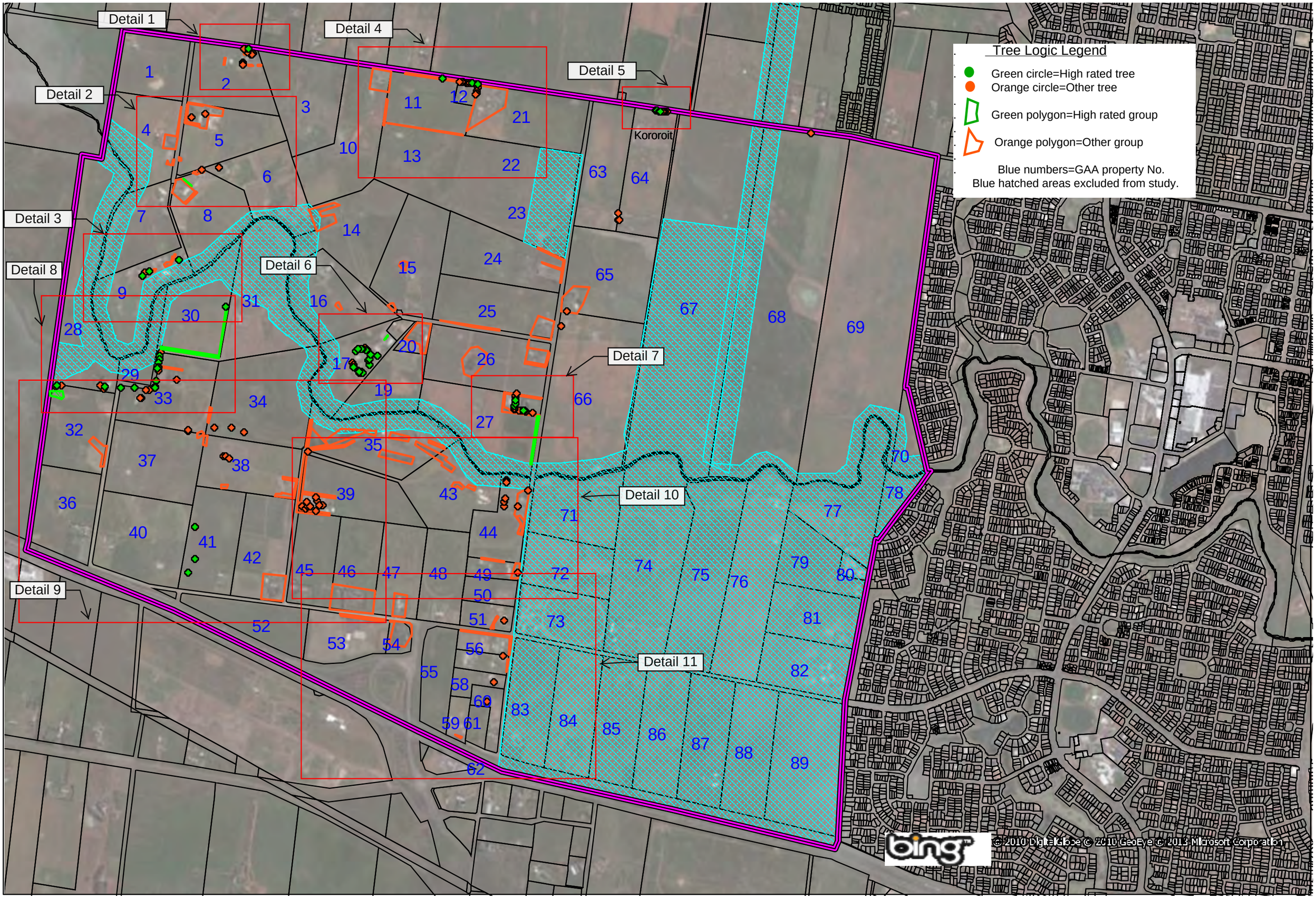
Refer to following 11 pages

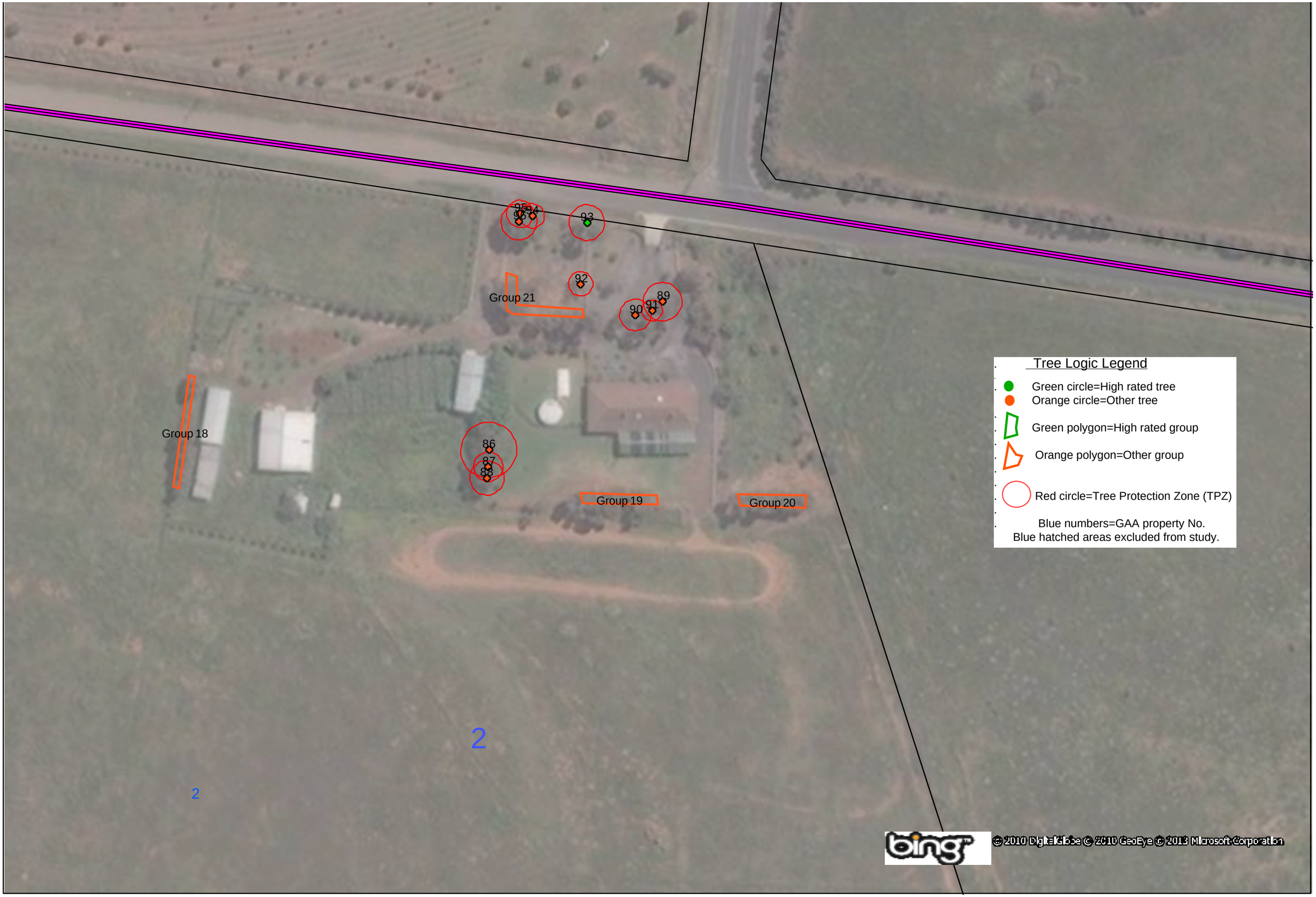
(Includes 10 pages of details)

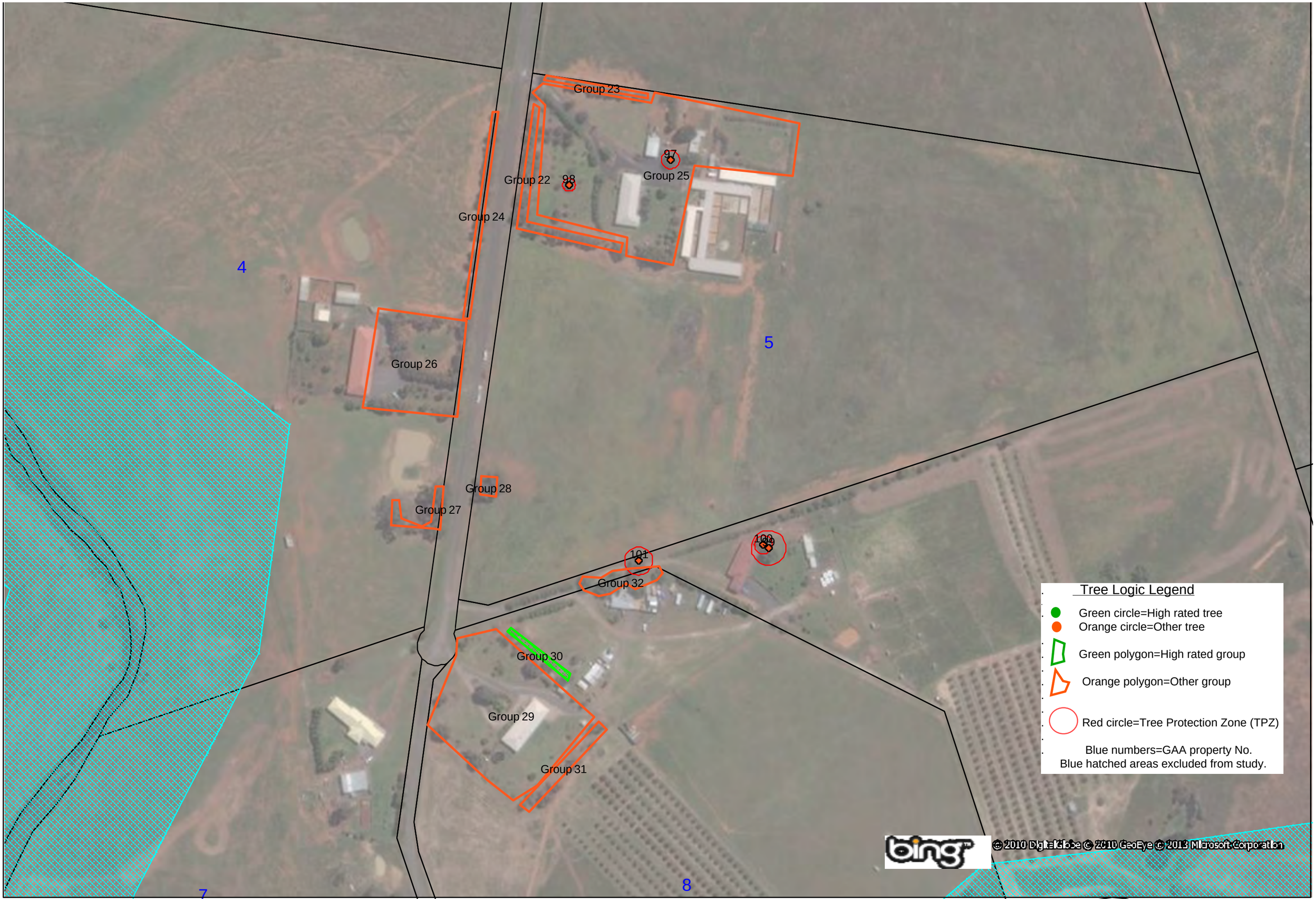
Appendix 2. Tree study area. Kororoit Precinct 1080.

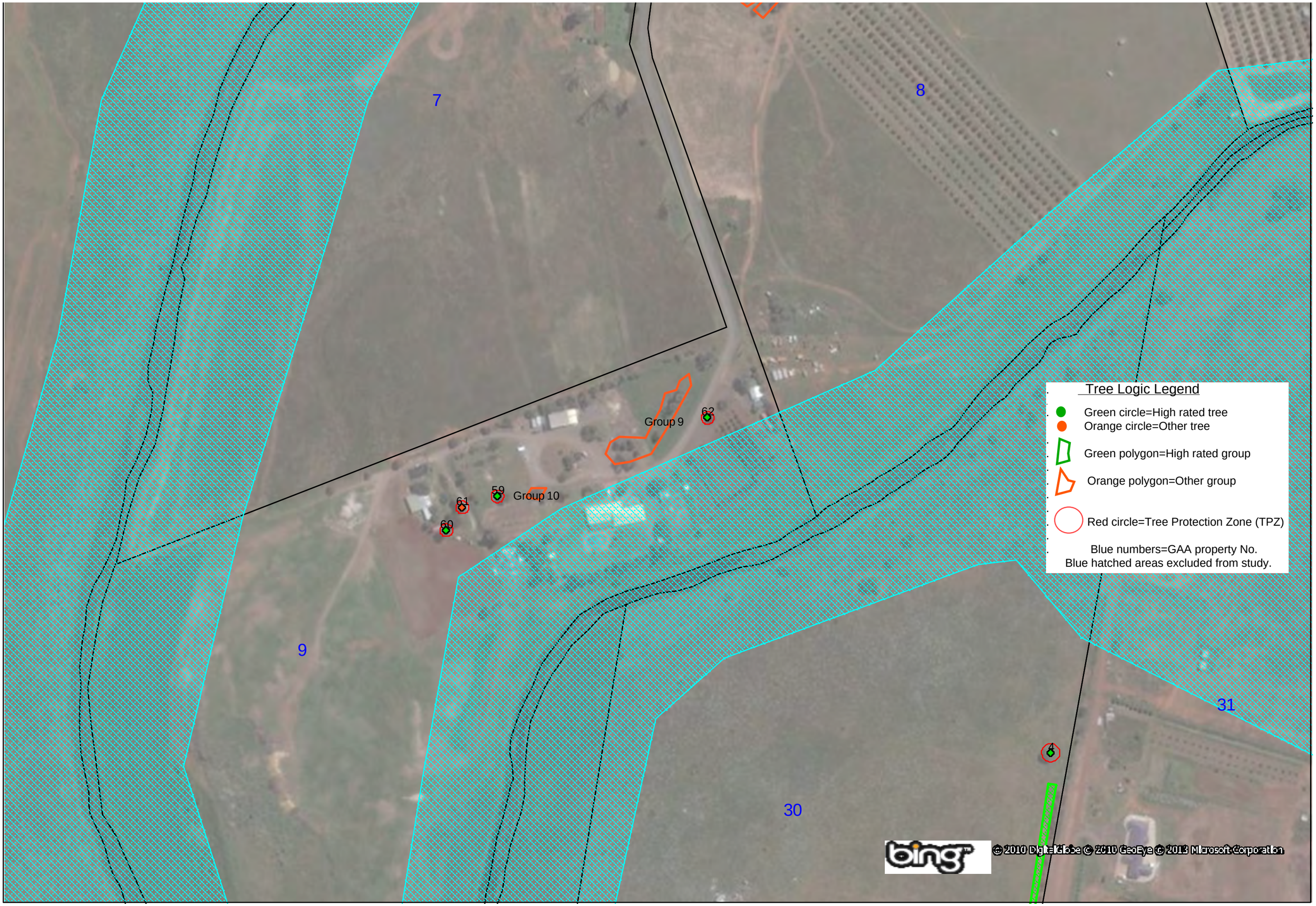
Refer to following pages for details.

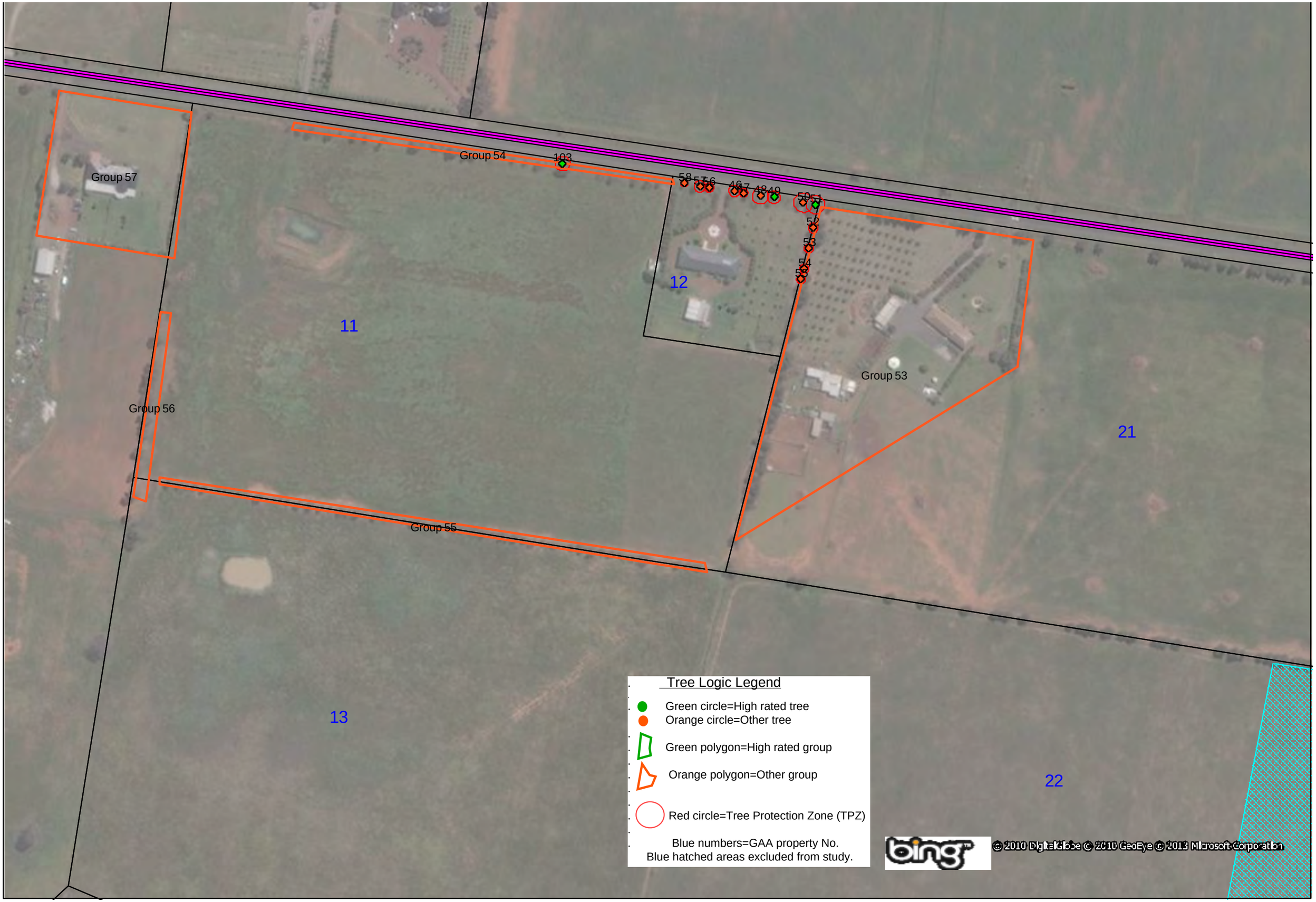
(Tree Logic 2013)

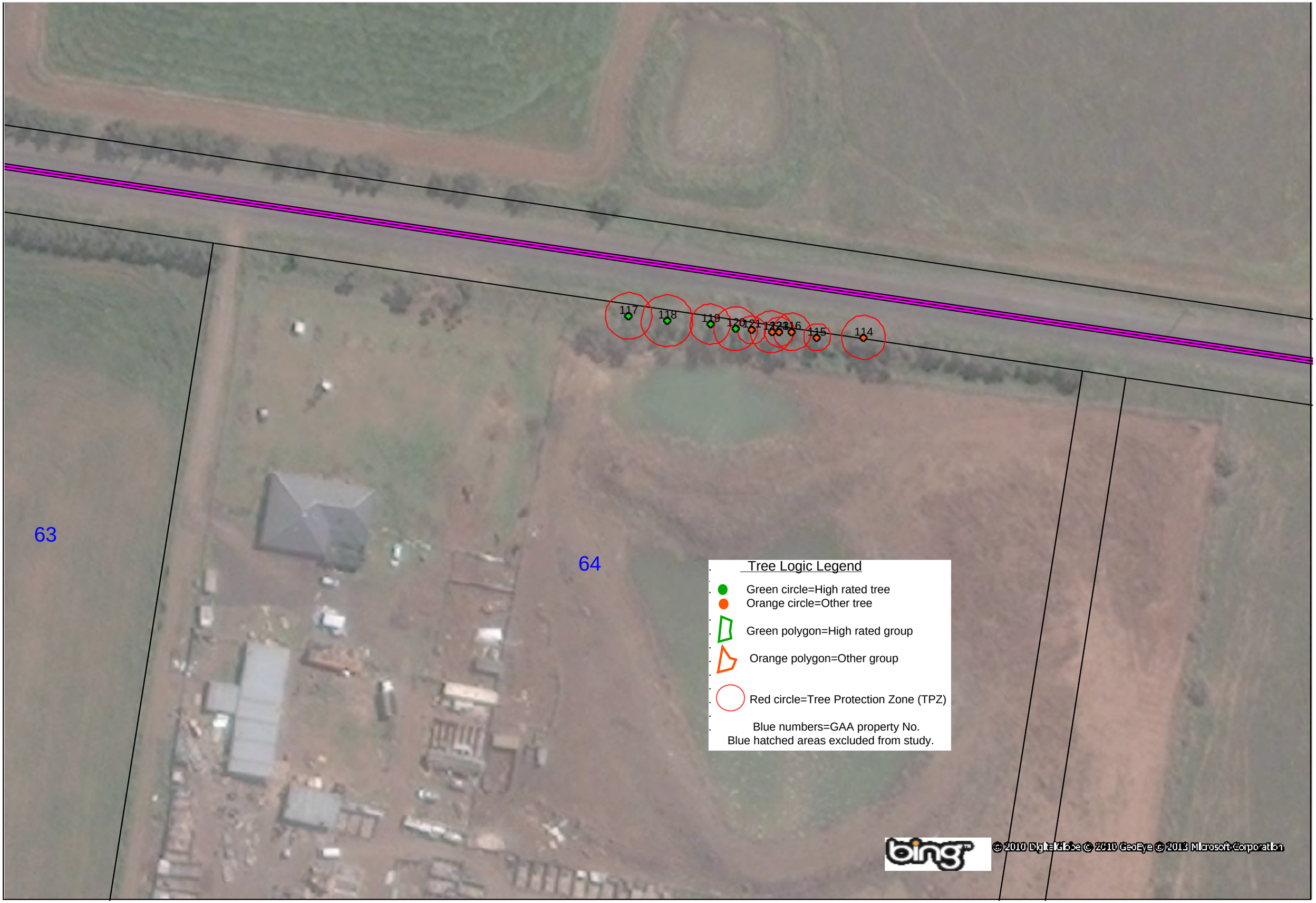


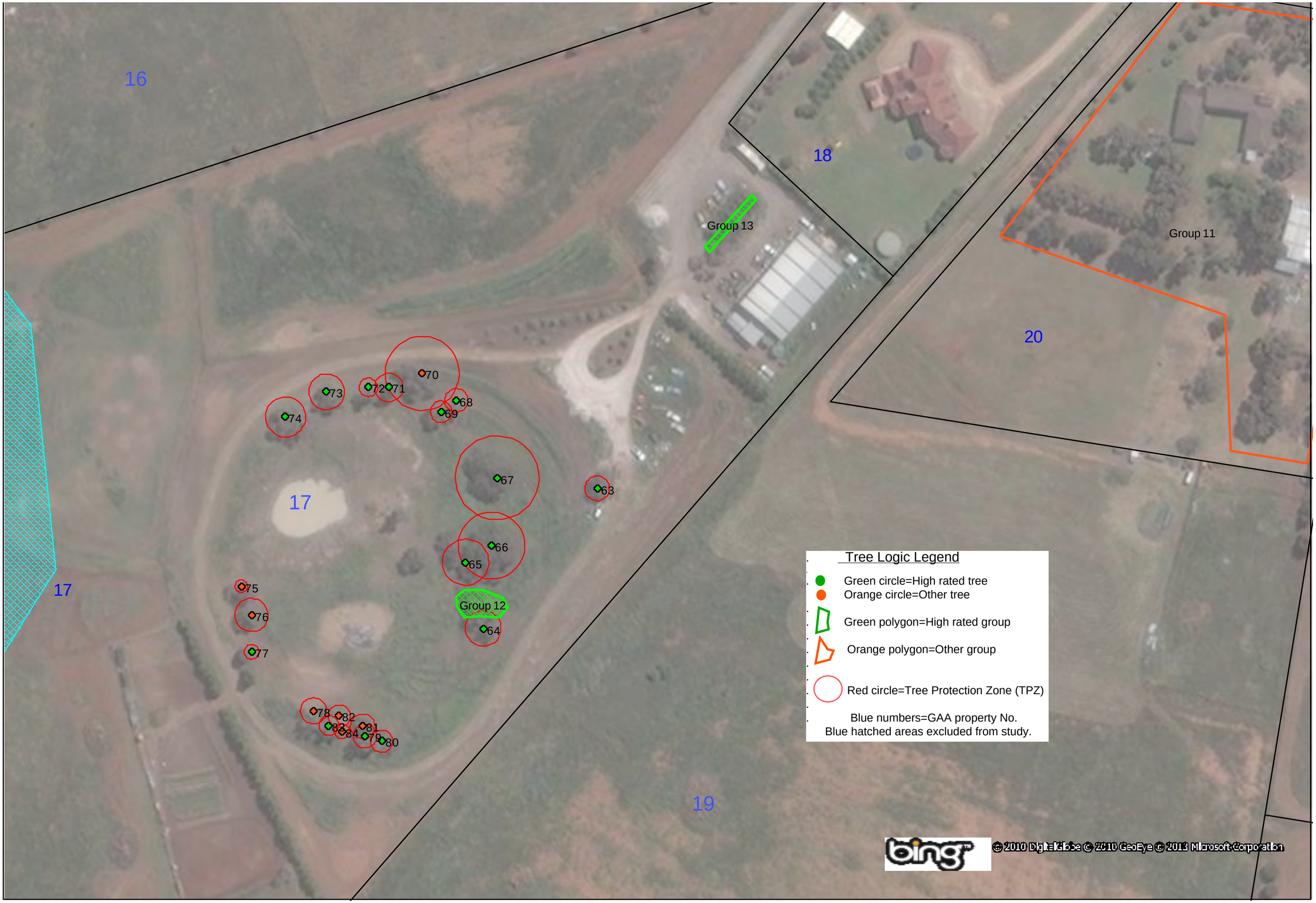

95
94
96
93
92
89
90
91
Group 21
Group 18
86
87
88
Group 19
Group 20
2
2
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

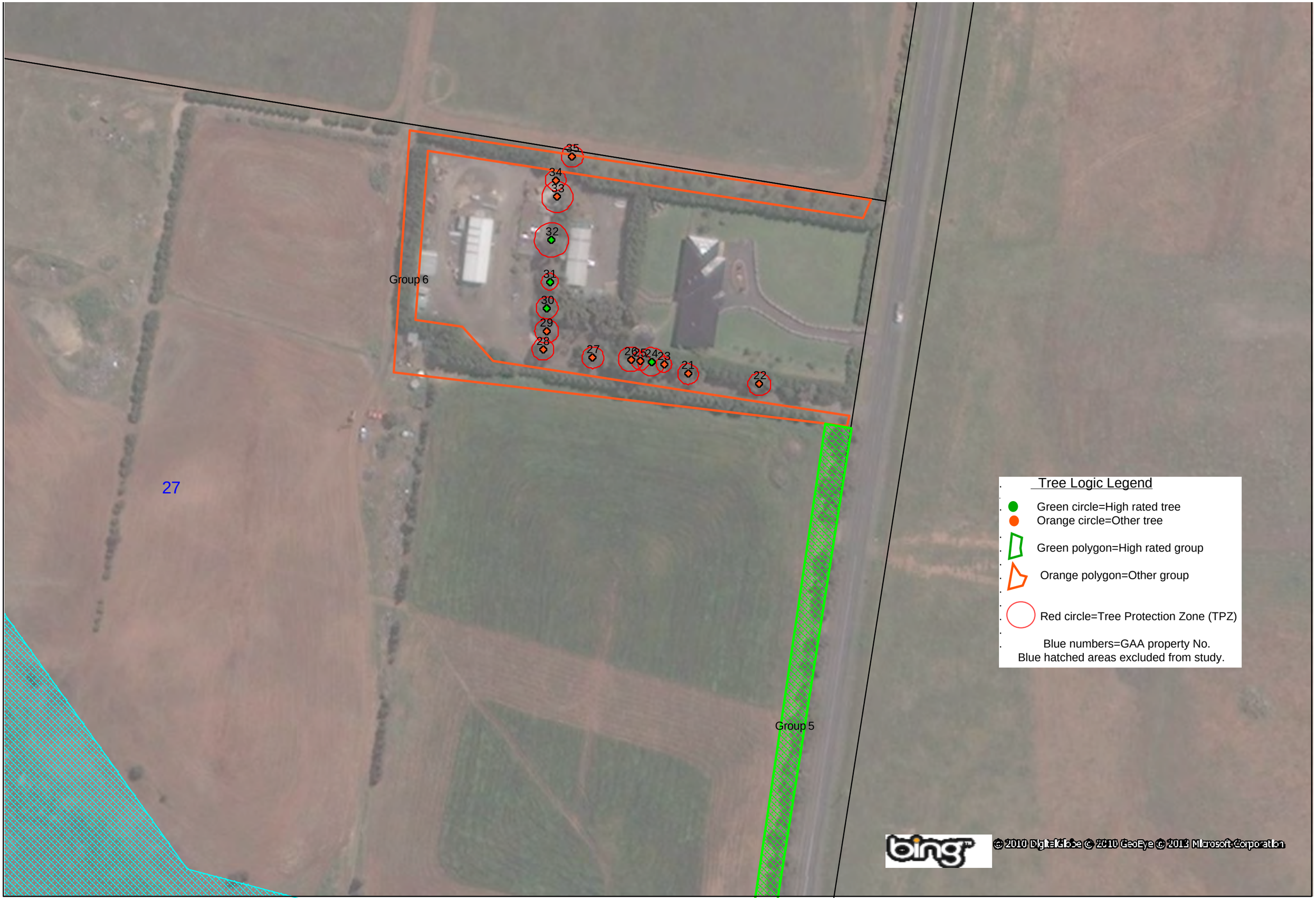

Group 23
97
Group 25
Group 22
98
Group 24
4
5
Group 26
Group 28
Group 27
100
101
Group 32
Group 30
Group 29
Group 31
7
8
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

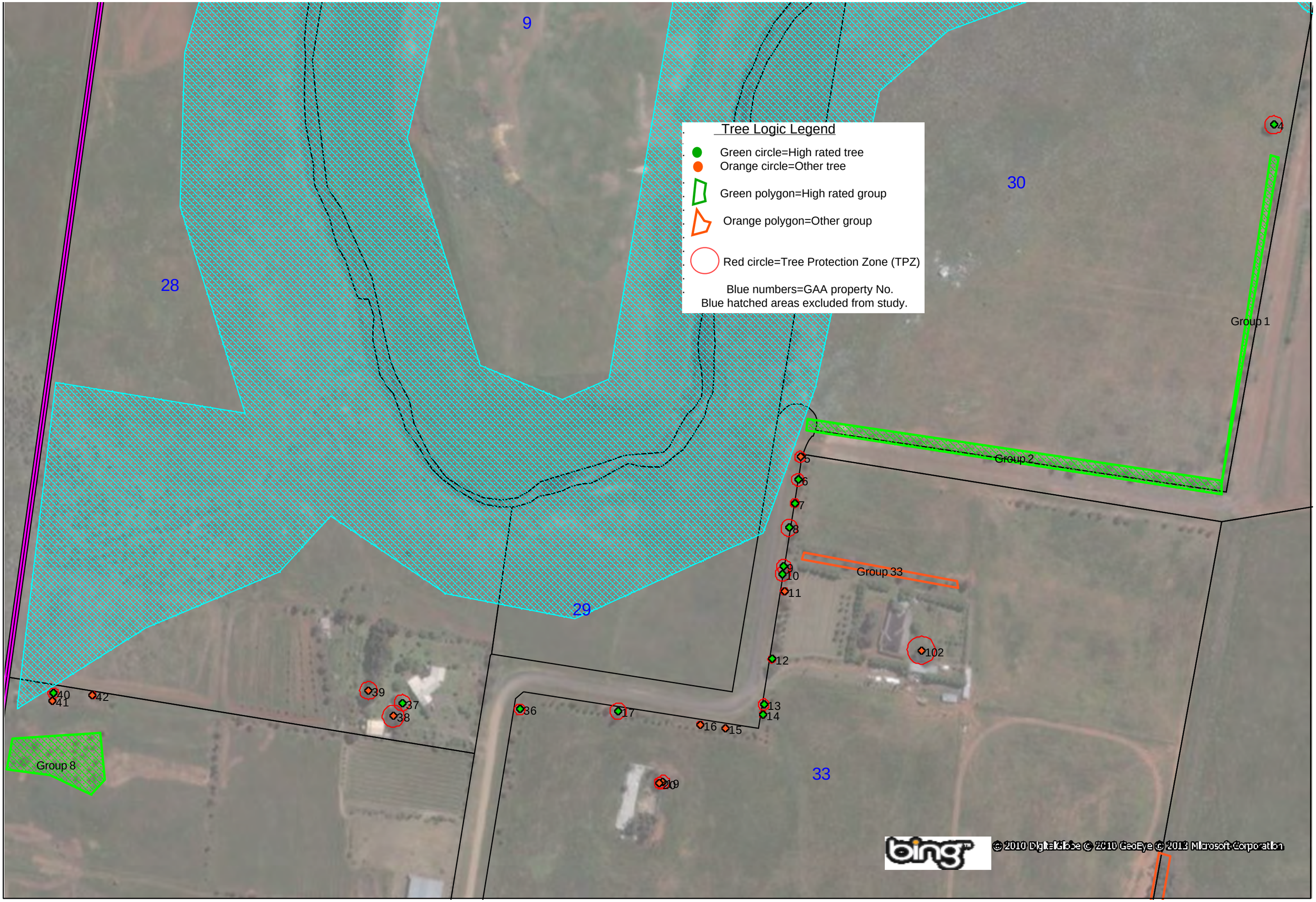

7
8
9
30
31
Group 9
62
59
Group 10
61
60
4
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

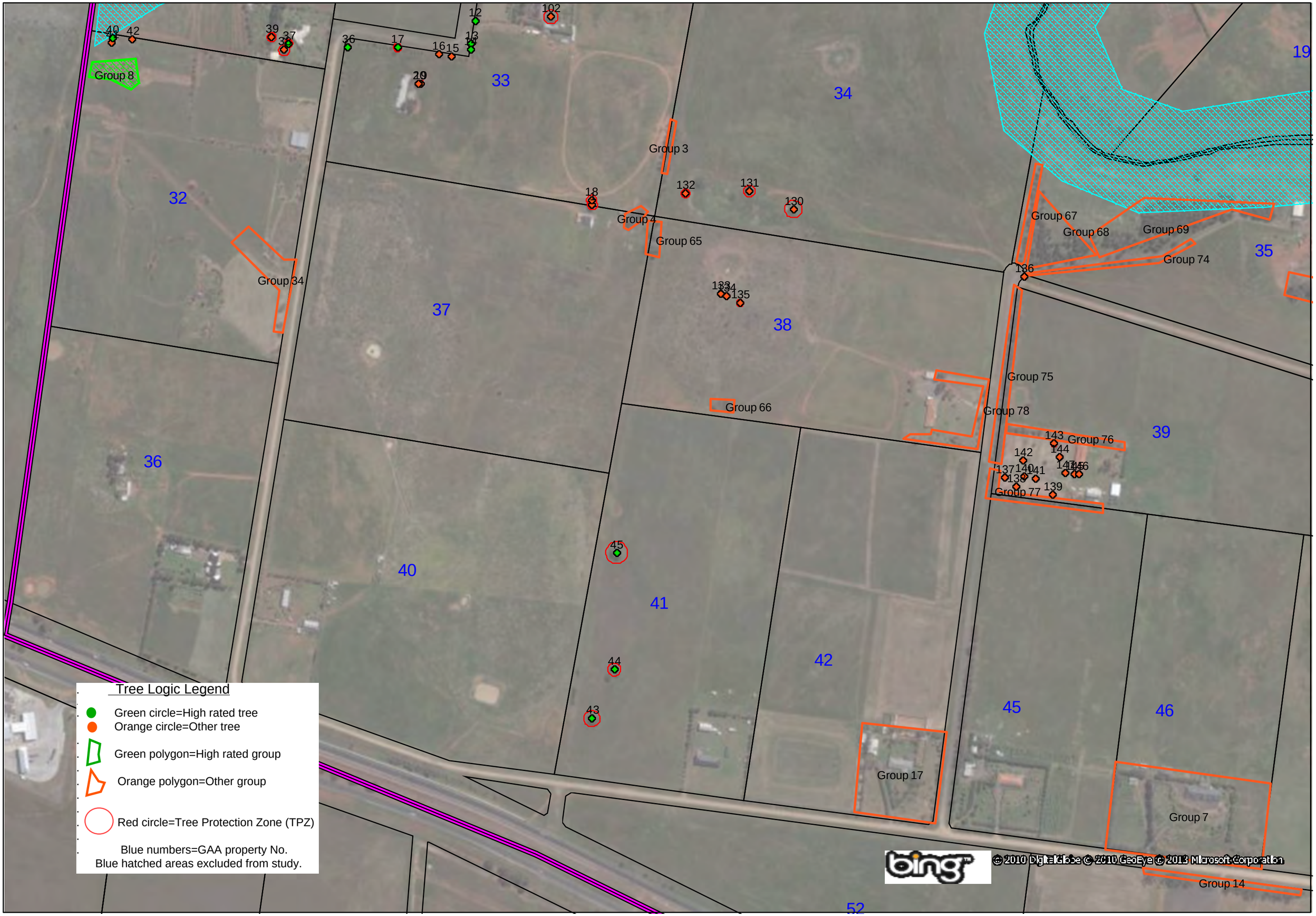

Group 57
Group 54
103
58
57
56
46
47
48
49
50
51
52
53
54
55
12
11
Group 53
21
Group 56
Group 55
13
22
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation


117
118
119
120
121
116
115
114
63
64
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation


16
18
20
17
17
19
Group 13
Group 11
Group 12
70
73
72
71
68
69
74
67
63
66
65
64
75
76
77
78
82
83
84
81
79
80
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation


35
34
33
32
31
30
29
28
27
26
25
24
23
21
22
Group 6
27
Group 5
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

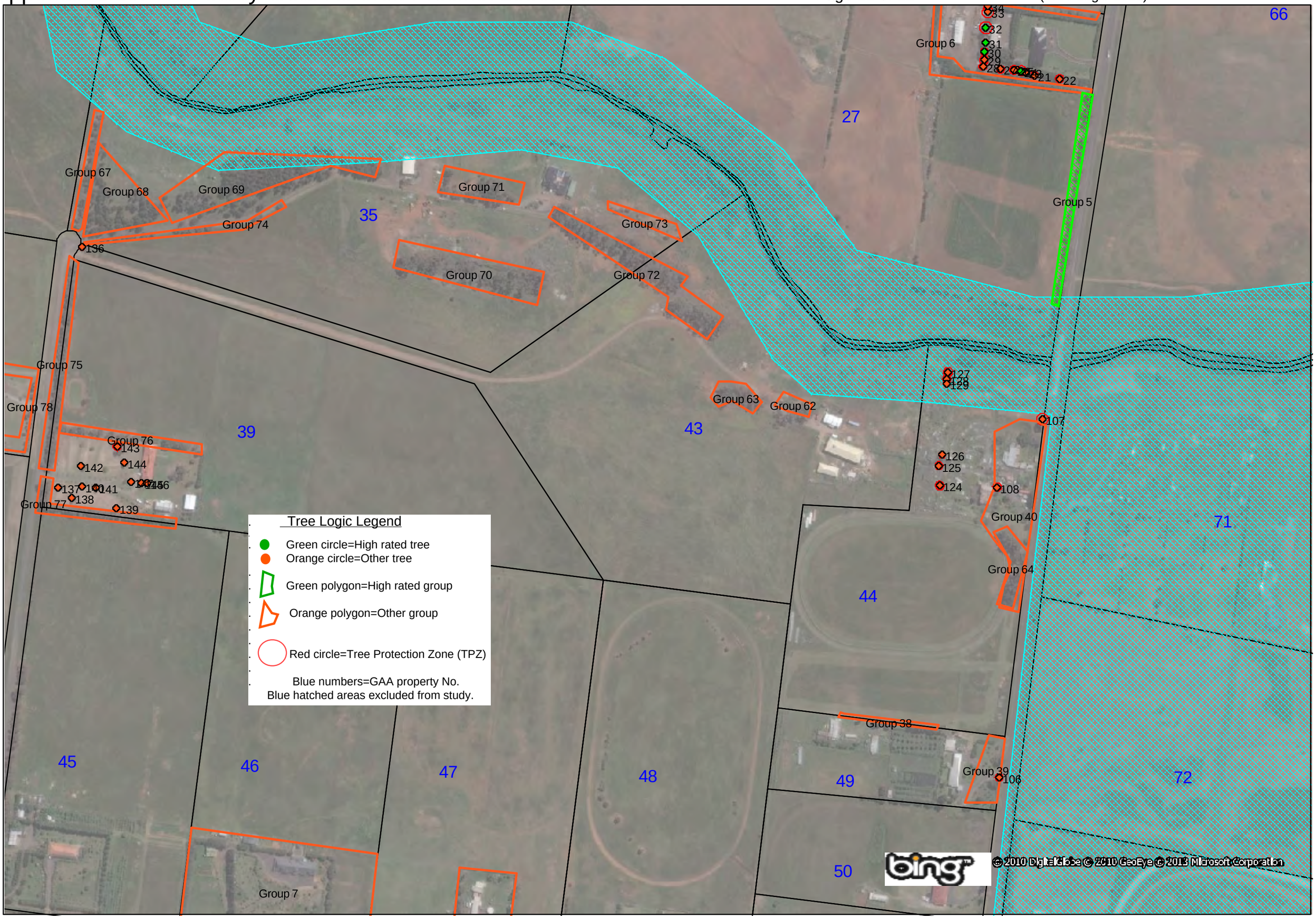

9
28
29
30
33
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
Group 1
Group 2
Group 33
Group 8
4
5
6
7
8
9
10
11
12
13
14
15
16
17
36
37
38
39
40
41
42
102
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

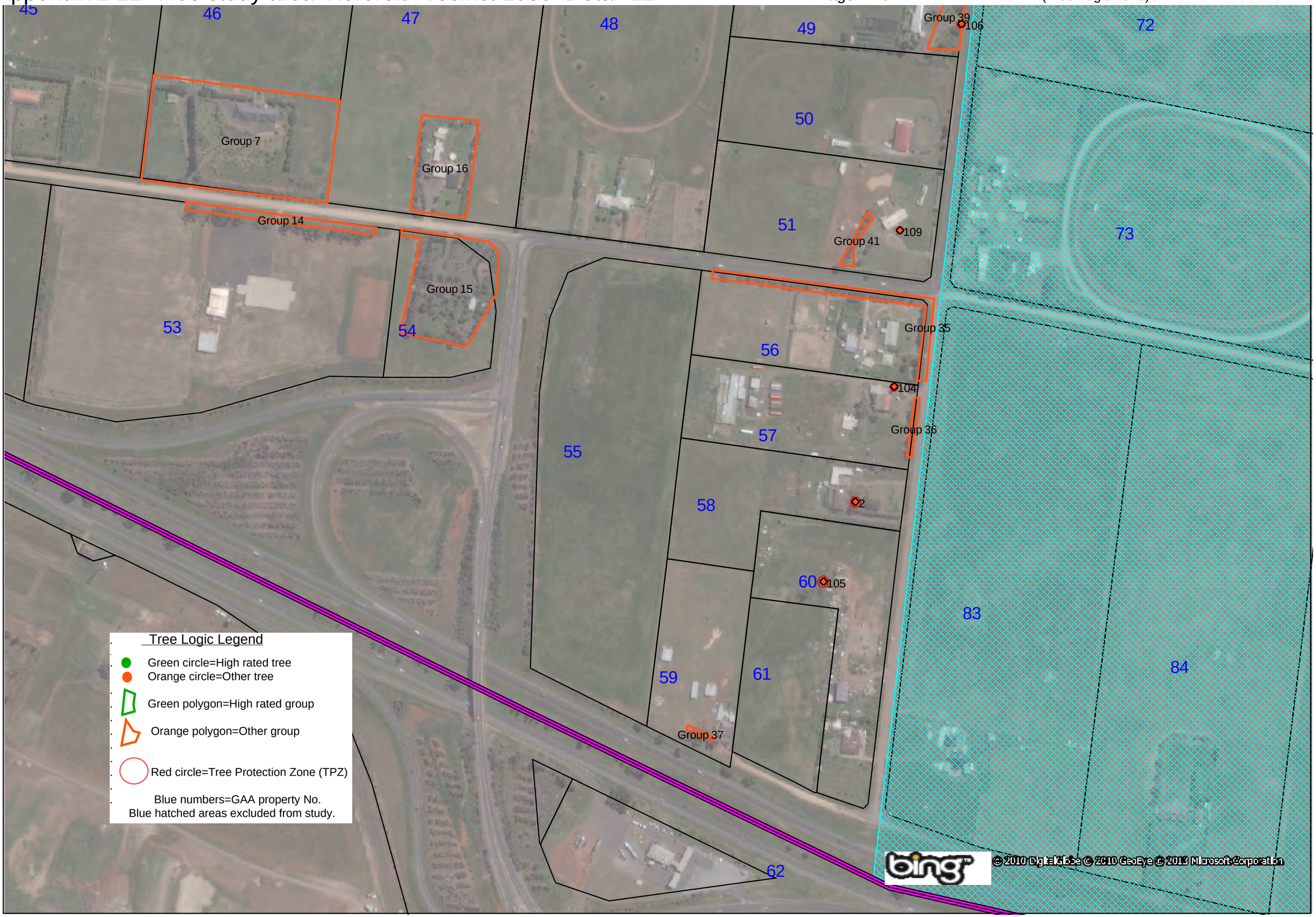


Tree Logic Legend

- Green circle=High rated tree
- Orange circle=Other tree
- Green polygon=High rated group
- Orange polygon=Other group
- Red circle=Tree Protection Zone (TPZ)

Blue numbers=GAA property No.
Blue hatched areas excluded from study.


Group 6
Group 67
Group 68
Group 69
Group 71
Group 74
Group 73
Group 70
Group 72
Group 5
Group 75
Group 78
Group 63
Group 62
Group 76
Group 77
Group 40
Group 64
Group 38
Group 39
Group 7
27
35
39
43
44
45
46
47
48
49
50
66
71
72
136
107
108
106
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation


45
46
47
48
49
50
51
72
73
83
84
53
54
55
56
57
58
59
60
61
62
Group 7
Group 16
Group 14
Group 15
Group 39
106
Group 41
109
Group 35
104
Group 36
2
105
Group 37
Tree Logic Legend
Green circle=High rated tree
Orange circle=Other tree
Green polygon=High rated group
Orange polygon=Other group
Red circle=Tree Protection Zone (TPZ)
Blue numbers=GAA property No.
Blue hatched areas excluded from study.
bing
© 2010 DigitalGlobe © 2010 GeoEye © 2013 Microsoft Corporation

Appendix 3: Arboricultural Descriptors

1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen t o what could be considered typical for that species growing in its location. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the author.

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

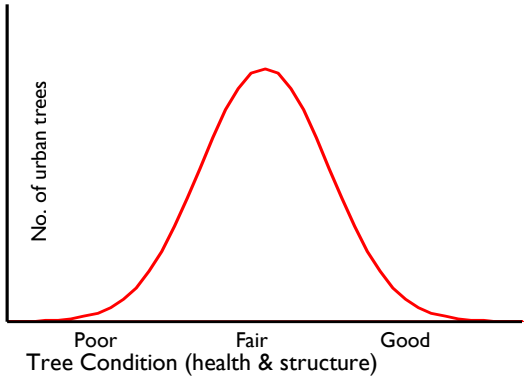


Diagram 1: Indicative normal distribution curve for tree condition

2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with author's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

5. Diameter at Breast Height (DBH)

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard AS 4970-2009 Protection of trees on development sites. Measurements taken with foresters or builders tape.

6. Health

Assesses various attributes to describe the overall health and vigour of the tree.

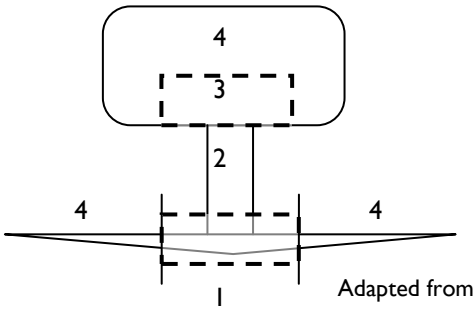
Category	Vigour/Extension growth	Decline symptoms/Deadwood	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical	None or minimal	Better than typical	None or minimal
Fair	Typical	Typical or expected	Typical	Typical, within damage thresholds
Fair to Poor	Below typical	More than typical	Exhibiting deficiencies	Exceeds damage thresholds
Poor	Minimal	Excessive and large amount/size	Exhibiting severe deficiencies	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

7. Structure

Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No damage, disease or decay; obvious basal flare / stable in ground	No damage, disease or decay; well tapered	Well formed, attached, spaced and tapered	No damage, disease, decay or structural defect
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Typically formed, attached, spaced and tapered	Minor damage, disease or decay; minor branch end-weight or over-extension
Fair to Poor	Moderate damage or decay; minimal basal flare	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump resprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump resprout	Decayed, cavities or branch attachments with active split; failure imminent	Excessive damage, disease or decay; excessive branch end-weight or over-extension

Diagram 2: Tree structure zones
1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Adapted from Coder (1996)

Trees are assessed and the given a rating for a point in time. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments. The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external and above ground tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation.

Structure ratings will also take into account general tree architecture which considers aspects of stem taper, live crown ratio, branch distribution or crown bias and position such as a tree being suppressed amongst more dominant trees.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s).

8. Life Stage

Relates to the physiological stage of the tree's life cycle.

Category	Description
Young	Sapling tree and/or recently planted
Semi-mature	Tree rapidly increasing in size and yet to achieve expected size in situation
Maturing	Specimen approaching expected size in situation, with reduced incremental growth
Over-mature	Tree is senescent and in decline

9. Arboricultural Rating

Relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context.

Category	Description
Very High	Tree of very high quality in good condition. Generally a prominent arboricultural feature. Tree is capable of tolerating changes in its environment if managed appropriately. These trees have the potential to be a long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.
High	Tree of high quality with generally sound structural condition and good health. Generally is or has the potential to become a prominent landscape feature. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.
Moderate	Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is generally desirable.
Low	Tree of low quality and/or little amenity value. Tree in poor health and/or with poor structure. Tree is not significant for its size and/or young. These trees are easily replaceable. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.
None	Tree has a severe structural defect and/or health problem that cannot be sustained with practical arboricultural techniques and the loss of tree would be expected in the short term. Tree whose retention would not be viable after the removal of adjacent trees (includes trees that have developed in close spaced groups and would not be expected to acclimatise to severe alterations to surrounding environment – removal of adjacent shelter trees). Tree has a detrimental effect on the environment, for example, the tree is a woody weed with potential to spread into waterways or natural areas.

10. Tree significance

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	Description
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant Indigenous vegetation that contribute to biological diversity

Bibliography:

Coder, K D. (1996) Construction damage assessments: trees and sites, University of Georgia, USA

Hitchmough, J.D. (1994) Urban landscape management, Inkata Press, Australia

Gooding, R.F., Ingram, J.B., Urban, J.R., Bloch, L.B., Steigerwaldt, W.M, Harris, R.W. and Allen, E.N. (2000) Guide for plant appraisal, 9th edition, International society of Arboriculture, USA

Pollard, A. H. (1974) Introductory statistics: a service course, Pergamon Press Australia, Australia.

Standards Australia (2009) Australian Standard AS 4970-2009 Protection of trees on development sites.

Appendix 4: Tree protection zones. Tree logic Pty. Ltd. © 2009

1.0 Introduction

In order to sustain trees on a development site consideration must be given to the establishment of tree protection zones.

The physical dimensions of tree protection zones can sometimes be difficult to define. The projection of a tree's crown can provide a guide but is by no means the definitive measure. The unpredictable nature of roots and their growth, differences between species and their tolerances, and observable and hidden changes to the trees growing environment, as a result of development, are variables that must be considered.

Most vigorous, broad canopied trees survive well if the area within the drip-line of the canopy is protected. Fine root density is usually greater beneath the canopy than beyond (Gilman, 1997). If few to no roots over 3cm in diameter are encountered and severed during excavation the tree will probably tolerate the impact and root loss. A healthy tree can sustain a loss of between 30% and 50% of absorbing roots (Harris, Clark, Matheny, 1999), however encroachment into the structural root system of a tree may be problematic.

The structural root system of a tree is responsible for ensuring the stability of the entire tree structure in the ground. A tree could not sustain loss of structural root system and be expected to survive let alone stand up to average annual wind loads upon the crown.

2.0 Allocation of tree protection zone (TPZ)

The method of allocating a TPZ to a particular tree will be influenced by site factors, the tree species, its age and developed form.

Once it has been established, through an arboricultural assessment, which trees and tree groups are to be retained, the next step will require careful management through the development process to minimise any impacts on the designated trees. The successful retention of trees on any particular site will require the commitment and understanding of all parties involved in the development process. The most important activity, after determining the trees that will be retained is the implementation of a TPZ.

The intention of tree protection zones is to:

- mitigate tree hazards;
- provide adequate root space to sustain the health and aesthetics of the tree into the future;
- minimise changes to the trees growing environment, which is particularly important for mature specimens;
- minimise physical damage to the root system, canopy and trunk; and
- define the physical alignment of the tree protection fencing

Tree protection

The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of tree protection zones for retained trees.

The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of TPZs for the assessed trees. The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be no less than 2m and the maximum no more than 15m radius. The TPZ of palms should be not less than 1.0m outside the crown projection.

Encroachment into the TPZ is permissible under certain circumstances though is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Examples are provided in Diagram 1. Encroachment greater than 10% is considered major encroachment under AS4970-2009 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable.

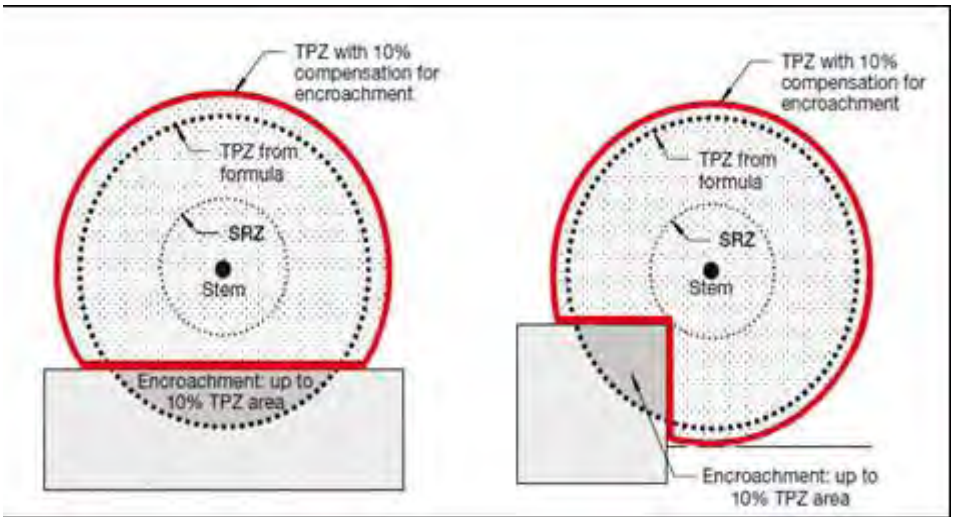


Diagram 1: Examples of minor encroachment into a TPZ. Extract from: AS4970-2009, Appendix D, p30 of 32

The 10% encroachment on one side equates to approximately ⅓ radial distance. Tree root growth is opportunistic and occurs where the essentials to life (primarily air and water) are present. Heterogeneous soil conditions, existing barriers, hard surfaces and buildings may have inhibited the development of a symmetrically radiating root system.

Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998). Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build.

The TPZ should also give consideration to the canopy and overall form of the tree. If the canopy requires severe pruning in order to accommodate a building and in the process the form of the tree is diminished it may be worthwhile considering altering the design or removing the tree.

General tree protection guidelines

The most important factors are:

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is to mulch the zone with woodchip and erect tree protection fencing. This must be completed prior to any materials being brought on-site, erection of temporary site facilities or demolition/earth works. The protection fencing must be sturdy and withstand winds and construction impacts. The protection fence should only be moved with approval of the site supervisor. Other root zone protection methods can be incorporated if the TPZ area needs to be traversed.
- Appropriate signage is to be fixed to the fencing to alert people as to importance of the tree protection zone.
- The importance of tree preservation must be communicated to all relevant parties involved with the site.
- Inspection of trees during excavation works.

Construction Guidelines

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the retained trees.

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.
- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.
- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.
- No storage of material, equipment or temporary building should take place over the root zone of any tree.
- Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.
- Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk calliper may provide the most even soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

References

Bernatzky, A. 1978. *Tree Ecology and Preservation.* New York: Elsevier Publishing.

British Standard 5837. 1991. *Guide for Trees in relation to construction*. British Standards Institute.

Gilman, E. F. 1997. *Trees for Urban and Suburban Landscapes.* Delmar.

Harris, R. W, Clark J.R. & Matheny N.P. 1999. *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*, *Third Edition.* Prentice - Hall, New Jersey.

Helliwell, D. R. 1985. *Trees on Development Sites*. Arboricultural Association UK.

Matheny, N. & Clark, J. R. 1998. *Trees and development – A technical guide to preservation of trees during land development*. International Society of Arboriculture, Publishers.

Mattheck, C. & Breloer, H. 1994. *The Body Language of Trees* HMSO

Mattheck C. 2002. *Tree Mechanics*, Forschungszentrum Karlsruhe GMBH

Tattar, T. A. 1989. *Diseases of Shade Trees*, 2nd ed. San Diego: Academic Press.

Watson, G. W. & Himelick, E. B. 1997. *Principals and Practices of Planting Trees and Shrubs.* International Society of Arboriculture.

Tree Logic Pty. Ltd.

Unit 4, 21 Eugene Terrace,

Ringwood. VIC. 3134.

Precedent disclaimer and copyright

Tree Logic Pty. Ltd.

Unit 4, 21 Eugene Terrace,

Ringwood. VIC. 3134.

Arboricultural Consultancy:

Disclaimer: Although Tree Logic uses all due care and skill in providing you the information made available in this report, to the extent permitted by law Tree Logic otherwise excludes all warranties of any kind, either expressed or implied.

To the extent permitted by law, you agree the Tree Logic is not liable to you or any other person or entity for any loss or damage caused or alleged to have been caused (including loss or damage resulting from negligence), either directly or indirectly, by your use of the information (including by way of example, arboricultural advice) made available to you in this report. Without limiting this disclaimer, in no event will Tree Logic be liable to you for any lost revenue or profits, or for special, indirect, consequential or incidental damage (however caused and regardless of the theory of liability) arising out of or related to your use of that information, even if Tree Logic has been advised of the possibility of such loss or damage.

This disclaimer is governed by the law in force in the State of Victoria, Australia

Report assumptions

Any legal description provided to Tree Logic Pty. Ltd. is assumed to be correct. Any titles and ownerships to any property are assumed to be correct. No responsibility is assumed for matters outside the consultant's control.

Tree Logic Pty. Ltd. assumes that any property or project is not in violation of any applicable codes, ordinances, statutes or other local, state or federal government regulations.

Tree Logic Pty. Ltd. has taken care to obtain all information from reliable sources. All data has been verified insofar as possible; however Tree Logic can neither guarantee nor be responsible for the accuracy of the information provided by others not directly under Tree Logic's control.

No Tree Logic employee shall be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.

Loss of this report or alteration of any part of this report not undertaken by Tree Logic Pty. Ltd. invalidates the entire report.

Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the client or their directed representatives, without the prior consent of the Tree Logic Pty. Ltd.

This report and any values expressed herein represent the opinion of Tree Logic's consultant and Tree Logic's fee is in no way conditional upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural drawings, reports or surveys.

Unless expressed otherwise: i) Information contained in this report covers only those items that were covered in the project brief or that were examined during the assessment and reflect the condition of those items at the time of inspection; and ii) The inspection is limited to visual examination of accessible components without dissection, excavation or probing unless otherwise stipulated.

There is no warranty or guarantee, expressed or implied by Tree Logic Pty. Ltd., that the problems or deficiencies of the plants or site in question may not arise in the future.

All instructions (verbal or written) that define the scope of the report have been included in the report and all documents and other materials that the Tree Logic consultant has been instructed to consider or to take into account in preparing this report have been included or listed within the report.

To the writer's knowledge all facts, matter and all assumptions upon which the report proceeds have been stated within the body of the report and all opinion contained within the report have been fully researched and referenced and any such opinion not duly researched is based upon the writers experience and observations.