



GbLA

Appendices

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BOROONDARA
City of Harmony

Project No:19030

Project A

GbLA.COM.AU

Appendix 1 Site selection methodology

Methodology used by Council officers to generate an initial list of Boroondara parks and reserves with the greatest scope for additional tree planting.

SUMMARY

Council has GIS polygon features for assets including trees, ovals, buildings, and biodiversity zones. These assets represent 'unavailable open space' within Council Managed Land (CML) where no new trees can be planted. Council also has polygon features for Council Managed Land (CML). Subtracting the sum of the area of the 'unavailable open space' features from the CML feature that they are located within provides an indication of the 'available' space for new tree planting. Buffers were also drawn around high use assets such as seats, tables, bbqs, and pathways, to determine where space for tree planting is available near these assets.

PROCEDURE

Tool used: Arc Map 10.2.2

1. Load feature classes: Biodiversity Zones (polygon), Buildings (polygon), Ovals (polygon), Park Trees (point).
2. Draw buffers around Park Trees features (point) based on 'Canopy Width' attribute to create polygon features for Park Trees.
3. Within each CML, merge feature classes: Biodiversity Zones (polygon), Buildings (polygon), Ovals (polygon), Park Trees (polygon) to create new feature class 'Unavailable Area for Tree Planting'.
4. Calculate area (m2) of features in feature class 'Unavailable Area for Tree Planting'.
5. For each CML, subtract area (m2) of 'Unavailable Area for Tree Planting' features from CML feature to give area (m2) within CML 'available' for tree planting.
6. For each CML, calculate percentage of total CML area that is 'available' for tree planting.
7. Sort CML list by percentage (high to low).
8. Visual review of each CML, including review of aerial photography, to identify anomalies.
9. Short list CMLs for further visual review by working group.
10. Visual review of CMLs by working group.
11. Load feature classes: Drinking Fountains (point), Seats (point), Tables, (point), BBQs (point), Playgrounds (point), Paths (polyline).
12. Draw buffers (40m Playgrounds, 10m all others) around features: Drinking Fountains (point), Seats (point), Tables, (point), BBQs (point), Playgrounds (point), Paths (polyline).
13. Calculate area (m2) of intersections of features in feature class 'Unavailable Area for Tree Planting' and above buffers to give area (m2) 'available' for tree planting within each buffer.
14. For each buffer, calculate percentage of total buffer area that is 'available' for tree planting.
15. Sort buffer list by percentage (high to low).
16. Provide data to GbLA for consideration.

Appendix 2 Site priority matrix

Site Count	Reserve Name	Suburb	tree density (score range as follows - lowest density is higher priority): <50/ha = 4; >50 and <100/ha = 3; >100 and <150 = 2; >150 and < 200 = 1; > 200 = 0	% canopy cover: < 15% = 3; < 30% = 2; < 45% = 1; < 60% = 0	Urban heat index scores: 7.6-9.4 = 3; 5.8-7.6 = 2; 4.0-5.8 = 1; 2.2-4.0 = 0	Consultant's initial ranking: high = 3; high-med or med-high = 2; med = 1; low or no = 0	biodiv site; yes = 1	playground; yes = 1	shared path; yes = 1	total score (max = 16)
1	OCLP C - Willesmere Road to Spruzen Avenue	Kew East	2	3	3	3	1	0	1	13
2	Markham Reserve	Ashburton	2	3	2	3	1		1	12
3	Yarra Flats Reserve	Balwyn North	4	3	1	3				11
4	Lynden Park	Camberwell	3	2	3	2	1			11
5	OCLP N - Shenley Ground	Canterbury	3	2	2	3	1			11
6	Koonung Creek Reserve	Balwyn North	4	2	2	0	1		1	10
7	Leonis Avenue Reserve	Balwyn North	3	1	2	2	1		1	10
8	Gardiners Creek Linear Park - Burke Rd - Tooronga Road	Glen Iris	3	2	2	3				10
9	Back Creek Reserve - Denman Avenue - Somerset Road	Glen Iris	3	1	3	3				10
10	Mont Albert Park	Balwyn	4	3	2	0				9
11	Brinsley Road Reserve	Camberwell	3	3	2	0		1		9
12	Hartwell Station Reserve	Camberwell	3	2	3	1				9
13	Grovedale Park	Surrey Hills	2	1	3	1	1		1	9
14	Patterson Reserve	Hawthorn	1	2	3	2			1	9
15	Chandler Park	Kew	3	2	0	0	1	1	1	8
16	Hyde Park	Kew East	3	2	2	0			1	8
17	Pridmore Park Connect to Yarra Bank Reserve	Hawthorn	3	2	2	0		1		8
19	Harrison Reserve (High Street)	Kew	2	2	2	1		1		8
20	Winton Road Reserve	Ashburton	3	1	3	0			1	8
21	Columba Street Reserve	Balwyn North	2	2	2	0	1		1	8
22	Gardiners Creek Linear Park - Tooronga Rd - Toorak Road	Hawthorn East	1	1	2	3			1	8
23	OCLP G - Normanby Road to Argyle Road	Kew	3	3	0	0		1		7
25	OCLP D - Spruzen Avenue to Belford Road	Kew East	1	1	2	3				7
26	OCLP A - Princess Street to Peel Street	Kew	1	0	3	3				7
27	OCLP F - High Street to Normanby Road	Kew East	0	0	3	3			1	7
28	King Street Chain - Naroo Street Reserve	Balwyn North	1	1	3	1				6
29	Kate Campbell Reserve	Kew	1	1	2	2				6
30	South Surrey Park	Surrey Hills	2	0	0	3				5

Appendix 2 sets out the list of 30 priority sites according to:

- Existing tree density.
- Existing % canopy cover.
- Urban Heat Index.
- GbLA initial ranking.
- Biodiversity site.
- Playground.
- Shared Path.

Appendix 3 Soil test report



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18 February 2020

Attention: Annette Warner

ANALYSIS OF SOIL SAMPLES BOROONDARA CANOPY RESTORATION PROGRAM

Eleven (11) soil samples were collected from representative areas in various locations within the Boroondara City Council for full nutrient analysis. The areas tested and sampled are intended to contain plantings of native trees/vegetation primarily around parks.

The samples collected via soil coring were combined into a composite sample for each of the areas requested. In addition to the soil chemical testing, a soil texture test was also undertaken for each of the samples collected. This is due to the large size of some of the areas sampled, as well as the fact that all of the samples collected are of a fine texture and are therefore highly likely to drain at a slow rate.

RESULTS

The nutrient results can be found attached at the end of the report in separate format.

COMMENTS

Sample: Lynden Park

- The sample has a slightly acidic pH level which is of no concern currently.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus levels are adequate and will support the growth of native trees.
- Potassium is low and needs to be increased.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Koonung Creek Reserve

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts are adequate and of no concern.
- Phosphorus is within the ideal range for turf grasses and is of no concern for native planted areas.
- Potassium is high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Hyde Park

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus levels are adequate and will support the growth of native trees.
- Potassium is quite high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted. Boron is also high but not of concern currently.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Chandler Park

- The sample has a moderately acidic pH level which is needs to be ameliorated.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Pridmore Park

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is quite high for areas that will be planted with native trees. Avoid adding phosphorus fertilisers and amendments to this area.
- Potassium is high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels most trace elements excluding chloride and sulphur. At this pH this should be of no concern to the suitability of this material.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Columba Street Reserve

- The sample has a very strongly acidic pH level which needs to be ameliorated.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is high and of no concerns.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: South Surrey Park

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is low and needs to be increased.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese and iron, indicating that this soil profile is likely waterlogged and compacted.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Kate Campbell Reserve

- The sample has a moderately acidic pH level which needs to be ameliorated.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese, boron and iron, indicating that this soil profile is likely waterlogged and compacted. At this pH these high levels are unlikely to cause toxicity.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: Markham Reserve

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts in the sample are adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is high and of no concern.
- Calcium is adequate while magnesium is high. Neither element is of concern currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern currently.
- The sample has very high levels of zinc, manganese, boron and iron, indicating that this soil profile is likely waterlogged and compacted. At this pH these high levels are unlikely to cause toxicity.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: OCLPG – Normanby Road to Argyle Road (Kew)

- The sample has a slightly acidic pH level which is of no concern.
- The level of Total Salts in the sample is adequate and of no concern.
- Phosphorus is adequate for areas which will be planted with native trees.
- Potassium is high and of no concern.
- Both calcium and magnesium are high and require no adjustment.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern.
- The sample has very high levels of zinc, manganese, boron and iron, indicating that this soil profile is likely waterlogged and compacted. At this pH these high levels are unlikely to cause toxicity.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

Sample: OCLPF – High Street to Normanby Road (Kew East)

- The sample has a moderately acidic pH level which is of no concern.
- The level of Total Salts in the sample are adequate and of no concern.
- Phosphorus within the ideal range for turf scenarios and is of no concern to areas which will be planted with native trees.
- Potassium is high and of no concern currently.
- Calcium is adequate while magnesium is high. Neither element requires amending currently.
- The CEC of this sample is adequate and indicates that the soil will have no issues retaining nutrients.
- Sodium is below the threshold and of no concern.
- The sample has very high levels of zinc, manganese, boron and iron, indicating that this soil profile is likely waterlogged and compacted. At this pH these high levels are unlikely to cause toxicity.
- The organic carbon levels are high for turf scenarios but of no concern for planted areas.

RECOMMENDATIONS

Please see the attached recommendation sheet containing all recommended amendments for the samples tested.

In addition to the recommended materials:

- Ensure adequate irrigation is applied at and following planting to support plant growth and establishment.
- Once established, during periods of low rainfall apply deep, infrequent irrigation to promote and direct root growth downwards through the profile.

SOIL TEXTURE TESTS

Each of the samples collected have been tested for soil texture and the results are as follows:

	Lynden Park	Koonung Creek Res	Hyde Park	Chandler Park	Pridmore Park	Columba Street Res
Texture	Clay loam	Clay loam	Sandy clay	Clay loam	Clay loam	Clay loam
Sample No	STC - 9737	STC - 9738	STC - 9739	STC - 9740	STC - 9741	STC - 9742

	South Surrey Park	Kate Campbell Res	Markham Res	OCLPG	OCLPF
Texture	Clay loam	Clay loam	Clay loam	Clay loam	Clay loam
Sample No	STC - 9743	STC - 9744	STC - 9745	STC - 9746	STC - 9747

COMMENTS

- Each of the materials tested were sampled from passive landscape areas which are intended to be planted with native plants.
- Given the slow draining nature of these samples, ensure the soil is placed on a slope to allow for adequate water movement.

Yours faithfully,



Adrian Knapping - Agronomist.

Soil Nutrient Analysis - Results

GBLA

14 February 2020

	Ideal Range	Lynden Park	Koonung Creek Res	Hyde Park	Chandler Park	Pridmore Park	Columba Street Res	South Surrey Park	Kate Campbell Res	Markham Res
pH (water 1:5)	6.0 - 7.0	6.1	6.1	6.2	5.9	6.2	4.8	6.5	5.9	6.6
Electrical Conductivity (mS/cm) (water 1:5)	< 0.27	0.07	0.13	0.11	0.09	0.15	0.21	0.11	0.12	0.12
Total salts (ppm) (water 1:5)	< 800	208	386	327	267	446	624	327	356	356
Phosphorus (Colwell) (ppm)	50 - 80	31	66	34	23	98	18	18	36	31
Exchangeable cations										
Potassium (meq /100g)	0.5 - 0.6	0.4	0.7	0.9	0.7	1.5	0.7	0.5	1.4	1.0
Calcium (meq /100g)	> 3.5	5.2	6.1	6.5	4.5	8.0	3.6	8.9	8.3	6.7
Magnesium (meq /100g)	0.8 - 1.0	1.7	1.9	2.3	2.1	2.6	1.3	1.9	3.6	2.3
Calcium Magnesium Ratio	2 - 5	3.1	3.2	2.8	2.1	3.1	2.8	4.7	2.3	2.9
Sum of Cations (CEC) (meq%)	> 5	7.5	8.9	9.8	7.5	12.4	6.6	11.5	13.5	10.1
% of CEC (Base Saturation)										
Potassium (%)	> 10	6	7	9	9	12	11	4	10	10
Calcium (%)	60 - 70	69	68	66	60	65	55	77	61	66
Magnesium (%)	18 - 23	23	21	23	28	21	20	16	27	23
Sodium (%)	< 5	1	2	1	1	2	4	1	1	0
Trace Elements										
Sulphur (ppm)	10 - 50	4	5	5	5	7	9	6	6	7
Zinc (ppm)	1 - 10	35.0	13.0	37.0	12.0	72.0	13.0	21.0	32.0	42.0
Copper (ppm)	1 - 10	1.7	6.2	1.6	1.2	21.0	1.2	1.5	1.8	2.2
Manganese (ppm)	1 - 4	5.1	10.0	8.0	9.8	7.6	65.0	6.0	13.0	5.5
Iron (ppm)	10 - 75	400	410	250	430	260	360	310	300	230
Boron (ppm)	0.3 - 1.0	1.0	0.9	1.4	0.8	1.7	0.8	1.0	1.4	1.1
Chloride (ppm)	< 100	15	24	27	29	34	66	28	25	27
Organic carbon (%)	1.2 - 2.5	3.0	4.1	4.0	3.8	5.4	5.2	3.9	4.1	3.5
Sample Number		22220777	22220778	22220779	22220780	22220781	22220782	22220783	22220784	22220785



low	
medium	
high	

DISCLAIMER: Results are based on the analysis of the samples as received. Because of the variability of the sampling procedures, environmental and managerial conditions, the Company does not accept liability for lack of performance based on these recommendations. Recommendations are made in good faith based on the sample and information supplied.

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BOROONDARA
City of Harmony

Project No:19030

Project A

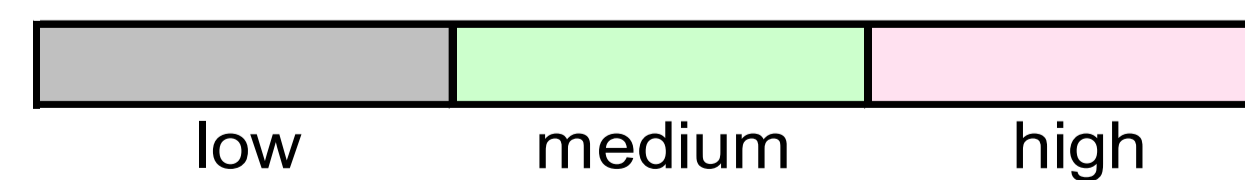
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Soil Nutrient Analysis - Results

GBLA

17 February 2020

	Ideal Range	OCLPG	OCLPF		
pH (water 1:5)	6.0 - 7.0	6.7	5.9		
Electrical Conductivity (mS/cm) (water 1:5)	< 0.27	0.19	0.14		
Total salts (ppm) (water 1:5)	< 800	564	416		
Phosphorus (Colwell) (ppm)	50 - 80	41	69		
Exchangeable cations					
Potassium (meq /100g)	0.5 - 0.6	1.3	1.3		
Calcium (meq /100g)	> 3.5	15.0	8.6		
Magnesium (meq /100g)	0.8 - 1.0	4.6	2.9		
Calcium Magnesium Ratio	2 - 5	3.3	3.0		
Sum of Cations (CEC) (meq%)	> 5	21.1	13.0		
% of CEC (Base Saturation)					
Potassium (%)	> 10	6	10		
Calcium (%)	60 - 70	71	66		
Magnesium (%)	18 - 23	22	22		
Sodium (%)	< 5	1	1		
Trace Elements					
Sulphur (ppm)	10 - 50	15	7		
Zinc (ppm)	1 - 10	43.0	59.0		
Copper (ppm)	1 - 10	2.4	2.5		
Manganese (ppm)	1 - 4	11.0	12.0		
Iron (ppm)	10 - 75	280	280		
Boron (ppm)	0.3 - 1.0	1.8	1.7		
Chloride (ppm)	< 100	37	24		
Organic carbon (%)	1.2 - 2.5	5.8	5.8		
Sample Number		22220797	22220798		



Soil Nutrient Analysis - Recommendations

Boroondara Canopy Restoration - GbLA

February 2020

MATERIALS (rate / 100m2)	Lynden Park	Koonung Creek Res	Hyde Park	Chandler Park	Pridmore Park	Columba Street Res	South Surrey Park	Kate Campbell Res	Markham Res
At planting, apply to the soil surface and lightly rake in the following materials:									
Agricultural Lime	-	-	-	20kg/100m ²	-	30kg/100m ²	-	20kg/100m ²	-
Potassium Sulphate	10kg/100m ²	-	-	-	-	-	10kg/100m ²	-	-
NPK 20:0:16 or similar (must be phosphorus free)	✓	✓	✓	✓	✓	✓	✓	✓	✓



NOTE: Multiple applications of a product should be separated by 4 to 6 weeks. Ensure all products are well watered in or applied prior to rainfall.

SportsTurf Consultants (Aust.) Pty Ltd

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Soil Nutrient Analysis - Recommendations

Boroondara Canopy Restoration - GbLA

February 2020

MATERIALS (rate / 100m2)	OCLPG	OCLPF							
At planting, apply to the soil surface and lightly rake in the following materials:									
Agricultural Lime	-	20kg/100m ²							
Potassium Sulphate	-	-							
NPK 20:0:16 or similar (must be phosphorus free)	✓	✓							



NOTE: Multiple applications of a product should be separated by 4 to 6 weeks. Ensure all products are well watered in or applied prior to rainfall.

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