



Landscape Design & Horticultural Consultancy

**LOT 2 Cnr NELSON ROAD & McHALE WAY**  
**NELSON**  
**TREE IMPACT ASSESSMENT**

JANUARY 2009

PREPARED BY:

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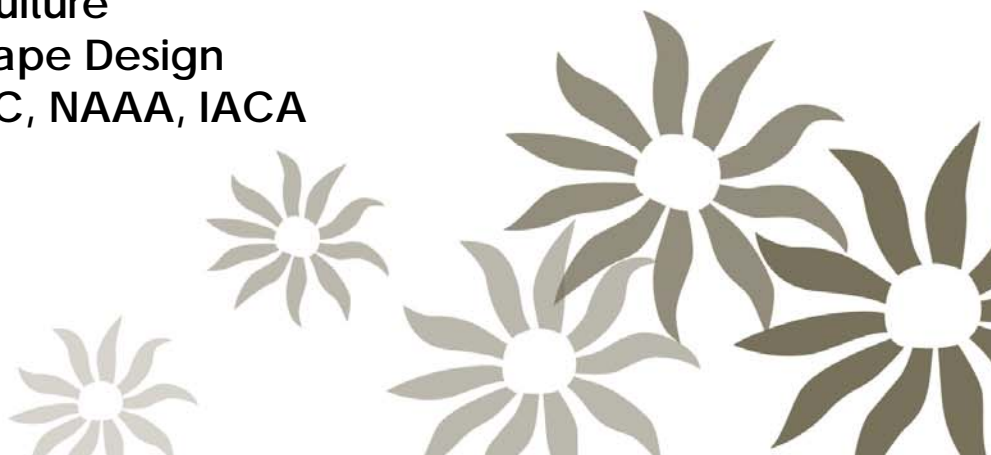
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## Executive Summary

This report was commissioned by Shree Swaminarayan Temple (Sydney) Inc. to accompany their Development Application within the Hawkesbury Council area at Lot 2 Cnr Nelson Road and McHale Way, Nelson. An assessment was made of seventeen trees in relation to the proposed development.

This report collates and presents information collected by Adrian Swain on the 20/09/07. The data collected is located at **6. Tree Survey Table** (page 8) also see **7. Tree Survey Table Notes** (page 10) for notes relating to tree survey table. Data collected includes:

- Genus, Species, Common Name;
- Height, Width, DBH (Diameter at Breast Height);
- Age and Health;
- Amenity or Ecological Value;
- Crown Form and Condition;
- Visible Defects or Evidence of Wounding.

We surveyed 17 trees, across the site and generally the vegetation of the site has a remnant native tree canopy, with a native and exotic shrub midstorey and a native and exotic groundcover layer. The trees are show in **8. Tree Location Plan** (page 13).

The proposed development will involve the construction of a Multi Use Hall with associated driveways, carparking, gardens, turf, paths, paving and retaining walls. This will involve regrading site levels through excavation, cutting and filling of soil on site. Refer to **8. Tree Location Plan** (page 13) for details of the site works.

In consideration of the data collected recommendations are given in regards to the likely impact that the proposed development will have on each tree, and the tree protection measures required to reduce these impacts. This report specifically recommends:

- Protect and retain trees 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17 caution must me taken to not sever woody structural roots greater than 50mm. See tree protection notes.
- For general tree protection notes see **9. General Tree Protection Notes** (page 15).

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## 1. Introduction

This report was commissioned by Shree Swaminarayan Temple (Sydney) Inc. to accompany their Development Application within the Hawkesbury Council area at Lot 2 Cnr Nelson Road and McHale Way, Nelson. An assessment was made of seventeen trees in relation to the proposed development.

The aim of this report is to provide an assessment of seventeen trees on site for the purpose of determining the impacts of the proposed development. This report collates and presents information collected by Adrian Swain on the 20/09/07.

## 2. Methodology

### 2.1. Site Inspection

A visual inspection of the tree/s' was performed from ground level without excavation, climbing, drilling, pathology or soil testing. Data collected includes:

- Genus, Species, Common Name;
- Height, Width, DBH (Diameter at Breast Height);
- Age and Health;
- Amenity or Ecological Value;
- Crown Form and Condition;
- Visible Defects or Evidence of Wounding.

The documented, observations, results, recommendations and conclusions given may vary after the site visit. Liability will not be accepted for damage to person or property as a result of natural processes, unforeseeable actions or occurrences.

### 2.2. Measurement

Tree locations are supplied on the client supplied survey plan or triangulated using a measuring tape. Diameter at breast height (DBH) is measured using a diameter tape. Height is measured using a clinometer. Canopy width is measured using a measuring tape.

Observations recorded for trees located within adjacent properties have been made without entering that property. As a result measurements for these trees are estimates. Similarly these trees were not subject to a complete visual inspection and defects or abnormalities may be present but not recorded.

### 2.3. Recording Data

Data collected is collated in the tree survey table located at **6. Tree Survey Table** (page 8). The tree survey table contains abbreviations for terms describing the trees characteristics; explanatory notes pertaining to these are located at **7. Tree Survey Table Notes** (page 10). The physical data for tree locations, crown width and DBH is schematically described in **8. Tree Location Plan** (page 13).

## 2.4. Reference Documents

The report was written in coordination with:

- Architectural Site Plan prepared by Consulting Drafting Services Revision 3 05/10/07.
- Survey Plan prepared by Murray Hastings Revision 13/12/06.

## 2.5. Council Tree Preservation Order

The Baulkham Hills Shire Council tree preservation order defines a tree as being "a perennial plant with a self supporting woody stem which has:

- a. A height of more than 5 metres; or,
- b. A spread of more than 3 metres; or,
- c. With a trunk diameter of 150 millimetres or greater, measured 1 metre from the base of the tree."

Noxious weeds, listed nuisance tree species and trees grown for edible fruit are exempt from this preservation order.

# 3. Observations

## 3.1. Site Description

The site is a single rural block located at Lot 2 Cnr Nelson Road and McHale Way, Nelson. It contains no built improvements and is largely covered by exotic pasture grasses and patches of Black berry *Rubus fruticosus*. There is a single area of degraded remnant vegetation which is the subject of this report. The site has a general southerly aspect.

## 3.2. Soil Landscape Map

Generally the landscape is characterised by gently undulating rises on Wianamatta Group shales and Hawkesbury shale. There is local relief to 30 m, slope gradients are usually <5%. Additionally there are broad rounded crests and ridges with gently inclined slopes <sup>2</sup>.

The soils in this area are from the Blacktown soil landscape group <sup>2</sup>. They are generally shallow to moderately deep <100 cm Red and Brown Podzolic Soils on crests, upper slopes and well-drained areas; deep 150-300 cm Yellow Podzolic Soils and Soloths on lower slopes and in areas of poor drainage.

These soils are generally limited by moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage. The critical soil characteristics of this soil type for trees growing on this site include poor drainage. <sup>2</sup>

## 3.3. Native Vegetation Map

The original native vegetation of this area is characterised by the Shale Plains Woodland ecological community. Shale Plains Woodland is generally dominated by *Eucalyptus moluccana* and *E. tereticornis* with *E. crebra*, *E. eugenioides* and *Corymbia maculata*

occurring less frequently. These species often form a separate small tree stratum, occasionally including other species such as *Exocarpus cupressiformis*, *Acacia parramattensis subsp. parramattensis* and *Acacia decurrens*.<sup>10, 11</sup>

A shrub stratum is usually present and dominated by *Bursaria spinosa*. Common ground stratum species include *Dichondra repens*, *Aristida vagans*, *Microlaena stipoides var. stipoides*, *Themeda australis*, *Brunoniella australis*, *Desmodium varians*, *Opercularia diphylla*, *Wahlenbergia gracilis* and *Dichelachne micrantha*.

Shale Plains Woodland is the most widely distributed community on the Cumberland Plain however it is listed as endangered under the Threatened Species Conservation Act 1995<sup>10, 11</sup>. There is one degraded patch of remnant vegetation from this community located on the site. This patch appears to be largely unaffected by the works although they are immediately adjacent.

### 3.4. Summary of tree health and condition

We surveyed 17 trees, across the site and generally the vegetation of the site has a remnant native tree canopy, with a native and exotic shrub midstorey and a native and exotic groundcover layer. The trees are show in **8. Tree Location Plan** (page 13).

No trees are located within the building footprint, 4 trees, are located adjacent to the carparking area associated with the proposed development this will cause a minor disturbance and 13 trees will be unaffected by the development.

## 4. Discussion

### 4.1. Summary of Proposed Development

The proposed development will involve the construction of a Multi Use Hall with associated driveways, carparking, gardens, turf, paths, paving and retaining walls. This will involve regrading site levels through excavation, cutting and filling of soil on site. Refer to **8. Tree Location Plan** (page 13) for details of the site works.

### 4.2. Trees adjacent to the development footprint

- Tree's 6, 7, 8 and 9 are located 6.0m, 4.3m, 6.0m and 6.2m, respectively, from the proposed base of the fill batter associated with the construction of the carparking area. This proposed construction would provide a minor disturbance to the PRZ of these trees. Providing that the installation of fill and construction activity is excluded from the areas beneath the drip line of these trees they will not be affected.

## 5. Recommendations

### 5.1. Assumptions

Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However Adrian Swain - Consulting Arborist can neither

guarantee nor be responsible for the accuracy of information provided by others. Unless stated otherwise:

- Information contained in this report covers only the tree that was examined and reflects the health and structure of the tree at the time of inspection; and,
- The inspection was limited to visual examination of the subject tree without dissection, excavation, probing or coring; and
- There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

## 5.2. Recommendations

- Protect and retain trees 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17. Caution must be taken to not sever woody structural roots greater than 50mm. See tree protection notes.
- For general tree protection notes see **9. General Tree Protection Notes** (page 15).

## 6. Tree Survey Table

NO#	Genus	Species	Common Name	Height	Spread	DBH	Age	Health	Am	Eco	Crown	Form	Defects	8	12	Development Impact	Comments
1	Eucalyptus	molucanna	Grey Box	17	7	360	M	G	M	H	C D	U S	I	2880	4320	No impact	Codominant @ 1.2m
2	Eucalyptus	molucanna	Grey Box	18	10	280/340	M	G	M	H	D	U S	I	2480	3720	No impact	Codominant @ 0.4m
3	Eucalyptus	molucanna	Grey Box	16	6	300	M	G	M	H	S	U S L	-	2400	3600	No impact	Crown shy
4	Eucalyptus	molucanna	Grey Box	16	8	380	M	G	M	H	C D	U S	-	3040	4560	No impact	-
5	Eucalyptus	molucanna	Grey Box	17	10	430	M	G	M	H	D	U S	-	3440	5160	No impact	-
6	Eucalyptus	molucanna	Grey Box	16	9	370	M	G	M	H	D	U S	-	2960	4440	6.0m from carpark fill	-
7	Eucalyptus	molucanna	Grey Box	8	5	250	J	G	M	H	S	U S	-	2000	3000	4.3m from carpark fill	-
8	Eucalyptus	molucanna	Grey Box	17	9	320/360	M	G	M	H	D	U S	-	2720	4080	6.0m from carpark fill	-
9	Eucalyptus	molucanna	Grey Box	19	6	280	S M	G	M	H	C D	U	I	2240	3360	6.2m from carpark fill	Codominant @ base
10	Eucalyptus	molucanna	Grey Box	19	6	280	S M	G	M	H	C D	U	-	2240	3360	No impact	-
11	Eucalyptus	molucanna	Grey Box	16	6	280	S M	G	M	H	C D	U	-	2240	3360	No impact	-
12	Eucalyptus	molucanna	Grey Box	16	6	280	S M	G	M	H	C D	U	-	2240	3360	No impact	-
13	Eucalyptus	molucanna	Grey Box	16	6	280	S M	G	M	H	C D	U	-	2240	3360	No impact	-
14	Eucalyptus	molucanna	Grey Box	15	7	200/200	J	G	M	H	C D	U	-	2720	4080	No impact	Basal multi
15	Eucalyptus	molucanna	Grey Box	15	7	280/100	S M	G	M	H	C D	U	-	1520	2280	No impact	Basal multi
16	Eucalyptus	molucanna	Grey Box	17	11	460	M	G	M	H	D	U S	I	3680	5520	No impact	Codominant @ 1.7m
17	Eucalyptus	molucanna	Grey Box	8	5	120	J	G	M	H	C D	U	-	960	1440	No impact	-

## 7. Tree Survey Table Notes

### 7.1. Genus, Species and Common Name

The botanical and common name of each tree is identified and recorded. Occasionally the exact species name is unknown, *sp.* is recorded to indicate this.

### 7.2. Height, Spread and DBH

- The trees height and spread is recorded in metres.
- The tree **DBH** is recorded in millimetres. DBH is an abbreviation of Diameter (of the trunk) measured at Breast Height (or 1.2m from the base of the trunk).

### 7.3. Age

The age class of each tree is estimated as either:

- **J** – Juvenile, a young sapling, easily replaced from nursery stock.
- **SM** - Semi Mature, a tree that has not grown to mature size.
- **M** - Mature, a tree that has reached mature size and will slowly increase in size over time.
- **OM** - Over Mature, a tree that has been mature for a long period and is beginning to display signs of decline, ie. large dead branches.
- **S** - Senescent, an over mature tree that is now in decline.

### 7.4. Health

The trees health is recorded as a measurement of:

- **P** - Poor the tree may have large areas of crown dieback, and/or many epicormic shoots, and/or large areas of decay, and/or reduced new growth at branch tips. These trees have been stressed for a long time, remediation of the growing environment would not return the tree to good health.
- **Avg** - Average Health the tree appears stressed and have some crown dieback, and/or a few epicormic shoots, and/or some dead wood in the crown and some new growth at branch tips. These trees may benefit from remediation of the growing environment to reduce stress and return it to good health.
- **G** - Good the tree does not appear stressed with no excessive dieback, insect infestation, decay, dead wood or epicormic shoots.

### 7.5. Amenity Value

Amenity value is a subjective measurement based on the trees contribution to the landscape, it may be based on the trees visual form, however it also includes non visual attributes such as provision of shade for a seat, screening of poor views or for privacy, or it has historical significance. The amenity value is recorded as:

- **H** - High, the trees form is an excellent example of its species and it makes a great specimen and/or it has other attributes such screening, or is historical significance. These trees are visually prominent and valuable to the community or public domain.

- **M** - Medium, the tree may have an altered form and/or it has attributes that provides amenity to local residents only.
- **L** - Low, the tree is not a good specimen and it does not provide substantial benefit to local residents or the community.

## 7.6. Ecological Value

Ecological value is a measurement of the trees contribution to the environment. It is determined by the trees area of origin, its potential to provide habitat to native fauna and its potential to become an environmental pest. The ecological value is recorded as:

- **H** - High, the tree is locally native.
- **M** - Medium the tree is native but not locally native and/or it has habitat value for native fauna.
- **L** - Low, the tree is not native and/or it may be a listed nuisance or weed species.

## 7.7. Crown

The crown of each tree is assessed and recorded as either:

- **S** - Suppressed, the crown is located beneath another larger crown and is leaning away (Crown Shy)
- **C** - Codominant, the crown is adjacent to another crown of similar size, their crown areas may appear join.
- **D** - Dominant, the crown is above other lower crowns.
- **E** - Emergent, the crown emerges from a lower canopy formed by other dominant or codominant crowns.

## 7.8. Form

The form of each tree is assessed and recorded as either one or a combination of several of the below terms may be used to describe the trees form; (**U**) Upright, (**B**) Broad, (**C**) Conical, (**Sh**) Shrub, (**V**) Vase, (**D**) Dome, (**P**) Palm, (**S**) Spreading, (**L**) Leaning or (**BM**) Basal Multi Trunked..

## 7.9. Defects

The presence of one or a combination of several defects is recorded (**W**) Wounds, (**D**) Decay, (**F**) Fungus, (**B**) Bulges, (**FB**) Fibre Buckling, (**C**) Cracks, (**S**) Splits, (**H**) Hollows, (**DB**) Die Back, (**E**) Epicormic shoots, (**DW**) Dead Wood, (**I**) Inclusions, (**CA**) Cavities, (**PF**) Previous Failure, (**R**) Root Damage, (**P**) Pests and diseases.

## 7.10. Development Impact

The successful retention of trees on construction sites is dependant on the adequate allocation and management of the space above, below and around trees to be retained.

The PRZ (Primary Root Zone) is a circular area with a radius measured by multiplying the DBH by twelve (12), or a circular area the size of the trees drip line whichever is greater. This area contains the main structural woody roots and excavation, filling compaction or other disturbance should not occur in this area.

The PRZ is used to identify the minimum area required for the safe retention of a given tree. This calculation is derived from the British Standard 5837 Trees in Relation to Construction (2005). An incursion to 30% of the PRZ on a single side is potentially acceptable if no other option is available. This may vary depending on the individual trees health, vigour and ability to withstand disturbance.

The trunk and canopy of tree/s' to be retained must be protected to ensure the trunk and branches are not damaged during construction. The removal of bark and / or branches allows the potential ingress of micro organisms which may cause decay. Similarly the removal of bark restricts the trees ability to distribute water, mineral ions and glucose.

It is essential to prevent the disturbance of the soil beneath the drip line of each tree, because this is the area where oxygen, water and mineral ions are absorbed by tree roots. Oxygen, water and mineral ions are essential for healthy plant growth. If soil becomes compacted, the ability of roots to function correctly is greatly reduced. Similarly the removal or damage of roots will reduce the ability of roots to function correctly. Woody roots provide stability for the tree and they also transport nutrients to the leaves.

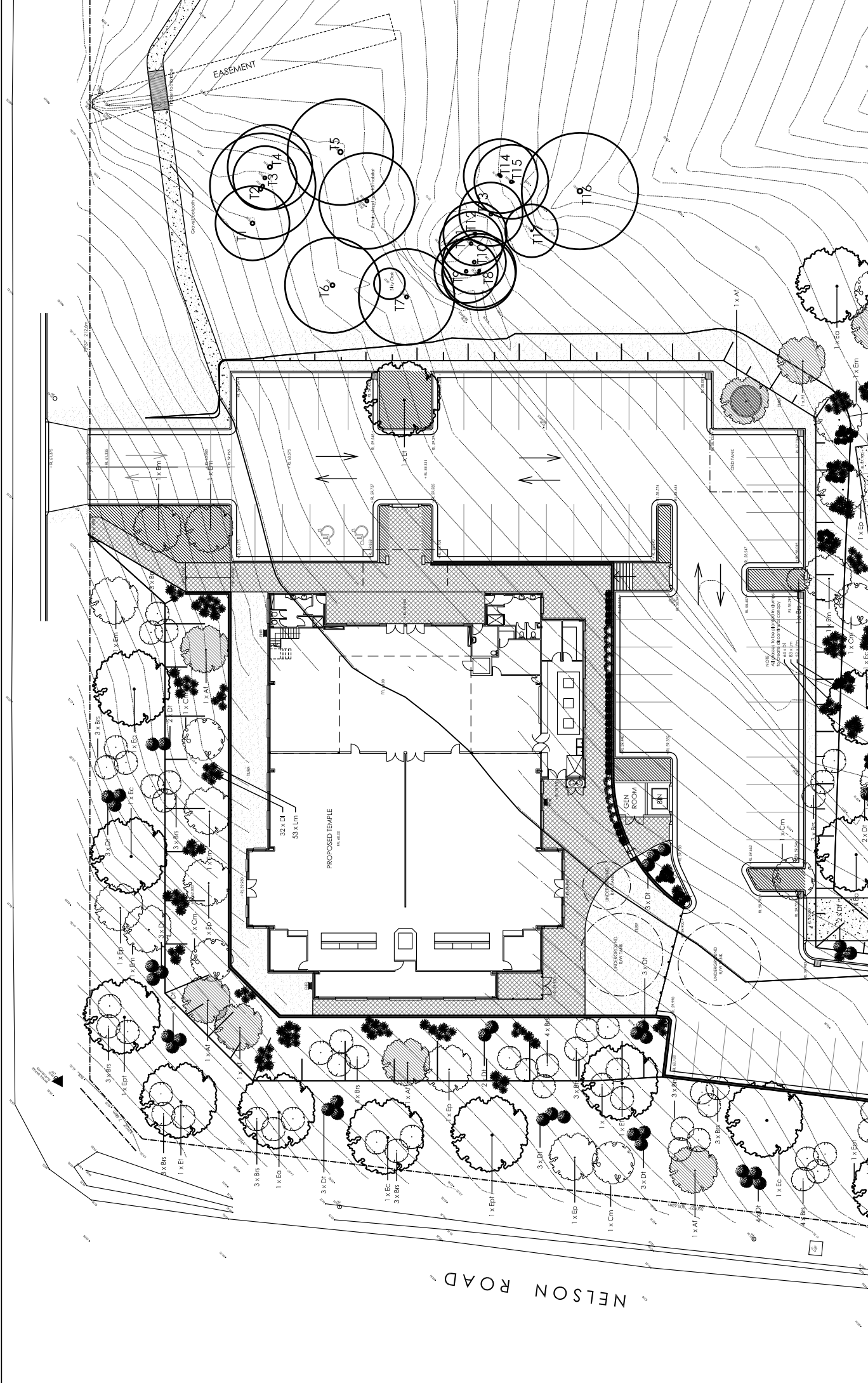
The potential implications of removing or damaging roots are threefold:

1. The risk of whole tree failure is increased as tree roots anchor and stabilise the tree. Woody roots are developed to assist in the support of the tree in prevailing wind, with these roots removed wind throw may occur, which would result in the mass failure of the tree.
2. The ability of the tree to absorb and transfer the essential nutrients, oxygen and water from the soil to the leaves is greatly affected. This will place the tree under stress and reduce the trees ability to photosynthesise, and in turn cause the tree to use up stored energy reserves. These energy reserves are used to fight infection, insect attack, new growth, maintenance of existing tissues and also for healing wounds. Once energy reserves become depleted a tree is much more susceptible to drought, disease and pest attack.
3. Open wounds are sites by which decay causing pathogens can enter the tree. The proposal will create many sites where these pathogens may enter, whilst the effect of decay may not be immediately apparent, the long term health and structure of the tree will be compromised.

## **7.11. Comments**

Comments generally relate to the suitability for retention. The comments allow for a brief notation of other factors relevant to the assessment of the tree.

## 8. Tree Location Plan



PROJECT		NEW MULTI PURPOSE HALL	
DRAWING		TREE LOCATION PLAN	
SCALE	DATE	TITLE	SHEET
NTS @ A3	DA	T-01	
DRAWN	CHECK	AS	DATE
AS	AS	AS	09-07-07
			REVISION
			B

ADDRESS  
**LOT 2 Cnr NELSON ROAD & McHALE WAY**  
**NELSON**

CLIENT  
**Shree Swaminarayan Temple (Sydney) Inc.**

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 7. This drawing to be performed by a suitably qualified landscape professional  
 8. For application purposes only - NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	DRAWN	CHECK	DATE
	A SUBMITTED TO CLIENT FOR COMMENT	AS	AS	12-10-07
B	SUBMITTED TO CLIENT FOR COMMENT	JB	AS	28-11-08

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 2. Verify all measurements on site  
 3. All work to be done in accordance with the Building Code of Australia  
 4. Copyright © ecodesign. All rights reserved  
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## 9. General Tree Protection Notes

### 9.1. Tree Protection Zones (TPZ)

For all trees to be retained a TPZ is to be provided. The TPZ shall be an area radially measured from the centre of the trunk of the retained tree enclosing the PRZ or the canopy dripline (which ever is greater). The TPZ primarily shall nominally protect the root zone however the canopy shall also be protected from damage or injury. The Project Arborist shall approve the extent of the TPZ.

The TPZ shall be mulched to a depth of 75mm with an approved organic mulch. In the TPZ the following activities shall be excluded:

- Excavation, compaction or disturbance of the existing soil.
- The movement or storage of materials, waste or fill.
- Movement or storage of plant, machinery, equipment or vehicles.
- Any activity likely to damage the trunk, crown or root system.
- Scaffolding.

### 9.2. Tree Protection Fencing

Prior to site establishment, tree protection fencing shall be installed to protect trees to be retained. Tree protection fencing shall be maintained entire for the duration of the construction program.

Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ.
- Cyclone chain link wire fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist
- Installed prior to the commencement of the works.
- Prominently signposted with 300mm x 450mm boards stating **"NO ACCESS TO THIS AREA - TREE PROTECTION ZONE CONTACT PROJECT ARBORIST 0407 006 852"**.

### 9.3. Trunk and Root Zone Protection

Additional measures may be required in addition to tree protection fencing may be required. These protection measures are required as directed by the Project Arborist to protect the tree from potential risk of damage.

Supplementary watering shall be provided in dry periods to reduce post-construction stress, particularly to those trees which have incurred root pruning.

The Project Arborist shall be consulted if there is risk of damage to a retained tree. The Project Arborist may require:

- A 50mm layer of approved mulch to be installed to the TPZ.
- A temporary drip irrigation system to be installed to the TPZ.
- Additional root protection to be installed.
- Additional trunk and branch protection to be installed.

## **9.4. Tree Damage**

In the event of damage to a tree or the TPZ of a tree to be retained the Project Arborist shall be engaged to inspect and provide advice on remedial action. This should be implemented as soon as practicable and certified by the Project Arborist.

## **9.5. Excavation within the TPZ**

Excavation within the TPZ shall be avoided. All care shall be undertaken to preserve tree root systems. Excavation within the canopy drip line or PRZ shall subject to the approval and supervision of the Project Arborist. Excavation shall be executed by hand to avoid damage to roots.

If excavation within the TPZ is required a root mapping exercise is to be undertaken and certified by the Project Arborist. Root mapping shall be undertaken by either ground penetrating radar (GPR), air spade, water laser or by hand excavation. The purpose shall be to locate woody structural roots greater than 50mm in diameter.

Where roots 50mm dia. or greater are encountered, alternative construction method shall be considered to ensure roots are not severed. Adequate allowance must also be made for future radial root growth. In paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

If there is no avoiding placing services through the PRZ excavate outside the PRZ and underbore below the root ball of the tree as directed by the Arborist.

## **9.6. Fill**

All fill material to be placed within the TPZ should be approved by Arborist and equal to 5-7mm Round River Pea Gravel to provide aeration and percolation to the root zone. Otherwise no fill should be placed within the TPZ of trees to be retained.

## **9.7. Pavements**

Proposed paved areas within the TPZ should be placed on or above grade to minimise excavation, and avoid root severance and/or damage. Pavements should be permeable or avoided otherwise.

## **9.8. Pruning**

All pruning work required (including root pruning) should be in accordance with Australian Standard No 4373-1996 - Pruning of Amenity Trees.

If required, roots should be severed with clean sharp implement flush with the face of the excavation and maintained in a moist condition. Root pruning shall be performed under the supervision of the Project Arborist.

## **9.9. Tree Removal**

Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry (1998).

Care shall be taken to avoid damage to trees during the felling operation. Stumps shall be grubbed-out using a mechanical stump grinder to a minimum depth of 300mm without damage to other retained root systems.

### **9.10. Post Construction Maintenance**

In the event of any tree deteriorating in health after the construction period, the Project Arborist shall be engaged to provide advice on any remedial action. Remedial action shall be implemented as soon as practicable and certified by the Project Arborist.

Tree protection fencing with additional trunk and root protection shall be removed following completion of construction. The mulch layer in the TPZ shall be retained and replenished where required to maintain a 75mm thickness.

## 10. TreeAZ Categories

### Z **Trees not worthy of being a material constraint:** Not suitable for retention for more than 10 years

**Small, young or regularly pruned trees/hedges:** Trees that could be easily/realistically replaced in the short term.

Z1	Small or young
Z2	Formal hedges and trees regularly pruned to restrict size
	<b>High risk:</b> Trees that would be removed within 10 years because of declining health or poor structural condition.
Z3	Dead, dying, diseased or declining
Z4	Severe damage/structural defects that cannot be properly addressed by remedial care including cavities, decay, included bark, wounds and excessively unbalanced
Z5	Present or future instability because of poor anchorage or increased exposure
	<b>Good management:</b> Trees that would be severely pruned or removed within 10 years through responsible management.
Z6	Severe damage/structural defects that can be temporarily addressed by remedial care including cavities, decay, included bark, wounds and excessively unbalanced
Z7	Poor trees with no realistic potential to improve
Z8	Adversely interfering with adjacent trees
Z9	Overgrown hedge or row of trees vulnerable to adverse weather events
Z10	Causing unreasonable inconvenience to existing properties (light, dominance, debris, interference, etc)
Z11	Causing damage to existing structures
Z12	Unacceptably expensive to retain

### A **Trees worthy of being a material constraint:** Suitable for retention for more than 10 years

**Note:** This excludes small and young trees.

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by limited remedial care or work to adjacent trees
A3	Special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may have legislative protection for ecological reasons (Advisory and will require specialist investigation)

#### NOTE:

Trees that are very good examples of category A can be noted as AA and trees that are the worst examples of category Z can be noted as ZZ summarised as follows:-

<b>AA</b>	<b>Most suitable for retention</b>
<b>A</b>	<b>Suitable for retention</b>
<b>Z</b>	<b>Not particularly suitable for retention</b>
<b>ZZ</b>	<b>Unsuitable for retention</b>

TreeAZ was designed by Barrell Tree Consultancy ([www.barrelltreecare.co.uk](http://www.barrelltreecare.co.uk)) and is reproduced with their permission

## 11. References

- <sup>1</sup> **AS 4373 - 1996 Pruning of Amenity Trees**; Standards Australia.
- <sup>2</sup> Bannerman, S.M., Hazelton, P.A.; **Soil Landscapes of the Penrith 1:100 000 Sheet**; Soil Conservation Service of NSW, Sydney; 1989.
- <sup>3</sup> Barrell, J.; **Tree AZ**; <http://www.barrelltreecare.co.uk/treeaz> ; 2005.
- <sup>4</sup> Fairley, A., Moore, P.; **Native Plants of the Sydney District an Identification Guide**; New Holland; Sydney; 2002.
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