The Arborist Network

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Dear Reader,

I feel the need to respond to a number of comments made by various councillors. I have no idea how extensively these comments have been circulated so I feel the need to respond to the group as a whole, the councillors, the consulting arborists and concerned residents in order that the matters be set clarified.

Of particular concern have been the following comments.

Councillor Cook said

> *"I can assure you that the poor 'report' provided by Mr (not Sir – see below) Hartley has not served your cause well and will not alter council's resolve to move towards the bigger picture. When the assessments which we are beginning to receive of Mr Harley's [Hartley's] document become public, you will agree this was not money well invested."*

And

> *My assessment is that Mark's report was lacking, not comprehensive, not thorough, not technically proven, etc – in other words poor.*

Councillor King said

> *Your logic of "they got one thing wrong so it's likely it's all wrong" (aside from assuming that they are wrong simply because they disagree with you) is nonsensical and adds no credibility to any of your offerings, in my opinion.*

The Title

I did not use my title in this matter nor do I intend to defend its validity since I do not believe that it is relevant. Councillor Cook apologised and I have accepted his apology. Councillor Cook explained that he obtained the quote from an article published in the Daily Telegraph on the 2nd May 2004. I am very aware of the article as it was initially sent to me by my solicitor and was the basis of legal discussions at the time because the headline "Fig Expert uses Bogus Credentials" was deliberately and intentionally misleading. I am of the understanding that the article is not present in a searchable database.

Councillor Cook says that he found the article doing a Google search. I have asked him for the link but it has not been forthcoming. In the absence of any evidence to the contrary I am of the belief that this article was not found by undertaking a Google search. Perhaps you can try doing a Google search for the article and draw your own conclusions. It is interesting to note that the article is "Attachment B" of an unidentified document.

The Brief

My initial brief was to review a number of documents and reports and to determine if the information contained in the reports was correct. Upon examining the reports I discovered 3 errors that I believed significantly altered the conclusions of the reports. When I explained this to my client I was asked to prepare a short report explaining the errors in order to assist the councillors in understanding the problems.

Unlike the many of the other arborists I did not have weeks or months to prepare the report. My client requested that a report be prepared in one and a half working days. In addition my client requested that I keep the report as brief as possible in order to control costs.

Because of the limited budget and time, my report has not been a comprehensive and exhaustive assessment of the existing reports and nor was it intended to be. Likewise my report was not aimed at providing extensive technical information because it is unlikely that the public and perhaps the councillors could readily process that information.

Technical information is generally prepared for other professionals. I have no desire, nor do I see the need to. engage in detailed technical criticisms of any of the works produced by my fellow professionals. I do however believe that it is fair that I question basic assumptions and or methodologies that they use in drawing the conclusions they draw. I hope that my pointing out errors in the reports has not been seen as criticism but rather as an opportunity to ensure that the right decisions are made based on a sound and scientific approach to the issues at hand.

The importance of correct information

If incorrect data is entered into a calculation then the final result will be unreliable. Both the largely redundant SULE and QTRA both require the likelihood of failure to be considered in order to obtain the end determination. If the wrong information is used there can be no guarantee that the end result is correct.

If the concern is the Risk of Harm from these trees and you start with the belief that trees failed and this is used as a part of ongoing processes and calculations then there cannot be any certainty that the end result is correct. As Councillor King wisely points out, the answer can still be correct but this is just a fortuitous coincidence.

Error 1: The Trees Fell Over

I trust that it is obvious from the photographs below that none of the trees outside the library and art gallery failed during the winds of the 8th June 2007. I have conceded that the trees may have moved in the ground although I suspect that this was not the case and what was observed as the trees moving was little more than the trees flexing slightly in the wind.

The trees did not fall over with their root plate tilted out of the ground. The proof of this is in the following photographs which show the stumps of the 3 trees with no disturbance of the surrounding ground. To suggest that the roots tilted out of the ground and then settled back in with out any evidence of failure is simply fanciful.

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<td>There is no moment visible around any of the stumps. I have seen other photographs that show a gap below a root of 1-2 centimetres and a crack in the pavement of about 1 centimetre but nothing that shows that these trees fell over.

It is the case that sometimes trees fall over and when the weight of the branches is removed they stand upright, almost vertical again but it is always obvious because the soil that is disturbed in the failure stops the root plate from sitting neatly back in place.</td>
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The trees did not fall over! This is not a very technical statement but it is plainly obvious. It is not a matter of opinion rather a matter of fact.

It has been pointed out By Councillor King that this error alone is not significant. If these nonexistent failures were not used for the basis of concern over the stability of the remaining trees I would agree. Unfortunately this has not been the case. No report makes this clearer than the report by Simenson who uses the two failures **that didn't occur** to determine the Risk of Harm of the remaining trees. Both Marsden and Swain also, I believe, form their opinions on tree stability based on prior "failures". Unfortunately when our belief about the extent of failures is wrong this can only serve to bias the end result (see 1200 figs below).

Error 2: The QTRA User Manual was not followed

Whilst I would be happy to provide a copy of the user manual to every Councillor it is indeed a technical document and I would not expect most of them to fully understand the document. In fact many arborists find it difficult and for that reason the system involves an initial day of training and a day of follow-up training is also recommended. If councillors whish to read the User Manual in full I believe they have one or more licensed users on staff who should have a copy of the User Manual.

Simenson deviated from the user manual and relied on tree failure rates to derive the probability of failure. In addition there were more than 15 trees and as has been shown the trees

had not fallen over. Obviously the use of the failure rate of 1 in 15 was in error. I do accept that failure rates should be used to inform but not to determine our estimates of the Probability of Failure. Resorting to data from a very small sample set over a very short time frame is statistically dangerous (see 1200 figs below).

Apart from an exceptionally high probability of failure (I suspect based in part on the belief that 2 trees in the grove had fallen over and in part being swayed by Simenson's report) Swain only makes a minor misapplication in the use of the Impact Potential and a few odd mathematical errors.

In either case if they have indeed followed the user manual correctly, as may be implied by councillor King, then they will be able to reference the user manual to support their poison.

I believe that if Simenson and Swain had access to the information below (1200 figs) and the pictures above, their estimation of the Probability of Failure may have been much smaller. I see no reason why they would not adopt a 1 in 10,000 Probability of Failure for any tree that passed a Pull Test. (see Pull Test below)

Error 3: Figs are shallow rooted and these horizontal roots are required for stability

Trees that are deep rooted or have a high incidence of vertical roots have immense structural stability. There are many reasons for trees to develop a more vertical root system. Whilst I am more than capable of explaining the various theories that drive the morphology of root systems it is clear that discussing inter cellular auxin gradients, the roll of starch grains and hygroscopic tension of water combined with the porosity, particle size and percolation rate of the soil are again not matters that I would generally expect the audience to be interested in.

Tree roots are no different than branches; they self optimise to take the forces that are regularly transferred to them. This ensures tree stability. Sure, just like branches tree roots can and do fail for a number of reasons but it has very little to do with the orientation of root growth. In fact trees that have more vertical root systems, such as Norfolk Island Pines on sandy costal soils, are some of our most stable trees.

The readers may not be aware but I have extensive experience in transplanting trees (as you can see from my CV which is attached to this document). I have made it much of my life's work over the last 2 decades to understand tree roots and their response to injury. My expertise has gained me international acclaim. In my capacity as a consultant and tree transplanting expert I have worked on 3 continents and 8 countries. I have been involved in more than 45,000 transplants.

In all probability I have seen and worked with more tree roots than all the other consultants combined. I have had the experience of transplanting a great number of Ficus with many being larger than the Laman Street figs. I have first hand experience about the tensile strength of fig roots and the forces required to separate them from the ground.

Still none of this is overly relevant other than to point out that the expectation of a vertical root system in this environment or the need for a tree to have such a root system is simply erroneous. Rather than to go into great detail I simply included a few images that demonstrate that that this view of roots is not supported by the evidence. I did resort to using images from Google so I thought it might be advantageous to include some of my own images to reassure the reader that this knowledge has been obtained first hand.

Point Piper, Sydney, excavation of rock for the construction of a block of units did not result in roots being cut.

The roots of this Port Jackson Fig (above and left) were all growing down hill along a 45 degree slope. The tree had a lean towards the water and was growing on top of a rock with very shallow soils. The construction work occurred in 2005 and the tree is doing fine.

Tap roots … yes roots are more complex in their form than you have been led to believe!

Swinging on the aerial roots of a fig tree … they have enormous tensile strength

If the assumption made by Marsden, and supported by the other consultants, that trees must have horizontal roots for stability is correct then examples such as these should not exist. The fact is that they do exist! The assertion that the Laman Street trees are unstable is based on the observation that the trees have few horizontal roots **and** that misbelieve that figs do not have vertical roots. Surely it is not unreasonable to question this assumption particularly given that no evidence has been provided to the contrary and I have provided evidence that figs can and do produce strong vertical roots. (See 1200 figs and The Pull Test)

1200 Figs

A concerned local arborist wrote to me in support but was unwilling to be named because of concerns about the possible consequences (I think we all understand). In part he said

> "My only comment is that on page 9, you conservatively estimated the risk of fig tree failure at 1:500 and I think that is a little out. With the benefit of local knowledge I can state that I have personally witnessed at least 4 entire tree failures in Newcastle over the last 10 years (only Hill's figs) including the Pasha bulker storm event, and 2 catastrophic failures of the majority of the canopy that would have been included in the same class because of the size of the part, although the nature of the failure cause was different. There are 1200 Figs left in Newcastle of a mature size….
>
> So 6 large or complete failures over a 10 year period out of approximately 1200 trees, what would that make the probability of failure? I am not licensed in QTRA any more. Would that increase or decrease the outcome of the probability?"

I have no way of knowing if his data is correct but based on his data and information I have been able to obtain from photographs and asking questions of local people I provided the response below. I acknowledge that it makes assumptions that the data is correct so I am more than happy to adjust the calculations if council is willing to provide more accurate data. My response was as follows

> *The data you provide is excellent! Is it publically available? Based on your data in 12,000 tree years (10 x 1,200) there have been 6 failures which means a rate of failure has been 1 in 2000. I have estimated the Probability of Failure to be 4 times higher than those records indicate. (I did say I was being conservative and there is some reason to be conservative when risk is involved) This means that the trees outside the gallery would need to be 200 times more likely to fail than the average fig tree in council's care. It also means that the* ***least conservative*** *estimate for the PoF provided by the council's experts is 200 times more conservative than the historic figures indicate.*
>
> *In addition there is some evidence to suggest that root severance contributed to at least two of the failures. If these are eliminated then the failure rate due to defects alone is 1 in 3,000. Furthermore the trees outside the gallery have all been assessed as being free from the significant included stem structure that resulted in the two structural failures ... whilst limb failure is possible loss of large portions of the tree is very unlikely. If these two structural failures are eliminated then the rate of failure has been 1 in 6,000 This is close to the Probability of Failure of 1 in 5,000 that I said I believe can be achieve with light reduction and thinning.*
>
> *This means that the Laman street trees would need to be 600 times more likely to fail than the average fig tree without cut roots or significant structural defects in the trunks in order to achieve the Probability of Failure adopted by Swain and 800 times more likely when considering Simenson."*

Perhaps that data is not reliable but it is interesting that data of this nature is almost certainly available to the council but it has either not been provided to and or used by any of the consultants. I am left wondering why?

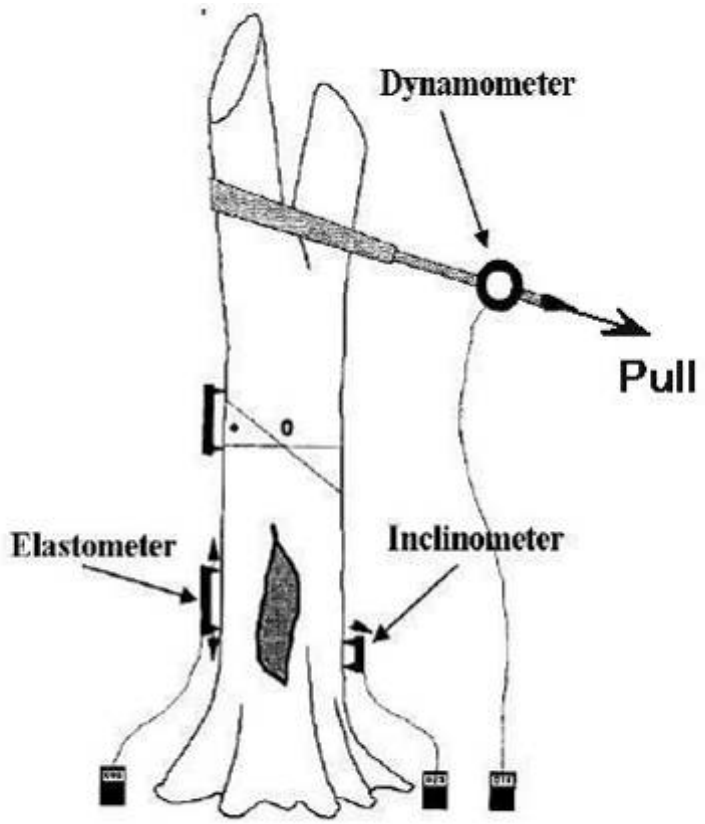
The Pull Test

I would have hoped that rather than argue the facts all parties would have realized that a number of errors exist and that they would have been keen to add clarity to the situation as a matter of some priority. Perhaps that may still be the case.

The question that really needs to be answered is **"Has the morphology of the root system along with past cultural practices resulted in these trees becoming unstable?"** Fortunately this question can be answered with a high degree of certainty by undertaking a scientific test … the Static or Pull Test. (See attached article if you are technically minded)

The Pull Test is a documented, peer reviewed process that allows for testing to determine if the root system of a tree has been compromised sufficiently to result in structural instability. Such a test would put an end to any uncertainty and would enable the council and concerned residents to move forward with the knowledge that only trees with an increased likelihood of blowing over would be removed.

I am able to organize for a pull test to be performed and am more than happy to have council staff or its consultants present to verify and validate the process is being performed as documented. The testing of 13 of the trees (up to 4 directions each where needed) would require an investment of $27,600 pus GST. Testing and report writing will take approximately 3 weeks to complete. I certainly would not want to suggest that it is cheap but if it simply put an end to the costs of target management it would be in fact at nil cost.



An illustration of a Pull Test

Curriculum Vitae for Mark Hartley

Education:

1979 UPCA Tree Care Certificate – Pass

1981 UPCA Tree Care Certificate – Credit

1986 Certificate in Continuing Studies Rivett Enterprises (Melbourne)

1987 Cert. Arboriculture AHCS (Melbourne)

1987 Cert. Continuing Education in Applied Arboriculture
M.F.Blair Institute of Arboriculture (USA)

1988 Instructors Cert. Applied Arboriculture M.F.Blair Institute (USA)

1990 Certified Arborist Western Chapter - International Society of Arboriculture

1993 Train the Trainer TAFE articulated
Advanced Certificate in Occupational Health Management 8627
Advanced Certificate in Training and Development 8628

1994 Palm Physiology Workshop
Shigo Trees and Associates - Hawaii Botanic Gardens

1995 Certificate in Tree Biology - Appalachian State University (US)

1997 Certificate in New Tree Biology - Appalachian State University (US)

1999 Certificate in Scientific Photography TAFE (NSW)

2000 American Society of Consulting Arborists, Consulting Academy
(Qualified to give evidence in the USA court system)

2006 QTRA licensed user

2008 QTRA licensed user update

2009 Diploma Horticulture (Arboriculture) with Distinction TAFE (NSW)

2009 TAA Certificate IV - Unity College ACT

Trade Affiliations:

- Life Member International Society of Arboriculture 1988 -
- Life Member International Palm Society 2000 -
- Life Member of Arboriculture Australia 2000-
- Member American Society of Consulting Arborists 2000 - 2005
- Life Member of National Arborist Association of Australia 2003 - 2010
- President National Arborist Association of Australia 1988 – 1992
- Board member National Arborist Association of Australia, 1998-2001
- Education Chair of the National Arborist Association of Australia 2003- 2010
- Committee member ISA NEC and Awards committees 2009 -

Awards:

1995 Professional Consulting Arborists of America,
- International Arborist of the Year

1996 Winner of the National Arborist Association's Grand Award for
- Excellence in Arboriculture - Transplanting

1997 Winner of the National Arborist Association's Award of Distinction for
- Excellence in Arboriculture - Transplanting

1997 Winner of the National Arborist Association's Award of Distinction for
- Excellence in Arboriculture - Tree Pruning

1998 Winner of the National Arborist Association's Grand Award for
- Excellence in Arboriculture - Transplanting

1999 Winner of the National Arborist Association's Award of Distinction for
- Excellence in Arboriculture - Transplanting.

2003 Winner of the Tree Care Industry Association's Award for
- Excellence in Arboriculture - Transplanting.

2009 South Western Sydney Institute of TAFE
- Award for Academic Excellence- Diploma Horticulture (Arboriculture)

2009 TAFE New South Wales
- State Medal - Diploma Horticulture (Arboriculture)