

DEVELOPMENT OF THE HUME TREE MANAGEMENT SYSTEM

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Background

Developing an inventory of trees for a whole city seems daunting; the reality is that it takes a lot of hard work. In this paper I plan to outline the processes and outcomes that have changed the way we manage trees in the City of Hume.

I started work for Hume City Council in 2002. At that time Council owned an inventory named *Tree Keeper*—a database from the Davey Group in the United States. It needed to be upgraded as it ran the Windows 98 operating system. We received quotes to upgrade to a map version for about \$60K. Due to concerns about the original data—and the fact the inventory had not been updated for over 5 years with new trees or even maintenance records—a decision was made to look at other options. One option was to utilise Council's existing GIS infrastructure and the Oracle relational database and develop our own custom made system.

Why create an inventory?

The need for an accurate and reliable inventory was many:

- One, to assist our insurer to let them know we understand our tree liabilities and assets
- Two, to management understand the risks and associated of tree management and to gauge the numbers and costs for replanting programs.

To better manage our trees as assets we needed up to date and accurate information

Council needed a policy framework for how trees were to be managed. It needed to be clear concise and well thought out. Then a strategy outlining how Council was going to implement the policy, including the important step of developing an inventory, was required.

We also developed more detailed technical notes that supported the policy and strategy that includes information on species selection and specifications for purchasing trees, planting them and even post care maintenance of trees.

This was a lot of work and consultants were employed to assist us and ensure the information was accurate, leading edge and relevant. Having this information gave us credibility with senior management and assisted when we were competing for funding. I think as an industry we need to develop more specifications to set standards and educate others within our industry.

How we started

To start with, a basic specification was written after much research and investigation. Data collection in one suburb highlighted additional information we wanted and generated many new ideas one of the most important was to identify and quantify the risks associated with trees after collecting over 200 high priority jobs. We decided to develop a risk score that helps prioritise those jobs even further.

Council engaged Ennoble Consulting to write a software program to help make our inventory a reality. Sam Majid, the project team leader who helped me to document the issues and any suggested improvements, helped getting the process started.

We have a great communication system online to keep each other informed about issues and developments. We are now up to version 8, where we are developing a mobile version for field inspections and a dashboard to manage all the work flows and the current status of our priority jobs.

Previous Management

Our Council, like most in 2002, was very reactive and had grand plans to visit every tree in the city in five years. The first problem with that idea was that we did not have any ideas about how many trees we actually managed. Over five years we had only managed to visit less than one third of the city; this type of management was never going to work!

The calls from residents were inspected and went into a pile that we worked on from the top—very inefficient. We never seemed to get time to do programmed work. We were removing around 4000 trees a year and planting only 400 with limited survival. At that time, we had only one crew with a 12 inch chipper and a 60ft GMJ telescopic boom EWP and five staff. We employed a second smaller crew for formative pruning and jobs that did not require a tower. We also employed a couple of contractors to assist in the task. We employed a senior arborist, a tree assessment officer and a tree establishment officer.

Making it happen

With these appointments, we had some real resources to tackle the large job ahead of us. The idea of an inventory had now grown to become known as the “Hume Tree Management System”. Council tendered out the Data collection with a very strict specification making sure the data collectors were experienced and adequately qualified to Certificate 5 as a minimum. We also wanted the ability to audit individual collector’s data to ensure they were up to the task.

We developed strict data collection guidelines to ensure consistent results and created a colourful manual with pictures to make it very clear. We needed to ensure the data set we were going to collect was going to have everything we needed. We made decisions like estimating tree heights and DBH ranges because everything that had to be measured takes time and adds cost.

The DBH ranges were linked to the sizes used to quote removal costs so we could ascertain the real cost to remove selected trees from the system. We had explanations to clarify any possible areas of confusion. In the end Roger Greenwood and Ben Kenyon, in a partnership, won the contract and worked closely with us to develop a risk assessment that would be used to further prioritise works.

Mathoney and Clarke’s method was slightly modified to put the tree in context in the landscape and to explain what were the consequences of tree failure and the value of the target. We started in Sunbury and looked at the data: we had over 200 high priority removals. The risk score allowed us to prioritise these jobs even further. These jobs were then inspected by our arborist, marked for identification and prioritised for the appropriate crew or contractor. This data became our new programmed works taken directly from a simple search on the system.

How this system changed the way we work!

Now every query about trees in Hume goes through this system and is recorded and prioritised for action based on a risk assessment. What we have done is target our limited resources at the trees of most need and we have dealt with them. We either pruned them to make them safe or removed them. During the collection process, we received a number of calls from the data collectors to remove very dangerous trees with active splits that day.

Some of these trees we probably would not have dealt with until they had failed and caused damage. One particular tree was amongst a group of trees along a road adjacent to a house and had an active split 15 metres up only five metres from a resident's house. We would have never found this tree with our old practices and would be dealing with an insurance claim after it failed and took out part of the house.

We now work our way down the priorities list until we receive a new data set and have a new set of higher priorities from a new suburb. We now do a few days reactive work and the rest of the week doing this programmed works.

One feature that we had collected was vacant sites. These are appropriate locations to establish trees within a street. We developed very specific guidelines to ensure we could establish a tree safely in this location. This information has allowed funding bids to be successful and for us to plant over 5000 trees a year.

To do this scale of planting, we needed good establishment maintenance and secured class b recycled water to ensure we would not be affected by water restrictions and to be more sustainable. We also identified the large need for formative pruning of the thousands of trees coming over to Council from developers and from our planting program—so we have obtained substantial funds to complete this important work.

So now, when a resident calls us, we inspect the tree within 5 working days and once inspected, the work is recorded, prioritised and allocated to an appropriated internal crew or contractor. There are 3 priorities we use to schedule all our works, whether it is reactive or programmed works. These are:

- Emergency to be completed within 7 working days.
- High priority to be completed within 8 weeks of inspection.
- Programmed works to be completed within 6 months.

So each crew takes the highest priority job and completes it and finds other lower priority works in the same suburb to make it more efficient—rather than running all over the city. This system is working well and most programmed works are completed no more than two months after they are inspected.

By the end of this financial year we will have over 150,000 trees identified on the system, which is about 90% of all trees in streets, developed reserves and Council facilities. Next year, we plan to use the funds from the contract data collection to employ a tree inspector—who will proactively reinspect trees on a risk based prioritised program, alerting us to the need for works once they are identified.

Features of the system

The system is a GIS based mapping program using Autodesk intranet based map interface with Oracle as the home of all the data we collect.

Every person in Council with computer access can use the system to search for information on trees but only authorised people can manipulate or change data.

One of the most powerful things about geospatial information is the ability to display multiple levels of information on a map to give you instant access to the data set. Once opened, we can overlay streets, waterway contours, powerlines with voltages, with poles and even service wires or underground power locations.

This information was requested from AGL; once we signed a data sharing agreement, we were given the data for Hume. It helps when developing tree pruning and tree planting to know what side of the street and the voltage in each street. We can overlay aerial photos and mark up maps showing the location of works where to dump mulch and other important information that can be emailed to crews or contractors.

The search function allows the user to search on anything collected; for example: Find all the *Eucalyptus camaldulensis* (River Red Gums) with a DBH greater than 90cm within Hume. Within less than 10 seconds, a list with hyperlinks to maps was on the screen. This can then be exported to excel to be filtered saved and emailed. From this search we developed a program to mulch out the canopies of the oldest remnant red gums in the City. We sprayed under the canopies, mulched them, and put up 20,000 litres of class B recycled water on each tree.

Data Management

One of the biggest challenges is trying to keep the data up to date and accurate. We record every inspection query against the tree in question and even have the ability to download photos from inspections.

Once we finalise the mobile system, we are developing all inspections via a tablet PC with a GPS and the full data set in the field—eliminating the need for data entry of inspections back at the office. Eventually, crews and contractors will have computers to tell them where the next job is and record the necessary information in the field. This will be updated at the end of each job to keep the system almost live.

Peer review of the system

We have conducted a number of peer review sessions from other Local government officers and other tree managers interested in managing urban forests. We set up a mock data set and allowed them to play. Most were impressed with how quickly and easily they could use the system and how readily you could access all the information on any tree. We asked people to suggest improvements we could make to the system: most couldn't think of any.

Most want to purchase it and we have received requests internationally and within Australia asking if we could sell them the package. Council is investigating the possibility of commercialisation with our developer Sam Majid from Ennoble Consulting.

Conclusion

Developing this inventory, which has become the Hume Tree Management System, has been a very interesting and enlightening process. We have seen a dramatic decrease in customer requests and an 80% reduction in after hours emergency call outs for storms because we have managed the trees most likely to fail. There are many more features that I have not mentioned and many more to be developed as we fully utilise the system.

Within Council, this system has been the flagship for GIS development and now parks have developed a playground management system and are developing a asset management system for all other assets in our vast open space network. This Councils GIS is becoming the Council asset management system with roads drains and many other areas of Council following our lead. If anyone would like further information on anything mentioned feel free to email me on jasons@hume.vic.gov.au or call me on (03) 92052387.

