The Project

My aim for the 2007 Kwatye (Water) Prize is to investigate the possibilities of improving the reliability of service to customers and system operators within a sewer reticulation system.

In particular, research what techniques are currently being utilised and what technologies are available to reduce the rate of sewerage blockages due to tree root intrusion.

Also investigate the possible advantages and disadvantages of processes currently being used, including establishing if any trials have been undertaken and what outcomes of these trials have produced.

General.

The long drought within Australia has seen an increase in the quantity of blockages in sewer mains with a majority due to tree root intrusions.

It has also been identified that the current frequency and practices utilised in preventative programs have not always reduced the rate of blockages and may not be the most cost effective or environmentally sustainable solutions.

It is considered that Barwon Water and the Water industry in general could benefit from a greater understanding of what technologies and practices are available and how they can effectively be utilised to control tree root intrusion into sewer mains and thus reduce the blockage rate.

The last few years have seen Australia in the grip of a prolonged drought that has stretched its water resources to the limit. Also as a consequence of this drought there has been a marked increase in the quantity of blockages (chokes) and generally a large percentage of these have been due to tree root intrusion. The Water Services Association of Australia (WSAA) data indicates some authorities experience a very high, up to 94.7%, portion of blockages due to tree roots, refer Table 1 below.

Authority	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
ACTEW (Australian Capital Territory)	90.2	92.2	92.3	94.3	94.3	96.6	94.7
Barwon Water	74.4	77.4	87.7	94.0	97.0	91.3	79.4
Central Highlands Water	42.5	72.6	65.6	64.2	60.4	63.8	62.8
City West Water	66.4	78.4	69.2	66.6	69.8	52.8	67.5
Coliban Water	75.1	88.7	84.5	79.9	67.0	65.8	61.3
Godsford City Council	80.1	75.4	87.7	88.8	89.0	85.0	80.0
Goulburn Valley Water	84.6	73.4	45.1	69.8	83.5	80.6	65.6
Hunter Water	80.2	67.4	71.0	87.4	86.2	86.8	85.1
Ipswich Water	-	-	-	84.0	93.0	83.8	79.2
Logan Water	-	-	-	-	67.2	66.2	68.3
South Australia Water	-	86.0	85.5	93.3	87.7	87.0	85.0
South East Water	64.6	49.0	67.0	68.6	70.4	60.5	68.6
Sydney Water	-	-	-	70.2	67.6	53.7	72.1
Yarra Valley Water	72	67.3	70	70.7	80.6	71.1	63.0

Table 1 - % Sewer Blocks Caused by Tree Roots

Generally organisations within the water industry that have a responsibility for sewerage services currently utilise various methods to clear the initial blockage (reactive) and in its preventative (proactive) maintenance programs. For reactive calls this may include hand rodding, jetting, root cutting. For example at Barwon Water the current practice for a reactive job is to use high pressure

water jetting machines to initially jet, i.e. clearing of block, then root cut the pipe again using the high pressure water to drive the cutting head. The root cutting method however is not used on any pipes that contain any plastic type material, eg uPVC, and high pressure jetting only is used.

In preventative programs methods used include adding chemicals while jetting, eg root foaming, or planned root cutting programs. The main issue associated with these types of methods are that in any root cutting process there is a need to determine the appropriate intervals between programs, i.e. what is the rate of tree root growth within the sewer. In the case of adding chemicals it is the potential adverse effect that any chemicals may have on the treatment process downstream and limiting possible reuse options, i.e. potential environmental impact. Also if chemicals are used in a reticulated sewer system there are the possible occupational health and safety (OHS) issues to the public, contractors and employees working on the authority's assets that need to be considered.

Another issue associated with hydraulic jetting, root cutting and root foaming is that they currently rely on potable water from a water reticulation mains, or tanker, in order to undertake the associated work. When consideration is given to the potential use of this reticulated water and the drought conditions that have existed there is an opportunity to investigate and evaluate what alternative methods may be available thus potentially adding value to this water.

If hand rodding is used, even with the assistance of mechanical aids, there are various Occupational Health & Safety (OHS) issues to be also considered. Also the work efficiencies associated with this method that could reduce the effeteness and viability of this process.

At Barwon Water the opportunities to use a chemical treatment method to tackle tree roots is generally limited to those pipes in a catchment where there is sufficient dilution and/or lengths done per day so impact of any treatment plant is eliminated or reduced. Therefore there are currently areas with high rates of blockages where alternative process are undertaken to tackle the blockage rates due tree roots. It is possible that the frequency of such preventative programs are not cost effective or the best option.

Although rehabilitation of sewer pipes can be undertaken there are budget and time restraints that limit the effectiveness of this option. Also isolated sections of sewer mains with significant damage can be replaced/repaired by dig/repair methods but again this may not be the best solution.

Generally in assessing the condition of pipes for follow up works a separate inspection using close circuit television (CCTV) equipment is undertaken which provides a visual and detailed report of situation/condition but can add to the delay and cost of providing a solution to a particular situation.

Methodology.

Utilising the data available from WSAA contact various water authorities with high rates of blockages due to tree root and establish water factors may impact on these rates within theses authorities.

Design a survey form that can be circulated within the industry that assists in derermining what is being done.

Design a methodology for undertaking field trials that may assist in determining the best methods for tackling the entry tree roots in to sewer mains.

If possible undertake field inspections within the water industry to inspect and investigate what process and practices are being utilised to undertake at time of blockage occurs and what proactive measures are being undertaken to reduce the rates of blockages associated with tree roots.

Where possible contact contractors undertaking maintenance works associated with blockages and establishing what practices they use and on what frequency works are done. Also contact suppliers of any chemicals used in combating tree root growth in sewers to establish what is being used and what impacts these products may have.

Benefits.

With data and information gathered it is intended to circulate the knowledge available within the water industry via WIOA.

Possible improve the effectiveness of preventative maintenance programs and thus reduce sewer blockages due to tree root intrusion.

Establish contacts within the water industry that have experience in the area of sewer blockages, particularly regarding blockages due to tree roots.

Sharing of ideas and methods for undertaking works associated with blockages on sewer mains due to tree roots.