



Safety strike for drones

Regular inspections of Taupo District Council's 84 water reservoirs presented a safety risk for workers – so they turned to some new technology for a solution, as Water Treatment Supervisor Rich Kruse explains.

It was a height safety course that highlighted some problems in the way workers were carrying out inspections of Taupo District Council's reservoirs.

As part of the water safety plans for all of TDC's water supplies, we must inspect each of our reservoirs around the district to ensure they are secure and free of potential contamination from vermin, pests or vandalism.

In total, we have 84 reservoirs with 25 of those ranging from three to eight metres in height; 52 are between one and three metres.

Working at heights requires the employer to take all practicable steps to ensure means are provided to prevent the employee from falling. We had identified from a height safety course that the way we had been working at heights was not meeting the health and safety requirements. We were climbing ladders up to eight metres without harnesses, safety ropes and anchor points and were simply putting ourselves at risk on a regular basis.

That prompted us to explore the use of drones to carry out inspection work. This would give us photo/video evidence that the reservoirs are secure and eliminate the need to put staff at risk by working at heights. It would also reduce the number of personnel required.

H&S GUIDELINES

According to the Ministry of Business, Innovation and Employment's best practice guidelines, there are three levels of requirements for working at heights.

1. Working up to one metre, using a stepladder only requires one person.
2. Working from one metre to three metres requires two people using a ladder.
3. Working above three metres requires three people (all of whom must be trained at working at heights), a rescue plan, certified equipment including harness, ropes, anchor points, and ladder. The certifications must be inspected at least annually and before each use by a competent person. Anchor points must meet the requirements of AS/NZS 1891.2:2001.

Work that we carry out around the district includes all of

the above but at different frequencies depending on the work that is required. There are two types of working at heights functions that we carry out.

1. *Regular inspection work:* Drinking Water Standards (DWS) and Water Safety Plan (WSP) requirements involve three monthly inspections of all reservoirs in the district to ensure the supply is secure and safe.
2. *Emergency/Maintenance work:* Some of this is planned though not at regular intervals and some is reactive emergency maintenance.

With both of the above we have then used the "hazard hierarchy" to determine what would be the safest option to carry out the work.

INSPECTION WORK:

Three-monthly using E, (eliminate) I, (isolate) M (minimise).

- E not climbing the ladder;
- I using a cherry picker/scissor lift; and
- M using ladder, harness and anchor points.

The risk of climbing the ladder to do the work can be eliminated by using a drone device to inspect the reservoirs.

EMERGENCY / MAINTENANCE WORK

using EIM:

- E not climbing the ladder;
- I using a cherry picker/scissor lift; and
- M using ladder, harness and anchor points.

The above work cannot be eliminated but can be isolated for 98 percent of the sites by using a cherry picker or scissor lift. The remaining two percent can be minimised by using a ladder, harness and anchor points.

Examining the pros and cons of the options – including the drone device, cherry picker and harness plus associated equipment – led to the following conclusions.

DRONE DEVICE

Pros:

- Safest option to carry out regular inspection work as it eliminates the hazard;
- Cheapest option, costs range from \$800 to \$3000;

- Minimal training required to use the device;
- No warrant or regular certification required; and
- One person required to carry out this work not three.

Cons:

- Reliability of device unknown.

CHERRY PICKER

Pros:

- Second safest option – isolating the hazard for emergency/maintenance work;
- Able to access 98 percent of the inspection points without leaving the cage/frame;
- If purchased, this equipment may be able to be used elsewhere within TDC teams;
- If hired, no ongoing maintenance costs, \$300 per day or \$1200 per week; and
- Two-person job not three.

Cons:

- Cost of purchase – \$40,000 to \$80,000;
- If purchased, need to carry associated maintenance costs; and
- Training required for all staff using the equipment.

HARNESS/LADDER/ANCHOR

Pros:

- Gaining experience using fall-arrest systems;
- Following H&S guidelines and not taking risks.

Cons:

- Regular certification required annually as well as prior to use meaning a contractor that is qualified needs to carry out this prior to using anchor points;
- Access to remote sites and distance around the district to certify all anchor points every three months would be costly and inefficient;
- Not the safest option – using EIM this option is ‘minimise’ which is the highest risk; and
- Three-person job, so labour intensive.

SUMMARY

With the information above, we concluded that using the drone devices would be both the safest and most cost-effective way

to carry out routine inspection work of TDC’s reservoirs that exceed three metres in height.

Any emergency/maintenance work using a cherry picker would be the safest option where access is attainable; then the harness/ladder/anchor system is used where access with a cherry picker is not an option.

As mentioned above, the cost for a drone device ranges from \$800-\$3000 depending on quality. The costs for a cherry picker to purchase range from \$40k-\$80k and to hire \$300 a day or \$1200 a week. For the amount of work we do, hiring would probably be the best option. If another department within council could also make use of the equipment (eg, arborist, parks and reserves), then it may be worth investigating if equipment like this should be purchased.

The harness/ladder and anchor point is the least safe option and requires a qualified person to certify anchor points prior to use which then raises the question of whether we get that person/persons to carry out the work while they are certifying the anchor points. There are so many sites in remote places that it makes the cost of this option unknown at present – but labour costs will be far higher than options 1 and 2. This also requires three trained people onsite.

EXPERIENCE

The drone has now been in use for about 12 months. There are some restrictions in its use. We have to abide by Civil Aviation rules – related to proximity to airports and permitted flying height. There are restrictions to its use on windy days and even rainy days are not ideal, so it is a case of picking the right day.

It is a lot more efficient – we can get the drone up and down within five minutes as opposed to sending three guys out and setting up the necessary equipment.

The savings in labour alone make it worthwhile. We estimated that it would take two weeks to do with three staff – now it takes one week with one staff member. Over the year, based on hourly rates, we have estimated the drone is saving around \$18,000. [WNZ](#)

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