

Proposal for a Shaft Top Safety System for DCA

This proposal was modified from one presented to the DCA Committee in February 2020. It was accepted and a mandate to purchase the equipment up to the maximum cost of £3000 was given. DCA are in a position to finance this and the purchase is moving ahead at time of writing, but it was agreed that this might be something BCA would consider supporting us in, considering their other purchases for regional bodies.

I have been the DCA Projects Officer since March 2014. Over that period, the following projects or requests for inspection/assistance have involved the descent of, or suspension in the top of, uncapped or unsecure mine shafts:

- Snelslow Swallet clean-up 2019 (DCA project)
- Cascade Caverns 2019 (investigation for NE)
- Cressbrook Dale shaft inspections 2018 (investigation for NE)
- Devonshire Mine Kirkland Shaft capping 2017 (DCA Project working on ginged shaft)
- Vixen Shaft 2017 (investigation for NE followed by DCA Project)
- Oxlow Farm investigation of Faucet Rake workings 2014 (Farmer requested)

There are also currently requests in from private landowners and bodies like NE and NT, to inspect or access:

- Mam Tor Engine Shaft
- Cascade Caverns (NE will need further visits to rebuild the dangerous shaft cap)
- Various marked shafts on NE land in Cressbrook Dale
- Stub Scrin shaft to Carlsark, which has been on the list for capping and stabilisation for years

In most cases, a tree belay or scaffold tube belay at ground level has been used or could be used for rigging access ropes. The danger is that this inevitably positions the rope from the anchors down at shaft top level and causes them to run directly over the edge of the shaft, and in some case on the ginging itself. Even when using scaffolding, that is often placed on the shaft collar. Using these methods in the past, DCA volunteers have been able to access or inspect several shafts prior to working on or in them. Often, we are unable to assess the quality of the shaft ginging our belay bars are sat on prior to descending the shaft, which is clearly a situation that is not safe.

In at least one case, whilst out with Christine Wilson and Roy Rodgers for NE, we decided it was too dangerous to even attempt to descend a shaft in Cressbrook Dale as we'd have to position belay bars directly on the shaft collar that was not inspectable for its solidity. This location still requires capping for Natural England but cannot be inspected.

Another reason that accessing shafts from trees or scaffold tubes is not optimally safe is self-rescue of a DCA colleague. In the event of an incident, DCRO would undoubtedly be called to assist in the evacuation of a caver. They would use a Multipod System or Larkin Frame to hang over the shaft top to avoid disturbing the ginging, but also allow them to lift a casualty up and out. If a DCA volunteer was hanging from a rope secured to a scaffold tube at ground level, even if the other cavers present had the skills to attempt a self-rescue, they would only be able to raise the person to the top of the shaft, they would have no way to extricate them from the shaft itself. Even if tree belays were used, the ropes that are being hauled on to recover the caver in the shaft would be getting pulled directly over the ginging and shaft lip.

There will always be shafts that are perfectly acceptable to descend using tree or scaffold belay methods. These will have sound collars and well-constructed ginging. DCA rarely gets asked to look at shafts that are solid and secure. The very nature of the service we offer landowners means we are often asked to look at shafts whose caps have deteriorated or sites that have just opened by collapse or been discovered in the undergrowth. What we should do as an organisation is have a method of accessing these less structurally secure sites that does not put pressure on the shaft collar or ginging and that allows for remote extraction of a caver beneath.

What I propose is for DCA to purchase a shaft top system that consists of a tripod or similar device, designed to span the shaft top yet have its feet on good ground. In order to access the high anchor points, safety ropes would be

needed to come from anchors further back, so the purchase of a shaft pod would also require the purchase of a ground anchor system for use when no other belay is available. A suitable set of simple rig-for-rescue equipment would also be beneficial.

A pod would allow access to a shaft from above without placing any load on the shaft edges or ginging. It would also be possible to rig ropes in a manner that allows the surface team to haul up an incapacitated caver below, so long as those present had been suitably briefed on the process.

I would not wish DCA to purchase something for use on shafts that becomes a system that we must always use. The drawback being that these systems are big and heavy. DCA volunteers should remain trusted to assess a shaft themselves and decide if a normal descent or a pod is required. Initial inspections visits do not often involve a descent anyway but are assessing what equipment would be required for a descent on the next visit. In that way, DCA volunteers could still have the final say in the equipment and method used, but in future they would at least have an additional option over descent on scaffold or trees or not at all.

Ropes and rigging equipment are traditionally provided by the volunteers themselves. Unless DCA wish to look to grow a store of technical tackle, this could probably remain the case for now, but I will review and make recommendations on this in future. The exception to providing ones' own rigging gear is items that a normal caver who might fill a role at DCA would not usually possess. I am proposing the purchase of the following items and will present options and costing in turn:

1. Shaft top tripod or multi pod system
2. Ground anchor system
3. Rig-for-rescue technical tackle
4. Rope and connectors

1. Pod

Currently, the most affordable shaft top pod on the market with an EN 795 (anchor) certification is the Lyon Obelisk.

<https://lyon.co.uk/anchors-lanyards/portable-anchors/obelisk>

With standard components the pod can span 2m at its feet and stand 2.2m high. It can be used in a smaller configuration and be adapted to sit on uneven ground. With a second carriage, a rescue and working rope system can be used in conjunction.

The price is around £1500 and includes a carry bag and second carriage.

The lifespan is not limited, so with careful use and inspection, the Obelisk could be with DCA for an unlimited time.

2. Ground Anchors

The intention is to purchase 2 all-included systems from Lyon. The ground anchors kit includes stakes and linking straps and when used in line, 3 anchor pins would be safe to use as a single anchor point in the rope system. These can also be used for anchoring the Obelisk down when not being used for SRT rope anchors.

The price is around £200 for 2 sets of 3 anchor pins and straps.

The lifespan is not limited on these items.

3. Rig-for-rescue

If ropes are hung from the Pod 'SRT style', the cavers move independently as they would in any other caving situation. If the SRT ropes are rigged through a progress capture device like a Petzl RIG, then they can still be used as before, but with the added benefit of the ability to remotely raise or lower the caver on the rope if required. A suitable mechanical advantage system would be needed as well as a rope grab. Pairing a 2m Petzl JAG kit with a Petzl Basic, a self-contained haul system can be used by anyone with almost no training.

4. Ropes and connectors

Hand in hand with the Obelisk is the need for ropes and karabiners. DCA would use and spare room in the purchase budget to procure some rope and connectors of its own. DCA volunteers always use their own rigging gear and that is generally not an issue. It is however preferable for DCA to have some rope and connectors to use on projects to save wear and tear on the personal gear. I would hope to purchase 100m-200m of 10.5mm Petzl Parallel rope and a reasonable volume of nylon rapides or steel karabiners for use in rigging bolting projects or shaft access. Despite steel being heavy and not usually the first choice, the connectors we buy will outlast most other connectors and be identifiably different to most caver's personal kit.

Training

I would produce a simple guide to the use of the equipment that would be pre-requisite reading for those who use it. The systems I have suggested above are very user friendly and hard to use or construct in way that makes them unsafe.

Inspection

As long as I am involved with DCA I am prepared to undertake the 6 monthly competent person inspections on these items. If the equipment use is infrequent, this could be done 12 monthly if we backed it up with a risk assessment showing why 6 monthly checks were not required. I am qualified to undertake these inspections and insured to provide them.

Summary

These systems do not come cheap, but the lifetime of products suggested is unlimited if cared for. With central BCA funding available for conservation and access jobs and a real positive exposure for DCA on the projects front currently, I feel that purchasing suitable modern equipment is a good move for DCA both in terms of how cavers perceive us, and of course it will ultimately make the jobs of the volunteers safer.

Follow up

The equipment above was ordered and paid for by DCA on the 3rd March 2020. The order total was £2574.31 and includes everything proposed above at a significant saving over retail prices thanks to Lyon Equipment (& Shaun Puckering) extending us the same level of discount as the MREW/BCRC teams get.

Pete Knight – March 2020