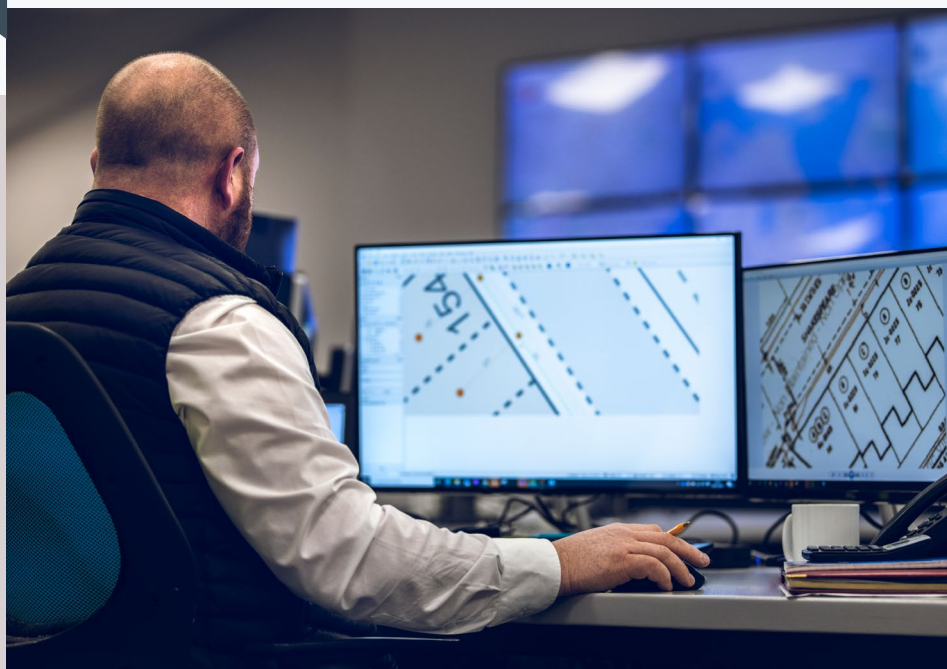


Sapient's Go-Locate notifications shown to be a strong predictor of a permanent fault occurring within a financial year.

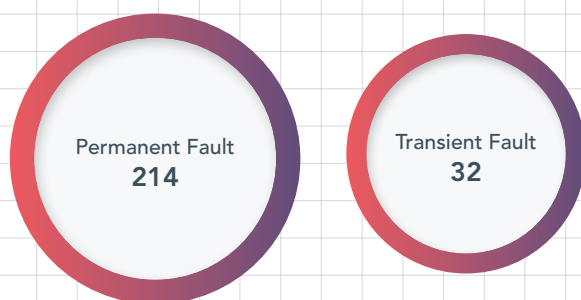


Executive Summary

Kelvatek's Go-Locate notifications were found to predict permanent outages requiring repair in 87% of cases. These fault cases, with enough fault information to create a Go-Locate to be sent to a customer, have been shown to result in a permanent fault within a year, half of which occurred within **78 days**.

Finding faults before they go permanent has the potential to save customer disruption and reduce the quantity, duration, and IIS impact of Low Voltage (LV) fuse and underground (UG) faults, however, there are concerns that not all defects identified via Go-Locate notifications will develop within a regulatory year into faults requiring a repair, therefore potentially bringing costs forward. This analysis proves that following a Go-Locate and enacting a planned repair will likely save an unplanned outage (permanent fault), multiple repeated short interruptions and at the very least reduce the duration of LV repair work.

Total Permanent Fault vs Transient Faults All License Areas



Background

The Sapient service operated by Kelvatek sends out thousands of Go-Locate notifications every year.

Go-Locates are a time-sensitive notification that indicates the presence of detectable levels of underground cable fault gas. This activity is detected via a Bidoyng, Weezap or PRESense device which monitors fault activity from the fuse board. The Go-Locate notification is triggered by our Single Ended Location of Fault (SELF) algorithm calculation which, based on patented data capture, fault energy and burn time calculations as well as our experience of fault gas behaviour, shows whether sufficient combustion gasses have been produced for a successful sniff (detection of a cable or joint defect using a cable sniffer).

Go-Locate notifications enable an active cable fault to be pinpointed by a Field Operative.

The DNO referenced in this analysis receives approximately 1400 Go-Locates per year which were used primarily for locating faults once they have gone permanent and customers are off supply.

Although finding faults and repairing faults before they go permanent has the potential to save significant customer disruption and reduce costs, there needs to be confidence that any pro-active repair of defects will not add unnecessary costs to the yearly operational budget. This case study shows that customers can have the confidence to undertake proactive repairs.





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Analysis

During this analysis, our expert team traced fuse and damage faults through the customer records and linked them to Go-Locates and Sapient records of fault activity & recloses. The objective was to quantify how many Go-Locates were sent which never resulted in a damage fault, and how many were sent which resulted in permanent damage requiring repair work to restore supply. Ongoing faults in which the outcome was unable to be verified were excluded from the calculation. The time to fault was also analysed to understand how long it took faults to progress from the first Go-Locate through to the final damage incident.

Data sources compiled from Sapient were complete Go-Locate records dating between January 2020 and March 2021 and complete LV fault records provided by the DNO for the same period. These were sorted by time and substation and linked across the different data sets based on substation name and number.



Results

From the 1400 Go-Locate notifications issued by Sapient between 01/01/2020-12/03/2021 the results were as follows:

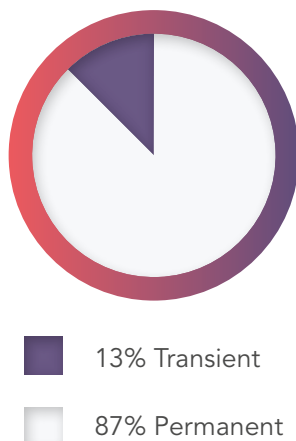
- 280 substations had defined outcomes
- 216 cases were permanent faults
- 27 cases went dormant or were otherwise back-fed/reconfigured
- 33 cases were ongoing
- The average time taken for a fault to go permanent from the first Go-Locate was 78 days
- The average time taken for a fault to cease activity after the first Go-Locate was 101 days

Of the faults which were transient, i.e., those not requiring a permanent repair over the period examined, the average number of short supply interruptions (recloses) following the first Go-Locate was 9.8. There were on average 8 reclose events between the first Go-Locate and the point a fault went permanent and required repair.

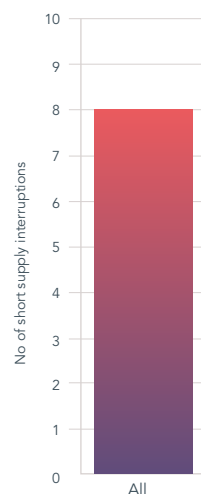
The average number of Go-Locates sent for each fault whether it went permanent, or remained transient was 4.2.

There was some variation between regions on all factors which may be a result of network differences, differing policies on installation, network reconfiguration abilities and other differences in investment strategies.

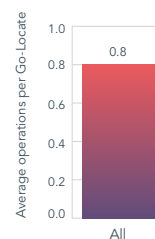
Portfolio overview Permanent vs Transient Faults from Go-Locates



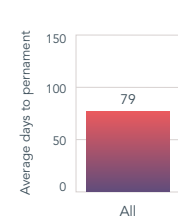
Average number of short supply interruption per license area



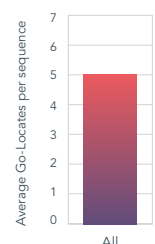
Average operations per Go-Locate



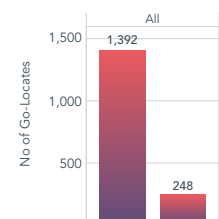
Average days from first Go-Locate sent to permanent fault



Average Go-Locates per sequence



Go-Locates vs final sequence Go-Locates





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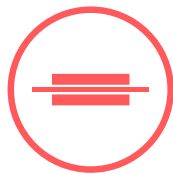
Key takeaways

This analysis highlights significant value in following Go-Locate notifications early in the degradation pathway of the cable or joint. Finding a fault whilst customers are still able to be restored with a reclosing device means that the damaged cable, joint or pot end can be fixed with a shorter, potentially planned repair, and the minimum number of excavations at a known fault location are carried out. Repairing known faults also prevents disruptive future multiple short interruptions and repeated high fault currents damaging other parts of the circuit.

This approach provides a range of benefits which include;



Reduction in Customer Interruptions (CIs) and Customer Minutes Lost (CML) for permanent LV underground faults



More efficient use of staff resource by removing the need for repeated fuse replacements



Reduction in unplanned excavations and a more proactive approach to managing cable faults



Enhanced quality of supply for customers and reduction in nuisance short interruptions

In conclusion, Go-Locates are a strong predictor of an unplanned outage occurring within the financial year, and future fuse activity. These findings highlight the significant value in undertaking planned repair work following a Go-Location notification from Kelvatek's Sapient service.