Case Study
A-UK (England)
A537 (Cheshire East)

It is well known that different road features contribute to the likelihood and severity of crashes. Changing or upgrading these road features may reduce risk. This case study is one of a series carried out on regional roads in England to demonstrate a process of road assessment and crash reduction where Crash Risk Mapping can guide a selective Star Rating process. This case study is concerned with the A537 in Cheshire East in the English Peak District.

Network-Wide Road Assessment

Since 2002, the Road Safety Foundation in the UK has produced risk maps of motorways and trunk roads in Britain as part of the EuroRAP programme, later adding local authority A-roads to those mapped. These maps identify the risk of being involved in a fatal or serious crash per billion vehicle-kilometres travelled. Chart 1 presents a derivative of this map showing only the 50 Medium-high-risk (red) and High-risk (black) regional roads in England – these being those regional A-road sections with the highest risk. These sections were then the subject of a national and local government effort to reduce risk on regional roads. The full details of this work were published in 2018.

The process of Crash Risk Mapping allows engineers and road-users to review how risk changes as one drives from one road section to the next, and road safety specialists to consider the type of measures that might be cost-effective in reducing that risk.


Chart 1. Schematic of top-50 High-risk (black) and Medium-high regional road sections in England (Source: RAC Foundation, Road Safety Foundation)
Detailed Road Assessment

Traditionally, within the iRAP methodology this has been done by using a Safer Roads Investment Plan (SRIP) where potential countermeasures are listed, together with the costs and benefits of making an investment in these measures and what the potential for saving lives and serious injuries may be. Figure 1 shows an example SRIP taken from the Foundation study. Such an analysis may be conducted over a large network (as large as all the major roads in a country) or on a much more selective basis such as on the road lengths described here.

ViDA, the iRAP software platform, provides easy access to the data and further information. The Road Safety Foundation report for the RAC Foundation explains that, by clicking on one of the orange-coloured treatment types listed in the SRIP (Figure 1), the economic and location details (Figure 2) of the countermeasures for each 100m segment are provided. This then supports countermeasure prioritisation.

Countermeasures Selected

The SRIP is not intended as a prescriptive “bill of works” and in order to make the outputs more useful to the road authorities involved in this project a “User-Defined Investment Plan” (UDIP) was developed so that local engineers could intervene in the process and offer local solutions and assess their effect. Again, it was possible to assess the number of fatal and serious injuries (FSIs) that could be prevented by each countermeasure.

Cheshire East Council developed proposals for the A537 as detailed here and in summary these can be represented as per Figure 3. These included plans to improve visibility and road markings, road surfaces and delineation (see figure 4), provide safer roadsides and ensure safer speeds. The route has a long history of motorcycle crashes and continued work with Cheshire Constabulary on speed enforcement also played a part in their plans.
Figure 3. Crash countermeasures for the A537 "Cat and Fiddle"  
(Source: RAC Foundation, Road Safety Foundation)
The economics of this investment are shown in Table 1. In summary, a capital investment of £2.49m provided a benefit-cost ratio of more than 11, meaning that for every £1 invested that over the 20-year life of the scheme, at least £11 would be returned in value to society. More than 20 fatal or serious casualties would be prevented in this time.

Conclusions

This case study describes the process of road safety improvement on the A537. Crash Risk Mapping identified the roads with the highest individual risk. iRAP techniques were used to identify what the appropriate crash countermeasures would be to treat the road section. Implementation of the measures is expected to save around 20 fatal and serious casualties over a 20-year period and provide a cost-benefit ratio of more than 11 for a safety investment of £2.49m.