



**CHEVRON TRAFFIC MANAGEMENT
PROFESSIONAL SERVICES DIVISION
CASE STUDY**

M6 J21a-26 Smart Motorway Project

Project Summary

When Costain required assistance preparing a GG104 Risk Assessment and 3D Traffic Management Design for temporary traffic management activities, Chevron Professional Services provided a swift and thorough response. Working collaboratively with Costain and the project stakeholders, a comprehensive risk assessment was developed so an accurate record of the decision-making process was created, while simultaneously ensuring that the temporary traffic management was optimised for all phases of the works. A 3D Temporary Traffic Management Design was also prepared that fulfilled the client's requirements for Building Information Modelling (BIM) while also providing a valuable tool for analysing the site safety issues prior to construction.

Outcomes Delivered

The GG104 process provides a risk analysis framework to ensure that adequate planning and preparation has taken place and all decisions are recorded for any activity that impacts the safety of the strategic road network. Should any incidents occur, a detailed account of the decisions made could be interrogated if needed. As the traffic management would be provided in phases, a thorough and comprehensive review of all options for each phase would be required to prepare the risk assessment.



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An eight-step process allows for emphasis to be placed on all activities that have a potential impact on safety. The first step was to plan the risk assessment by defining answers to key questions such as “What the aim of the works is?”, “What options should be considered?”, “What stakeholders needed to be consulted?” and “What governance arrangements were required by the client?”. This allowed Chevron and Costain to determine and agree the objective and scope of the strategic risk assessment. It also ensured that due diligence was undertaken to assess the character of the M6 J21a to J26 and establish what works needed to be undertaken in each phase and any scheme specific issues, hazards, or concerns.

The rest of the risk assessment process included categorising the activity type based on a number of factors such as the scale of the works, prior experience and the impact on stakeholders. The team ensured that all potentially affected populations were identified by consulting with a wide range of stakeholders, who provided their input and comments for a thorough representation of all possible population groups.

The scope of the risk assessment was decided by starting from first principles and defining the safety question we wanted to answer. This was agreed collectively with the client and affected stakeholders to arrive at the following scope description:

“The scope is to assess any change to the risk profiles to all affected population groups identified when the considered and assessed TTM design option(s) is/are implemented between the determined M6 Junction 21a to J26 work extent areas for the carriageway upgrade proposed construction phasing links.”

Defining the safety baseline and safety objective for the works was done using quantitative statistical data such as the AADT, average traffic speed, and collision analysis. This enabled us to establish the current exposure levels of risk for both road workers and road users and compare risks against the established safety baseline.

We identified all reasonably foreseeable hazards that the temporary traffic management might create and analysed the resulting safety risks and reasonably foreseeable consequences. Because the works were deemed as outside the normal operation of the road, the safety objective for road workers, users, and other parties had to reduce the risk to As Low As Reasonably Practicable (ALARP).

Eight-step process



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Following this process, we were able to gather all the information required to structure the risk assessment, enabling the capture of the decisions made along with supporting evidence, as well as any assumptions made and the basis for them. As a live document, the risk assessment would be updated throughout the life of the traffic management and regularly reviewed should anything change and potentially affect the safety objective. An owner was assigned to actively monitor any residual risks that were recorded as part of the process, while any assumptions made during the process were regularly validated as part of an ongoing review.

With the risk assessment completed, it could be used to inform the final traffic management layouts. To create the 3D temporary traffic management design, the Professional Services Design Team worked with the client to understand the output that would be required for the 3D elements.

In order to work as efficiently as possible, the design was initially created in 2D using industry standard software (CONE). This enabled the designers to optimise the traffic management layout for each phase and create the drawings that would be needed during construction. Developing the design in 2D allowed for faster checking and approval times in order to identify and address any potential issues before the works went to site. The 2D design was also useful for pricing elements

of the works. Once the final traffic management layouts had been created, the 3D design could then be developed from them.

The 3D design was created using Sign Pro and Line Pro. For each phase, a layer was produced for the temporary road markings, signs, cones, and any other traffic management equipment that was needed. Once completed, the 3D design was submitted through Highways England's BIM management system before an internal audit was carried out to inform best practice on future projects.

The hazard identification and analysis, risk analysis and evaluation, and mitigation selection was carried out using an iterative process. As each hazard associated with an activity was identified, the likelihood of the risk being realised, the severity of the consequences, and the potential mitigation options to achieve the safety objective (ALARP) were developed. Each risk was then discussed in collaboration with all affected parties on the project. This ensured that the iterative process required to refine the mitigation measures and meet the safety objective was thorough and all possibilities were addressed. Any options that were considered to have an increased risk against the safety baseline were discussed as to whether they could be made safer or more suitable.

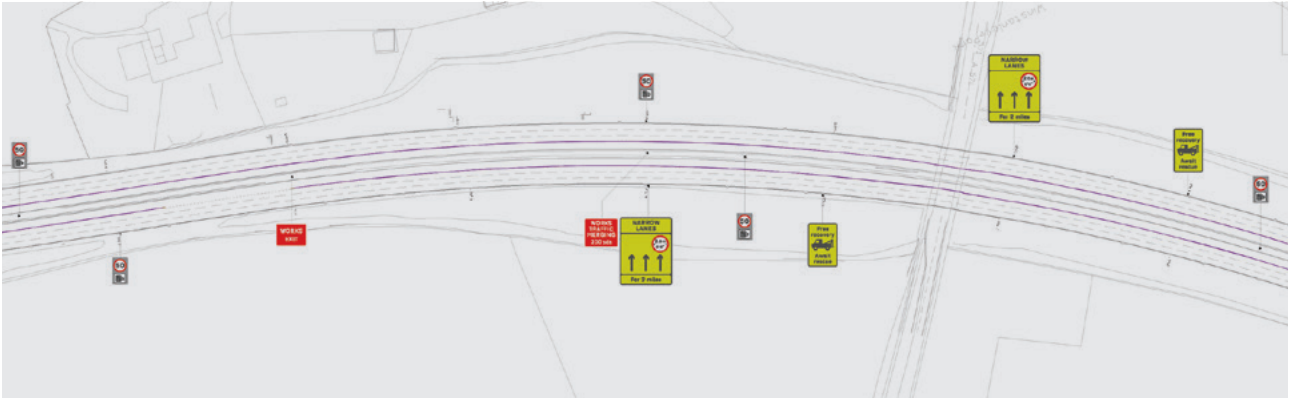


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Solutions

After undertaking the risk assessment and consulting multiple stakeholders via a PSCRG (Project Safety Control Review Group), the preferred temporary traffic management option selected was narrow lane running. This had been chosen over a contraflow as there were multiple junction arrangements in proximity. The existing merge and diverge alignments also compromised the road user's Stopping Sight Distances (SSD), which affected the final decision. With a contraflow, this would impose design constraints for any contraflow arrangements with regards to crossover entry and exit points. As a result, there may be increased road user confusion, resulting in increased safety risks and potentially longer customer journey times.

A further complication of a contraflow arrangement would have been the safe access and egress issues for road workers, as well as the interruption of NRTS communication services when both verges could not be worked on simultaneously. Had contraflow been selected, there would have been an increase in phase change requirements, which presented the likelihood of a significantly extended construction programme and a prolonged impact on road users.

Additionally, certain oversized wide loads would have had operational difficulties when directed onto the primary contraflow carriageway as only two lanes would have been available for use. It was agreed that this could pose an increased risk to customers while also negatively impacting journey times.

At the end of the process, Costain had a fully-fledged safety risk assessment which covered the entire duration of the smart motorway project. It was supported by a robust and detailed Traffic Management Options Report, which detailed all different options considered and the hazards and issues associated with each option. With this information, the temporary traffic management was optimised and a complete record of the decision-making process was created at the same time, providing the client with the information they would require should an incident occur.

With the 3D traffic management design, the client was able to visualise the works before they were on site and address any potential issues before they could become a safety risk on the site. This provided cost savings before any changes on site became more expensive.

About the client



Costain is a leading provider of end-to-end highway services, delivering technology-based engineering solutions for their clients. They provide a full range of highway services, from asset inspection and assessment, scheme development, managing the statutory process, detailed design and construction, commissioning and handover, maintenance and aftercare.



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