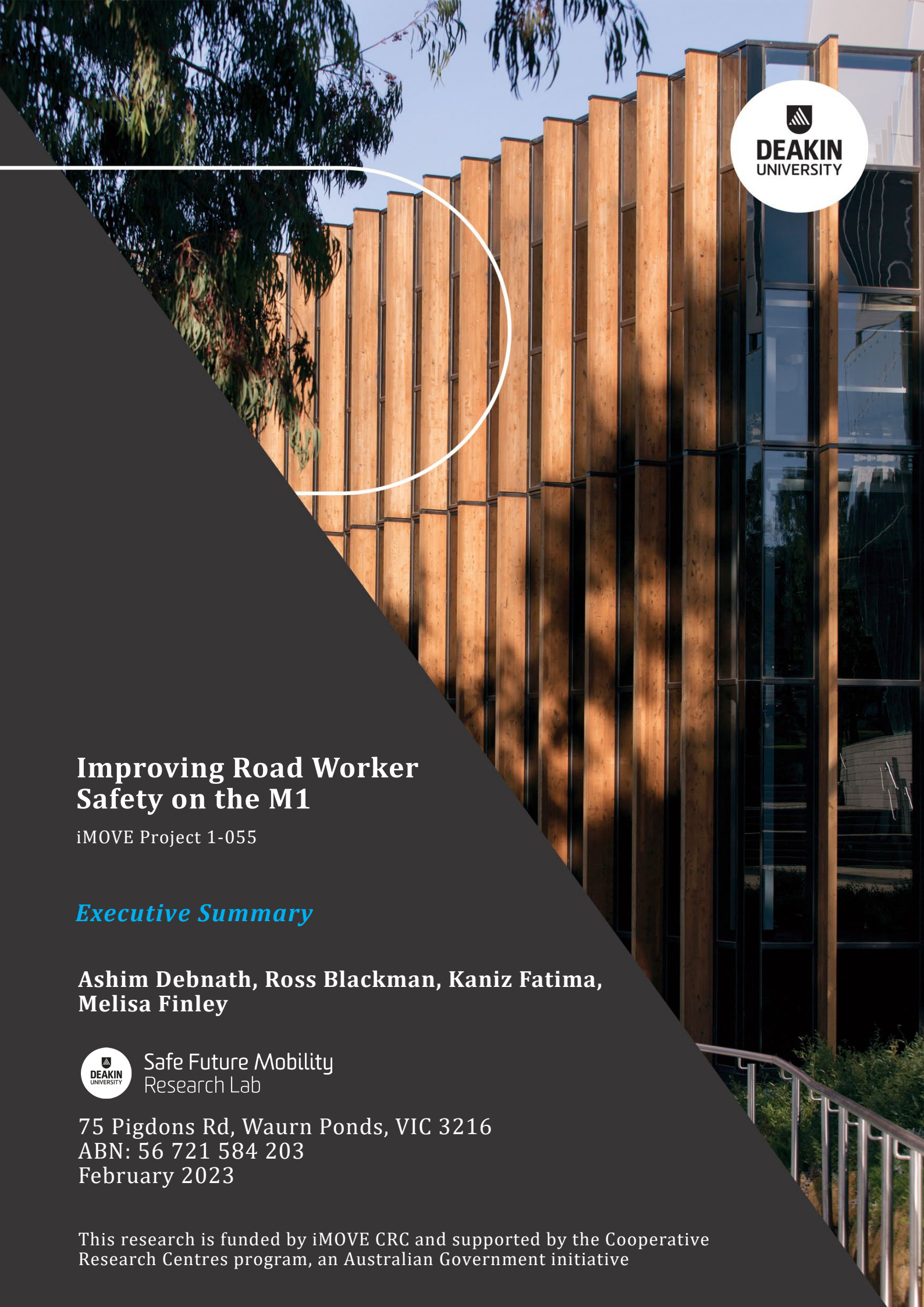

Improving Road Worker Safety on the M1

iMOVE Project 1-055

Executive Summary

Ashim Debnath, Ross Blackman, Kaniz Fatima, Melisa Finley

Safe Future Mobility Research Lab

75 Pigdons Rd, Waurn Ponds, VIC 3216
ABN: 56 721 584 203
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EXECUTIVE SUMMARY

Background and context

The M1 Pacific Motorway connects northern Sydney with the regional city of Newcastle on Australia's east coast, carrying up to three lanes of traffic in each direction over a length of approximately 129km. The M1 is subject to a range of activities that place workers at risk in a live traffic environment, including, maintenance, repairs, incident response, and road and roadside inspections. To improve worker safety, Transport for New South Wales (TfNSW) sought to investigate crash and injury reduction measures, including alternative and innovative methods for the M1 section. In partnerships with TfNSW and iMOVE, Deakin University undertook research activities aimed at achieving the objectives of TfNSW.

Aims, Objectives and Scope

Primary aims of the project were to (1) identify current technologies and innovative work methods for reducing risk associated with M1 operations, and (2) recommend technologies and practices targeting safety improvement for potential future trials.

The recommendations were targeted to achieve three outcomes: (1) remove or reduce the need for workers to be on the road, (2) reduce worker exposure to incidents and minimise incident severity, and (3) ensure control measure effectiveness and ease of use.

Methodology

The project methodology includes five phases:

- Phase 1: Inception, planning, and methodology development
- Phase 2: Understanding work practices and current risks
- Phase 3: Identification of best practices and technologies
- Phase 4: Options analysis and recommendations
- Phase 5: Reporting

At a high level, the project involved a review of the literature and the background materials provided by TfNSW, interviews with workers, consultations with international experts and industry representatives, and options analysis to develop recommendations for future trial. In addition to regularly working with representatives of TfNSW, feedback from TfNSW on an interim report (Deliverable 3 of this project) was obtained which are incorporated in this Final report.

Key findings

The M1 is a high risk workplace for which a wide range of rigorous guidelines, protocols, procedures, administrative and other controls have been developed. Training and induction materials appear to comprehensively address all common highway work zone hazards, and specifically highlight those requiring emphasis or focus in the M1 context. Interviews with workers including traffic controllers, maintenance crews, incident responders and works managers revealed numerous problems, many of which can be addressed at the technical and/or management level to achieve safety improvement.

Findings from the literature review and the expert and industry consultations identified many innovative and promising safety and alternative work approaches. Some of these

are demonstrably effective, while others are yet to be rigorously evaluated or are still in a development stage. These approaches are largely (though not entirely) underpinned and driven by new and emerging technologies and related systems. Smart motorway systems emerge as a basis for many of these improvements. Specific measures were included in the options analysis based on projected outcomes to inform recommendations as follows.

Recommendations

Recommendations are provided for future considerations and trials separately for three application areas: (1) temporary traffic management, (2) alternative work methods, and (3) asset inspection. The recommendations are identified as applicable to planned works (PW), incident response (IR), or both. Note that the recommendations are provided as general recommendations for the M1 section, without making considerations for specific work or site setup, including the location, timing, and context of setting up the solutions noted in the recommendations. In future trials and use, it is strongly suggested that risk assessments, traffic guidance scheme developments, and other relevant approvals are considered before implementing the recommendations on site.

Traffic management solutions	**Planned works**	**Incident response**
Increase variable message signs (VMS) use	Yes	Yes
Variable speed limits	Yes	Yes
Speed feedback and vehicle-activated warning signs	Yes	-
Speed cameras	Yes	-
Increase police presence	Yes	Yes
Automated cone truck	Yes	-
Mobile barrier truck (MBT-1)	Yes	-
Queue warning systems	-	Yes
Errant vehicle warnings	Yes	-
Sequential lighting (traffic guidance)	Yes	Yes
Increase CCTV monitoring (incident monitoring)	-	Yes
Work methods solutions		
Automatic pavement repair truck	Yes	-
Debris removal vehicles & accessories (vacuum & sweeper truck)	Yes	Yes
Increase crossovers/turnarounds	Yes	-
Planning and coordination (e.g., clumping)	Yes	-
Provision of sufficient shoulder width	Yes	Yes
Incident Response Vehicle design and configuration	-	Yes
Remove redundant assets (e.g., shutters)	Yes	-
Asset inspection solutions		
In vehicle Geospatial video, AI (pavement)	NA	NA
In vehicle HD imagery, stills (pavement)	NA	NA
In vehicle Video, sensors (pavement & adjacent assets)	NA	NA
Drone: Video, possible LiDAR 3D models	NA	NA

Contact: A/Professor Ashim Debnath
ashim.debnath@deakin.edu.au

Deakin University
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ABN: 56 721 584 203

Safe Future Mobility
Research Lab