PATREC

ANNUAL REPORT 2025

Planning and Transport Research Centre

May 2026

FINAL

ANNUAL REPORT 2025

Planning and Transport Research Centre

Version

FINAL

About PATREC

The Planning and Transport Research Centre (PATREC) is a collaboration between the Government of Western Australia and local universities, constituted to conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning. The collaborating parties are: The University of Western Australia, Curtin University, Department of Transport and Major Infrastructure, Main Roads Western Australia, Western Australian Planning Commission and the Western Australian Local Government Association.

Publisher

Planning and Transport Research Centre
The University of Western Australia (M087)
35 Stirling Highway, Crawley, WA 6009
+61 8 6488 3385
patrec@uwa.edu.au
https://patrec.org/

Contents

KEY ACHIEVEMENTS IN 2025

86%

Stakeholder satisfaction

$3.412 million

Research income

- Additional to core partner annual subscriptions

6

Core projects completed

- Battery-electric school buses
- e-rideable impacts on the transport task
- Tour-based mode choice model
- Micromobility and freight
- Road safety treatment evaluation
- Automated intersection measurements

9

Core projects progressed

- Enhanced vehicle detection
- Video analytics for active transport
- Roundabout safety review using drones
- Automated on-road freight vehicles
- Satellite imagery for dwelling yields
- Take up rates in higher density/infill areas
- Low-carbon TOD precincts
- Adaptation of active transport network
- Circular economy – transport infrastructure

4

External projects completed

- National Cycling Data & Analysis Platform
- Perth freight route priority trial evaluation
- AI for road maintenance decisions
- Biochar waste in pavements

3

Large external grants secured

- AURIN WA Node ($1,240k)
- National Road Safety Action Grants Program: Safe paths ($787k)
- Australia's Economic Accelerator (AEA) Innovate: RoadSense Analytics ($3,326k)

6

Positive policy impact statements

- Improved strategic transport model
- Inputs to improve freight movement
- Informed Neighbourhood Design policy
- Built awareness of micromobility for freight
- Insights into e-rideable user behaviour
- Informed transition to BEV school buses

58

Publications and presentations

- 12 technical reports/software tools
- 8 news articles published, mostly in conjunction with iMOVE CRC and AURIN
- 8 peer-reviewed journal articles published, related to PATREC research
- 30 presentations made at PATREC connection events and conferences

2

Director external invited roles

- Chair: AURIN Scientific Advisory Committee (National)
- Advisory board member CUPUM (International)

6.4

University ROI

- Non-university income/university investment
- 3-year rolling (2023-25)

1. PURPOSE

The primary purpose of this report is to provide an update of activities conducted in 2025 with a focus on outputs and outcomes achieved. After providing a summary of completed research projects, the report on progress achieved in relation to commencing and current projects core and external projects, highlighting the newly commenced climate action in transport and land use planning projects. Knowledge transfer activities are then reported focussing on research outputs, communication at connection opportunities and events, teaching and training and research impact. Operational aspects of staffing, resources and governance needed to undertake the research is covered next with the report culminating with a summary table of key performance indicator achievements.

2. RESEARCH PROJECT ACTIVITY

2.1. Projects completed

Ten projects were completed in 2025.

Six **core** projects completed:

- Feasibility of battery-electric school bus services in WA: Scaling up the transition
- Impacts of e-rideables on the transport task
- A Tour-based Mode Choice Model using Revealed and Stated Preference Data
- Micromobility and freight – exploring opportunities in WA
- Evaluation of road safety treatments - trial design and evaluation using video analytics
- Pilot - Automated intersection parameter measurement

Four **external** projects completed:

- National Cycling Data and Analysis Platform (NCDAP)
- Perth freight route priority system evaluation trial
- Machine learning and multi-objective optimisation models for enhanced road maintenance investment decision making – extension
- Application of biochar waste in pavement design

Excerpts from the technical reports of the completed projects are provided next as an introduction to the projects. Graphics are only included for illustrative purposes, not for interrogation (too small). Full technical reports can be downloaded from the PATREC website if permission has been obtained to publish.

Feasibility of battery-electric school bus services in WA: Scaling up the transition

PATREC-iMOVE Project ($130,000; November 2024 – May 2025; DTMI, DOE, UWA)

To understand the technical feasibility of transitioning WA school-owned buses to battery electric from current diesel models. This included charging infrastructure, technology availability on the market and suitability of operational capabilities and school operational requirements.

Key findings:

Technical Feasibility

- Electrification of all school-operated buses in WA is technically feasible
- Low driving distances mean power (kW) and energy (kWh) requirements are also very low
- No instance where schools required an electricity upgrade to support e-bus adoption
- Suitable e-buses models are available that meet all technical needs
- Mature inexpensive charging systems are available to meet needs

Financial Feasibility

- Net present cost of e-buses was higher than for diesel buses at 2025 prices due to:
  - low annual distances
  - relatively high prices of e-buses

Emissions and Pollution

- 38% reduction of GHG emissions of the diesel bus fleet (using 2025 factors); up to 51% in 2030 (clean energy generation)
- Will eliminate NOx emissions and significantly reduce PM emissions

Figure 3-2 Ciao purpose built electric school bus, Escolar, Brazil[6]

Impact

- Findings will be used to continue to demonstrate the feasibility of fleet electrification and inform future e-bus purchasing considerations
- Individual cost/benefit analysis reports will provide schools with information to make an informed decision towards reducing their carbon emissions and towards school and community benefits.

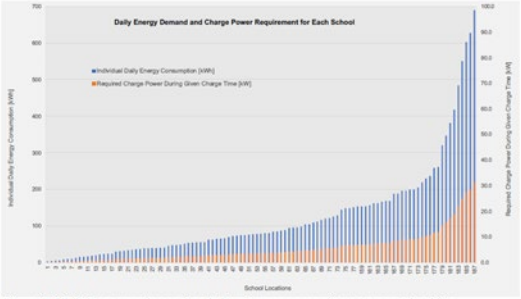
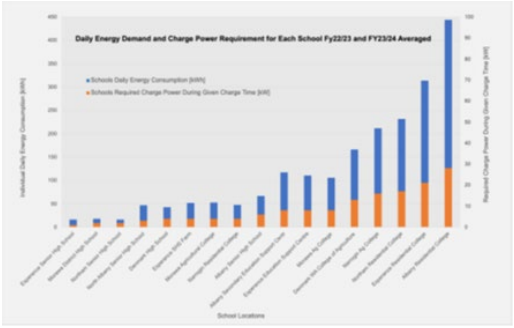


Figure 2-11 Daily energy demand and charging power requirements per school site



Impacts of e-rideables on the transport task

PATREC-iMOVE Core Project ($85,000; January 2024 – Dec 2025; iMOVE, UWA, Curtin, DTMI)

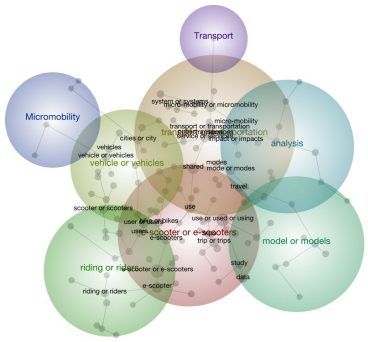
- To build upon and contribute to the growing body of evidence on how the use of e-rideables impact transport in Perth, providing insights into their use and integration with other transport modes
- The project evaluates e-rideable usage patterns in Perth through two data collection stages: an intercept survey and an experiential survey.

Literature review - 4 main themes:

- Sustainability and impacts
- Travel behaviour and adoption preferences
- Safety aspects
  Ffreight applications

Conclusion

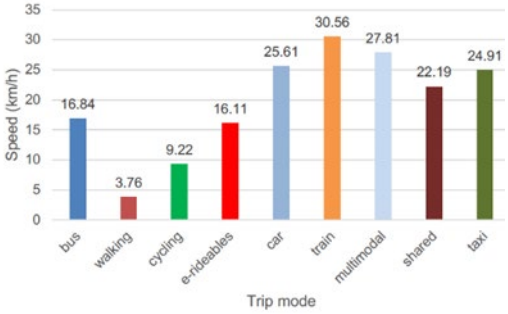
- Use of shared and privately owned e-rideables is distinct
- Future research and policy efforts should be on developing integrated approaches
- Maximising positive impacts while mitigating risks
- Through improved infrastructure, regulation and coordination of transport modes



Intercept survey results

- e-rideables represent a small fraction of active travel
- e-rideables for convenience, environmental friendliness, enjoyment
- Most trips were door-to-door, limiting travel distances
- more separated paths and ability to carry e-rideables on PT could encourage usage
- speed differences between e-riders and other path users a concern

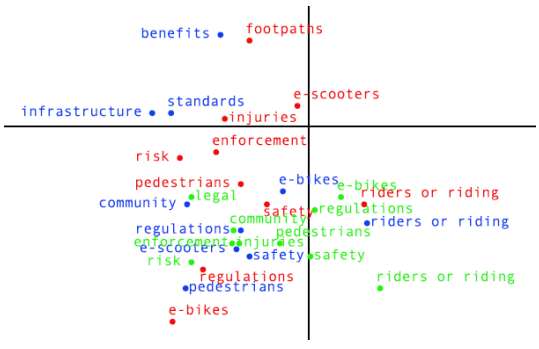
Experiential survey results



- e-rideables for shorter distances, for convenience
- Preference for higher speeds - more than a quarter of trips over 25km/h
- Less than 5% of travel (count of trips)
- Frequency much lower than other active modes
- Two classes of users: commuting and other purposes - weekends, for recreation

Parliamentary Inquiry

- Need for modernised laws
- Safer infrastructure
- User education
- Inclusive planning



Estimating simplified main tour mode using revealed and stated preference data

PATREC-iMOVE Core Project ($100,000; October 2023 – September 2025; iMOVE, DTMI, UWA)

To evaluate the Revealed Preference (RP) and Stated Preference (SP) data collected as part of the Perth Area Travel and Household Survey (PATHS), conducted between 2018 and 2021, with the objective of identifying the occurrence and nature of multi-activity-mode trips i.e. trip chains/tours. The purpose of the analysis was to assess the extent to which the SP data can inform Transport's Strategic Transport Evaluation Model (STEM) in updating the mode choice component for Perth.

Approach

- Profiled household travel patterns, identified the common home-based and non-home-based tours undertaken by Perth households
- Examined quality and usability of SP data, by estimating stand-alone SP choice models and assessing the reasonableness of behavioural outputs: value of travel time savings and transfers, perception of parking cost compared to fuel or fares;
- Estimated a tour-based mode choice model on SP data, augmented by RP, including information on daily tours;
- Estimated tour-based RP mode choice models, considering imputed data for the choice set and attributes
- Estimated a joint RP and SP mode choice model

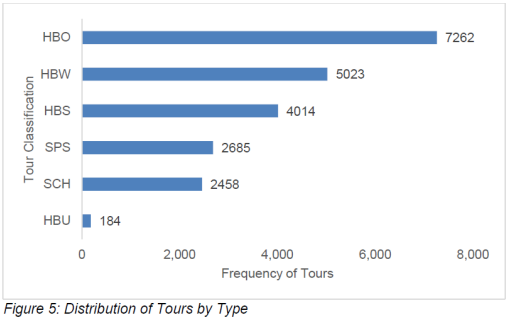
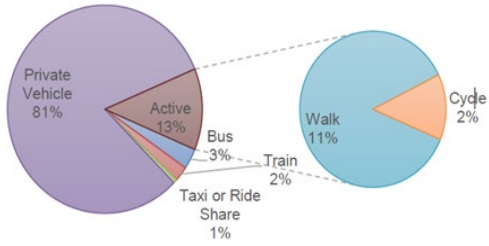
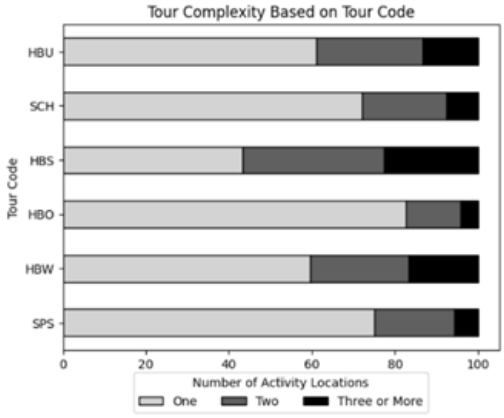


Figure 5: Distribution of Tours by Type





Conclusion

- PATHS dataset offers a robust empirical foundation for building a mode choice model for use in STEM
- RP models outperform SP and donor approaches in explanatory power, behavioural realism, and policy relevance
- SP models are useful for scenario checks, but unsuitable for calibration due to design issues
- Transport investment in Perth should be guided by PATHS-derived RP models, which capture the realities of Perth's car dependence, PT challenges, and urban form, while offering clear evidence on the behavioural levers most relevant for policy

Micromobility and freight – exploring opportunities in WA

PATREC-iMOVE Core Project ($85,000; September 2023 – December 2025; iMOVE, DTMI, Curtin)

To develop knowledge of the current state of micromobility logistics globally, with a particular focus on micromobility logistics in the Australian urban context. This knowledge is intended to inform planning, policy-making and regulatory design in transport and land use planning in Western Australia (WA) to support the development of micromobility logistics that balances the needs of market operators and demonstrates public benefits

Approach

- Examined three primary micromobility categories
  - cargo bike logistics (including e-bikes, tricycles and bicycle trailers)
  - drone logistics (uncrewed aerial vehicles for parcel delivery)
  - autonomous robotic logistics (ground-based delivery devices).overview of key characteristics of micromobility logistics
- Current state of micromobility internationally and nationally
- Emerging trends set to shape micromobility logistics in the next decade.
- Recommendations for WA State Government agencies, local governments, the logistics industry and others interested in the benefits that micromobility logistics could offer in WA

Figure 1 DHL advertise the use electric powered vans for local deliveries in Paris. Source: Curtis, July 2024.

Figure 4 Electric motorbikes used for cargo delivery in inner city Paris. Source: Curtis, July 2024

Recommendations

- Across capacity building, planning frameworks, infrastructure development, knowledge building, market support and space management for each mode
- Priority actions:
  - Establish trial partnership frameworks
  - Develop state-level strategies for each mode
  - Support pilot micro-hubs
  - Create clear guidance for local governments on integrating micromobility logistics into planning processes.

Integrated safety analysis: vehicular dynamics on freeway ramps and road safety interventions in WA regional towns

PATREC-iMOVE Core Project ($161,000; April 2024 – December 2025; iMOVE, MRWA, UWA)

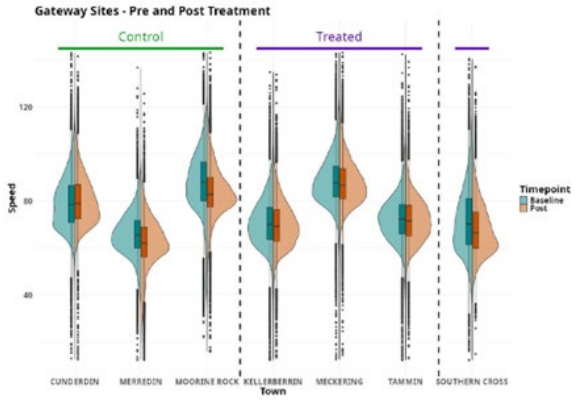
To inform speed management in regional towns and on freeway ramps to not only contribute to the reduction of road trauma but also to provide a model for evidence-based, efficient road safety interventions in WA using an integrated approach of video analytics and more traditional before-after road safety treatment evaluation.

Road safety interventions in regional towns

- In regional towns along major highways, there is an issue with vehicles exceeding speed limits
- Several low-cost treatment options have been proposed to mitigate this
- Conventionally, the effectiveness of these road safety treatments has been gauged using uncontrolled before-after intervention evaluation
- This research evaluates a “Dragon’s teeth” treatment using randomised allocation of sites to treatment or control

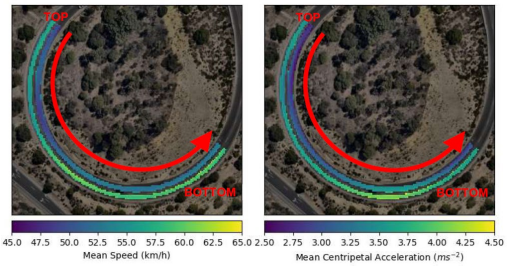
Conclusion

- Did not appear to be a clear beneficial effect of the Dragon’s teeth markings on speed profiles at the installed sites
- For the main speed analysis at the gateway sites, where the Dragon’s teeth markings end, there were small non-significant increases in speeds during the day and small nonsignificant decreases at night
- Speeds within the townships were also mildly elevated during the day relative to the control sites



Vehicular dynamics on freeway ramps

- Freeway ramps have the highest Fatal and Serious Injury (FSI) crash density per kilometre
- Drone videos used to do exploratory analysis of vehicle trajectories to inform different treatment options for future projects



Conclusion

- Vehicles are increasing speed and centripetal acceleration as they traverse down the ramps
- Values higher for vehicles in the outside lane of the two-lane ramp
- Centripetal acceleration is relatively high - large superelevation values would be required if these are to match Austroads design principles
- Clustering results are still preliminary, but there is some evidence of “correcting” behaviour - vehicles also tend to hug the inside of their lanes

This project has been extended to include two AFTER surveys at one of the regional towns.

Automated intersection parameter measurement using aerial photography and computer vision - pilot

PATREC Core Project ($30,000; October 2024 – December 2025; MRWA, UWA)

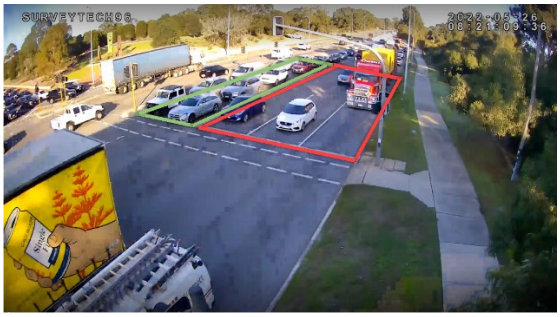
Before embarking on the full-scale project to identify a method and develop a tool for using computer vision to automate the measurement of intersection parameters from aerial photography, this research is a pilot to develop a proof-of-concept to uncover any technical risks inherent in the process.

Challenge

- Intersection modelling requires two broad categories of data, traffic and geometry (intersection layout)
- Currently, measuring intersection design parameters for use in model calibration, and determining whether signal operations comply with policy and guidelines, is largely a manual process, using aerial photography, as-built design, or concept design drawings
- Parameters being measured manually include number of lanes per approach, presence and length of pockets, channelisation treatments, turn radii, length of pedestrian crossings, median width, intersection crossing distance and others
- This project tested the feasibility of automating geometry (intersection layout) data collection from aerial photography to streamline the traffic modelling pipeline

Conclusion

- After testing multiple solutions, the team concluded that there are no immediate, low-cost solutions to this problem



National Cycling Data and Analysis Platform (NCDAP)

External project ($30,000 (UWA); January 2025 – December 2025; ARC LIEF (lead: UNSW), UWA, Curtin, UQ, Monash

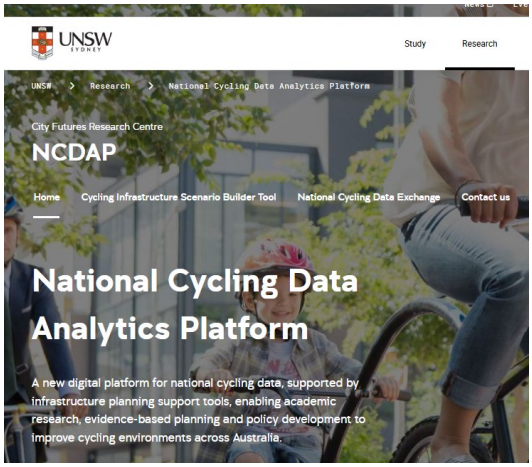
To collect, integrate and communicate new and historic data on cycling infrastructure, attitudes, and behaviours through an open access e-Infrastructure to enable tracking social and cultural changes that influence transport choices, create effective behaviour change programs and prioritise cycling infrastructure investment:

- address the significant issue of data fragmentation
- pilot a national cycling survey
- develop a cycling toolkit to allow exploring and testing various cycling infrastructure scenarios

The project team delivered the National Cycling Data and Analytics Platform that includes:

- A public data portal to collect and share datasets related to cycling and bicycle infrastructure
- A new national survey with 13,600 respondents that covered a broad range of questions on attitudes and behaviours around transport and cycling
- A decision support tool that can predict the new cyclists and new cycling trips that would result from new cycling infrastructure. The tool allows users to analyse potential infrastructure investments across greater Brisbane, Melbourne, Perth and Sydney

https://www.unsw.edu.au/research/ncdap



Perth freight route priority system evaluation trial

External Project ($127,000; June 2024 – May 2025; iMOVE, MRWA, Curtin)

To evaluate the effectiveness of the Freight Route Priority (FRP) system trial of MRWA, along two major freight routes serving Fremantle Ports, which provides traffic signal priority to approaching heavy freight vehicles (HFV) with potential for reductions in travel time, number of stops at intersections, road congestion and emissions as well as enhancing intersection safety.

Conclusion

- Speed/time
  - On Leach Hwy eastbound corridor, enabling priority was associated with a 24 second time gain (3.7% reduction) and an average improved speed of 1.8 km/h (4.4% increase). For the equivalent westbound corridor, enabling priority was associated with a time gain of 33 seconds (4.6% reduction) and an improved speed of 2.2 km/h (5.7% increase) on average
  - The average gain in speed was 1.93 km/h during the pre-holiday period, increased to 3.05 km/h during the holiday period and then decreased to 1.33 km/h post-holidays
  - The gain was unaltered by factors like rainfall, peak periods and incidents in proximity

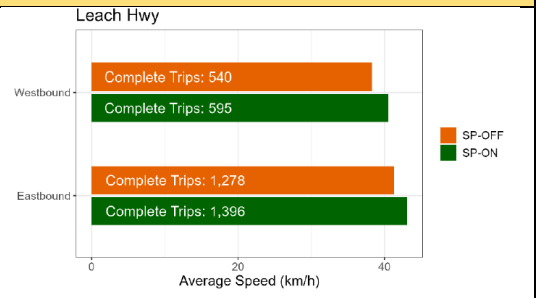
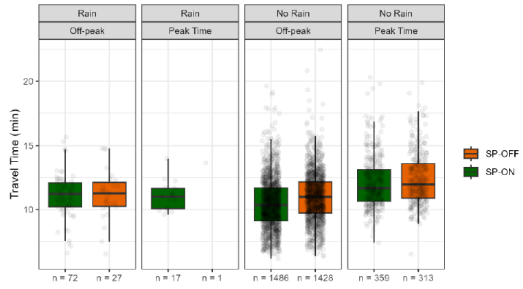


Figure 2. Average speed per trip along the Leach Highway corridor

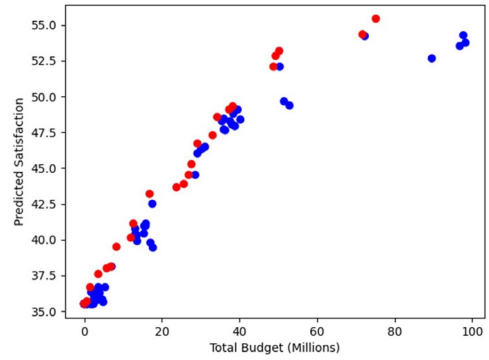


Machine learning and multi-objective optimisation models for enhanced road maintenance investment decision making – extension

PATREC core project ($35,000; January 2025 – June 2025; Main Roads, UWA)

To develop prototype machine learning (ML) and optimisation techniques to enhance road maintenance investment decision-making, by using two complementary approaches:

- Multi-objective optimisation to demonstrate the advantages of this approach over traditional single-objective methods, using the example of minimising cost while maximising customer satisfaction.
- ML methods to test how well expert maintenance priority decisions can be predicted from available data, thereby identifying potential data gaps.



Key findings include:

- The multi-objective approach successfully identified optimal solutions corresponding to different possible trade-offs between cost and satisfaction
- Regional differences in maintenance needs and potential satisfaction improvements were clearly visualised
- Machine learning models achieved limited success in predicting expert decisions, highlighting data gaps

Figure 6: Regional trade-off dashboard demo

Application of biochar waste in pavement design

External Project ($278,000; May 2023 – February 2026; iMOVE, Main Roads, UWA)

To determine whether biochar can improve pavement performance while enabling net reductions in greenhouse gas emissions through a comprehensive evaluation of hot mix asphalt (HMA) modified with three types of biochar, BC-1, BC-2, and BC-5, used as partial replacements for fine aggregates (i.e. 2.5% and 5% of total mass).

The study assessed the mechanical performance, moisture susceptibility, deformation resistance, fatigue behaviour, and carbon sequestration potential of biochar-modified asphalt relative to an unmodified control mix.

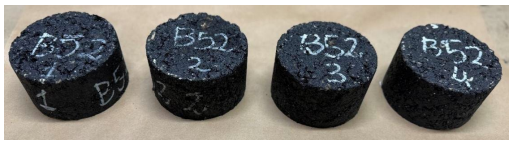


Figure 3-8: Marshall specimens - BC-5 2.5%

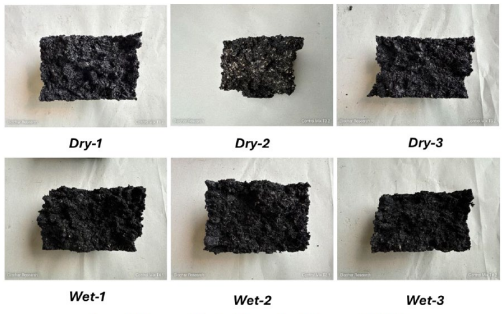


Figure 5-1: Images of broken faces of control mix post TSR tests

Conclusions

Performance - biochar can be incorporated into HMA without compromising essential performance requirements. Fatigue results remain inconclusive.

Moisture resistance - biochar improves Tensile Strength Ratio and reduces stripping potential—an important advantage in pavement durability.

Carbon benefits - when biochar has a high carbon content and is used at appropriate replacement levels, the modified asphalt can achieve net-positive carbon sequestration, supporting climate-positive construction practices.

Practical considerations - differences between biochars matter—density, pore volume, and surface area influence binder absorption, compaction effort, and performance. Biochar types must be carefully selected and mix designs tailored to prevent excessive air voids or stiffness.

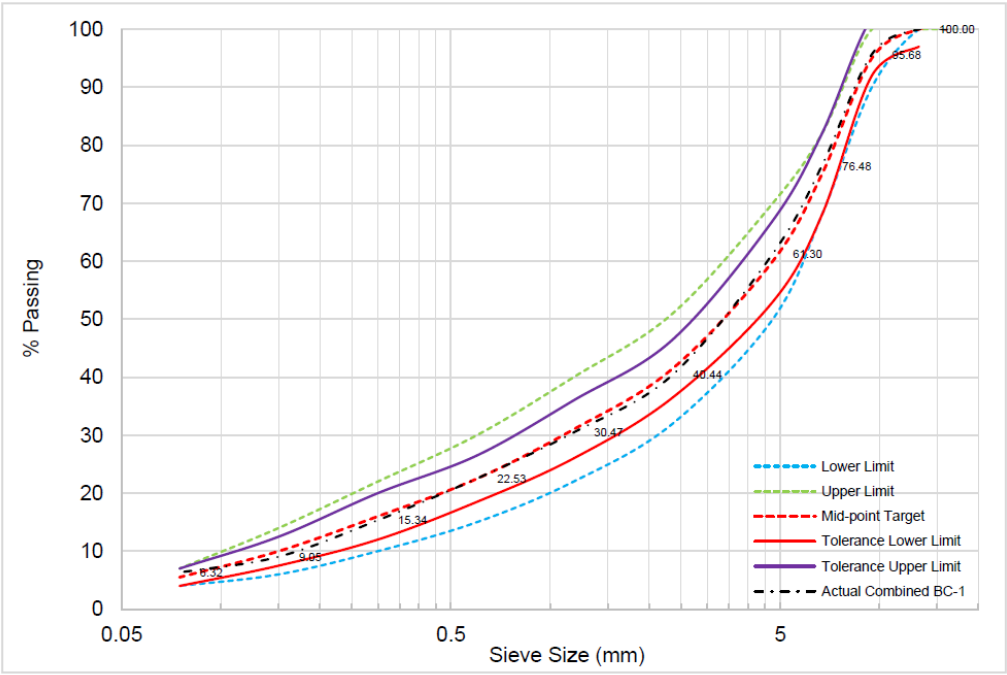


Figure 3-3: Combined PSD and grading limits BC-1 2.5%

2.2. Core projects progressed

Eight core projects from the 2025-27 program of research, commenced and were satisfactorily progressed during 2025 (Table 1). These are due for completion by the end of 2026 as the final round of iMOVE CRC projects. The 2019-21 project: Enhanced vehicle detection, delayed for a number of years while sensors were being acquired (COVID delays) and installed at selected intersections and on smart freeway sections, recommenced in late 2025 once installation had been completed and sensor data collection commenced.

Table 1: Status of core projects commenced and progressed in 2025

Project Title	Key Agency	Research team	Progress as at 31 December 2025
2019-21 core program of research - all completed except			
Enhanced vehicle detection at traffic signals and smart freeways	MR	UWA	Recommenced
2025-27 core program of research (fast-track and replacement projects)			
Assessing the efficacy of video analytics for comprehensive active transport	DTMI, MR	UWA	30% completed
Roundabout safety review using drone video analytics	MR	UWA	30% completed
Preparing WA to deploy automated on-road freight vehicles	DTMI, MR	UWA, Curtin	30% completed
A satellite imagery-informed deep learning approach to estimate and forecast Perth's dwelling yields	DPLH	UWA	20% completed
Take up rates – future dwelling capacity and yield forecasts in higher density or infill areas	DPLH	Curtin	10% completed
Low-Carbon Transit-Oriented Development Precincts	DPLH	UWA	30% completed
Evidence-based climate adaptation strategies for Perth's Primary Network for Active Transport	MR, DTMI, DPLH	UWA	30% completed
Mapping the circular economy of WA – the case for transport infrastructure from a system-wide perspective	DTMI	Curtin	10% completed

2.3. External projects progress

Significant progress was made on external projects - those which do not receive core funding (Table 2).

Three major grants were secured, commenced and progressed:

- National Critical Research Infrastructure Strategy (NCRIS), AURIN WA Node to support climate action in transport and land use planning research, with UWA, Curtin, DEED ($1,240,000)
- National Road Safety Action Grants Program: Safe paths – enhancing active transport infrastructure through video analytics and community reporting, with UWA, City of Stirling, Main Roads WA ($787,500)
- Australia's Economic Accelerator (AEA) Innovate: RoadSense Analytics – AI-enabled traffic intelligence, with Main Roads WA, Surveytech, Stech cameras ($3,326,742)

One new opportunity was investigated and progressed:

- Future Freight CRC Bid – PATREC, UWA and Curtin engaged with the Bid team to build WA representation with Ports WA committing to participation

Table 2: Summary of status of external projects and opportunities for 2025

Project title	Key agency	Research Lead	Status as at 31 December 2025
AURIN WA Node to support climate action in transport and land use planning research	NCRIS	Sharon Biermann	Behind schedule – contracting and recruitment issues. Alternative secondment arrangement underway. Extension to mid-2028 agreed by AURIN and DEED
Safe paths – enhancing active transport infrastructure through video analytics and community reporting	National Road Safety Action Grants Program, Main Roads, City of Stirling	Chao Sun	On track. Recruitment mostly completed.
RoadSense Analytics – AI-enabled traffic intelligence	Australia's Economic Accelerator (AEA) Innovate, Main Roads, Surveytech, Stech cameras	Chao Sun	On track. Recruitment mostly completed.
New opportunity - Future Freight CRC - Bid		*Sharon Biermann*	*Under investigation. Stage 1 Bid submission due March 2026. UWA and Curtin running processes. Ports WA involvement secured.*

3. KNOWLEDGE TRANSFER

3.1. Research outputs

The focus of PATREC's research outputs in 2025 was, as is usually the case, on technical reports, of which there were 11 completed and accepted (Table 3). There was one web platform produced for the ARC LIEF National Cycling Data and Analysis Platform (NCDAP).

Eight peer-reviewed journal papers were published in 2025 (Table 3) with five journal papers still in process (submitted, re-submitted) (Table 4). An outstanding number of 30 presentations were delivered by PATREC associates at conferences, PATREC forums and other industry-organised events (Table 5). Eight news articles on PATREC-research were published mostly on the iMOVE website with links to the PATREC website (Table 3).

Table 3: Research publication outputs in 2025

Publication Title	Authors	Date
RESEARCH PROJECT TECHNICAL REPORTS COMPLETED		
Evaluation of HVO renewable diesel trial on the Byford Rail Extension Project in WA *(project counted as complete in 2024 but report finalised and counted in 2025)*	Yun Yu, Md Maksudur Rahman and Zhiliang Wu	May 2025
Perth freight route priority system evaluation trial	Andrew Grose, Ritu Gupta and Tele Tan	May 2025
Machine learning and multi-objective optimisation models for enhanced road maintenance investment decision making (extension)	Tom Lymburn, Sergio Banchero, Daniel Demiris and Chao Sun	June 2025
Improving SIDRA roundabout modelling using drone video analytics (with extension) (project counted as complete in 2024 but the 2nd final report completed and counted in 2025)	Max Davidson, Tom Lymburn, Sergio Banchero, Samson Ting, Thomas Stemler and Chao Sun	Dec 2024
Feasibility of battery-electric school bus services in WA: Scaling up the transition	Thomas Bräunl, David Harries, Mark P McHenry, Guido Wager and Sharon Biermann	Aug 2025
Impacts of e-rideables on the transport task	Doina Olaru, Tristan Reed, Sharon Biermann, Brett Smith and Courtney Babb	Mar 2026
Estimating Simplified Main Tour Mode Using Revealed Preference and Stated Preference Data	Brett Smith, Doina Olaru, Tristan Reed, Hugo Nilsson and Max Davidson	Sept 2025
Micromobility and freight - Opportunities for WA	Courtney Babb, Carey Curtis and Stephen Kovacs	Dec 2025
Integrated Safety Analysis: Vehicular Dynamics on Freeway Ramps and Road Safety Interventions in WA Regional Towns	Matt Albrecht, Sergio Banchero, Tom Lymburn, Paul Roberts and Chao Sun	Mar 2026
Application of biochar waste in pavement design	Marcos Magalhaes, Colin Leek, Yuxia Hu and Chao Sun	Mar 2026
Pilot - Automated intersection parameter measurement	Chao Sun and Sergio Banchero	Mar 2026
OTHER OUTPUTS		
National Cycling Data and Analysis Platform (NCDAP) https://www.unsw.edu.au/research/ncdap		Jan 2026

PEER-REVIEWED JOURNAL PAPERS PUBLISHED
Garima, Olaru, D., Smith, B., & Siddique, K. H. (2026). Farm-level adaptations to harvest logistics constraints in export-oriented grain systems. *Agricultural Systems*, *231*, 104565.
Knight, C., McLarnon, M.J., Olaru, D., Lee, J. & Parker, S.K., (2025). Hybrid work design profiles: Antecedents and well-being outcomes. *Journal of Vocational Behavior*, p.104174.
Gannett, A., Hooper, P., Saunders, J. & Trapp, G., (2025). Exploring preferences for interventions to increase active school transportation among children and adolescents in Australia. *Journal of Transport & Health*, 44, p.102154.
Webb, D., Olaru, D., & Rastin, C.J. (2025) Unlocking Motivation for Energy Saving: A Study of German Electricity Consumer Segments", *Energy Research and Social Science*, 125, 104082.
Bolleter, J, Edwards, N, Cameron, R, & Hooper, P (2024). Density my way: Community attitudes to neighbourhood densification scenarios. *Cities*, 145, 104596. doi:10.1016/j.cities.2023.104596
Ting, S, Lymburn, T, Stemler, T, Sun, Y & Small, M. (2025). Estimating Gap Acceptance Parameters with a Bayesian Approach. *Transportation Research Part B: Methodological,* 192, p.103157
Jiang, Z., Wu, C. & Chung, H. (2025). The 15-minute community life circle for older people: Walkability measurement based on service accessibility and street-level built environment–A case study of Suzhou, China. *Cities*, *157*, p.105587.
Olaru, D, Smith, B, Reed, T & Biermann, S (2026). Travel and satisfaction changes in response to working from home (WFH) in Perth, Western Australia. *European Journal of Transport and Infrastructure Research* (accepted for publication, 1/12/25)
NEWS ARTICLES PUBLISHED
https://aurin.org.au/announcing-the-aurin-wa-node-advancing-climate-action-and-sustainable-planning-in-western-australia/
https://imoveaustralia.com/project/mapping-was-circular-economy-stage-2-transport-infrastructure/ (published 24/7/25)
https://imoveaustralia.com/project/preparing-wa-to-deploy-automated-on-road-freight-vehicles/ (published 17/7/25)
https://imoveaustralia.com/project/project-outcomes/towards-a-science-based-circular-economy-observatory-for-wa/# (published 16/7/25)
https://imoveaustralia.com/project/project-outcomes/working-from-home-greater-perth/ (published 11/6/25)
https://imoveaustralia.com/project/evidence-based-climate-adaptation-strategies-active-transport/ (published 27/5/25)
https://imoveaustralia.com/project/satellite-imagery-and-ai-to-enhance-dwelling-yield-forecasting/ (published 18/9/25)
https://imoveaustralia.com/project/future-dwelling-capacity-and-yield-forecasts-perth/ (published 17/9/25)

Table 4: Journal papers in-progress in 2025 (Submitted, Re-submitted, Under Review)

Journal Papers in progress
Cummins, L., Sun, Y., Reynolds, M., Intelligent Pick-up and Drop-off System for Passenger vehicles, *Journal of Urban Technology*.
Lin, X., Hu, Y., Leek, C., Sun, Y., Sarker, P. Fatigue and Rutting Resistance of Asphalt Mix Modified by Recycled Soft Plastics and Recovered Toner. *Construction and Building Materials*.
P. Hooper, N. Edwards, F. S and J. Bolleter. Do fears become reality? Evaluating community experiences before and after a higher density infill development. *Journal of Housing and the Built Environment*.
Grace, B., Bolleter, J., Lund, C., Belia, W (2025). Accounting for greenhouse gas emissions in the planning for suburbs: a Western Australian perspective. *Sustainable Cities and Society*.
Kiffin-Petersen S., Purchase P., Olaru D. and Smith A Prototype Analysis of Trust in Autonomous Vehicles (AVs), 3rd round revision, *Transportation Research Part A*.

Table 5: Seminar, conference presentations in 2025

SEMINAR/EVENT/CONFERENCE PRESENTATIONS
Smith B., Olaru D., and Loyola M. (2025) Integrating solar energy into electric vehicle charging: User preferences in Western Australia, ATRF 18-21 Nov 2025, Auckland, New Zealand**.**
Roberts, P, Banchero, S & Sun, Y (2025) Evaluating Zigzag Pavement Marking for Speed Reduction at Pedestrian Crossings. *2025 Australasian Road Safety Conference* Oct, 2025.
Olaru, D, Reed, T W, Smith, B, Biermann, S, & Babb, C (2025) Motivations behind private e-rideable use in Perth, WA", ATRF 18-21 Nov 2025, Auckland, New Zealand.
Chen, J & Wu, C (2025) PINN-KD: a physics-informed knowledge distillation framework for vehicle trajectory prediction. *46th Australasian Transport Research Forum*, Auckland, 18-21 November 2025.
Kiss, I, Grose, A, Boufajreldin, Z, & Gupta, R (2025) Freight Vehicle Traffic Signal Priority trial implementation and outcomes, *Intelligent Transport Systems, Australia, Mobility Summit*, 2025.
L. Le, H. Allan, T. Bräunl, Evaluation of 3D SLAM on a Shuttle Bus Equipped with Limited Sensors Using Sensor Fusion and Calibration Techniques, *Australasian Conference on Robotics and Automation (ACRA 2025)*, 1-3 December 2025, Perth.
K. Quirke-Brown, Z. Lai, L. Le, Z. Li, T. Bräunl, An Overview of Shuttle Bus Systems on Campus and Urban Areas, *Australasian Conference on Robotics and Automation (ACRA 2025),* 1-3 December 2025, Perth.
Biermann, S, Chi, S, & Reed, T (2025) Measuring the Risk of Transport Disadvantage in Perth, Australia. *Computation Urban Planning and Urban Management (CUPUM) conference, London 23 – 27 June 2025*, UCL's Bartlett's Centre for Advanced Spatial Analysis, London.
Pillai, J, Izadpanahi, P & Nematollahi, S (2025) Virtual Reality as a collaborative tool in road planning: Insights from a case study in Perth, Western Australia. *Computation Urban Planning and Urban Management (CUPUM) conference*, London 23 – 27 June 2025, UCL's Bartlett's Centre for Advanced Spatial Analysis.
Izadpanahi, P, Lieske, S & Leao, S (2025) Towards Net Zero: Converting Car Commutes to Bicycling in Australia. *Computation Urban Planning and Urban Management (CUPUM) conference*, London 23 – 27 June 2025, UCL's Bartlett's Centre for Advanced Spatial Analysis.
Wu, C (2025) Spatial Analysis of Road Infrastructure Impact on Crash Frequency in a Low-Density City. 57th UTSG Annual Conference, Dublin, 25-27 June 2025.
Reed, T, Biermann, S, Smith, B & Olaru, D (2025) Unlocking the potential of e-rideables: Perth insights, *Transport Research Symposium* May, 2025.
Kong, X, Liang, L, Quirke-Brown, K, Lai, Z, Olaru, D, & Bräunl, T (2025) A Generative Self-diagnosis Disengagement Reporting System for Autonomous Shuttles, *36th IEEE Intelligent Vehicles Symposium IVS 2025*, 22-25 Jun, Cluj-Napoca, Romania.
Babb, C, Curtis, C & Kovacs, S (2025). Pathways for Cargo Bike Logistics in Australian Cities: Global Lessons, Local Solutions for Implementation and Scaling. *State of Australasian Cities*. Brisbane, Queensland. December 2-5, 2025

PATREC Research Forum – Climate Action – 1 May 2025 • Beyer, S, Bryan, J & Biermann S (2025) Strategic context for climate action research in relation to planning and transport • Bolleter, J & Grace, B (2025) Accounting for carbon in the planning for residential neighbourhoods • Braunl, T (2025) Feasibility of battery-electric buses for regional school bus services in Western Australia • Marinova, D & Hopkins, J (2025) Mapping the circular economy of WA – monitoring the contributions of circularity towards achieving Net Zero • Sun, C (2025) Use of biochar waste in carbon capture and reduced emissions
PATREC Research Forum – traditional program – 29 October 2025 • Estimating Simplified Main Tour Mode Using Revealed Preference and Stated Preference Data, Brett Smith • Integrated Safety Analysis: Vehicular Dynamics on Freeway Ramps and Road Safety Interventions in WA Regional Towns, Tom Lymburn • Modelling Agents of Disruption: Humans, AVs and Drones, Chao Sun • Micromobility and Freight – Exploring Opportunities in WA, Courtney Babb • Impacts of e-rideables on the Transport Task in WA, Doina Olaru
UWA Data Institute Research Bytes Forum on 18 Sept 2025: presentation by Chao Sun: Agents of Disruption: Humans, AVs and Drones
Tristan Reed: Raising the Bar, Perth 20 Oct 2025 Believe your eyes? Think again! Why you can't afford to ignore deepfakes
• AUDRC presentations o Julian Bolleter: A platform for Urban Design in the 21st Century at the Urban Design Forum June 2025 o Julian Bolleter/ Bill Grace: Infrastructure WA briefing on current research March 2025 o Julian Bolleter/ Bill Grace: Development WA briefing on current research September 2025 o Julian Bolleter/ Bill Grace: Department of Planning Lands and Heritage, Liveable Neighbourhoods review team briefing on current research, July 2025

3.2. PATREC connection opportunities and events

PATREC arranged and hosted four events in 2025:

- 1 May 2025 - Climate Action Research Forum held in the afternoon, at 140 William Street
- PATREC Research Forum (traditional program) held on 29 October 2025 in the morning, at 140 William Street
- 19 March 2025 - John Taplin Memorial Lecture 2025. Sustainable Transport: The Role of City Design in Achieving Zero Emissions, presented by Professor Mark Stevenson (60 people attended)
- 19 March 2025 - DoT-hosted discussion with Prof Mark Stevenson: Sustainable transport and urban planning futures – the critical intersection of transport, planning, health and the environment (25 people participated)

Media opportunities:

- Media - Brett Smith: Commutes taking longer
    - Perth commuters, is your drive to work taking longer? You're not imagining it https://www.watoday.com.au/national/western-australia/perth-commuters-is-your-drive-to-work-taking-longer-you-re-not-imagining-it-20251006-p5n0g8.html
    - The daily grind: Why drivers are spending more time on Perth roads https://www.6pr.com.au/the-daily-grind-why-drivers-are-spending-more-time-on-perth-roads/
    - Segment on Channel 9
- Media - Brett Smith: Smart freeways

- ABC online https://www.abc.net.au/news/2025-02-04/perth-smart-freeway-mitchell-kwinana-freeway/104872328
- ABC TV https://www.abc.net.au/news/2025-02-04/just-how-smart-is-perths-new-smart-freeway/104892738

3.3. Teaching and training

Included here is PhD activity directly relating to PATREC projects and/or Higher Degree by Research (HDR) supervision by PATREC staff (Sharon Biermann and Chao Sun), usually co-supervising with other UWA academics. PATREC Associates at both partner universities would usually have HDR students not captured as directly relating to PATREC.

- Completed 2025 - Samson Ting (PhD) - using a data-driven approach to improve intersection modelling - co-supervised by Chao Sun and Thomas Stemler, UWA Mathematics, (PATREC and iMOVE top-up scholarships)
- Continuing
  - Liam Cummins (PhD) – "Intelligent Pick-Up and Drop-Off" - co-supervised by Chao Sun and Mark Reynolds, UWA Computer Science
  - Hugo Nilsson (PhD) - co-supervised by Chao Sun and Doina Olaru UWA Business School
- Completing
  - Xiaoyu Lin (PhD) - recycled soft plastics in pavement - co-supervised by Chao Sun and Yuxia Hu, UWA Civil Engineering (submitting April 2026)
  - Anna Gannett (PhD) – directly related PATREC project: Transport Environment and Kids…15 years on - creating an evidence base to inform targeted interventions to increase active school transport in primary and secondary school students in Perth (submitting 2026)

In addition to PhD supervision, Curtin's circular economy project's Stage 1 report is being used in teaching the undergraduate course on Urban and Regional Planning at Curtin University (accredited with the Planning Institute of Australia).

3.4. Research impact

3.4.1. Research project feedback

For completed core projects and selected external projects, steering committee chairs/representatives are asked to provide feedback on the output quality and value for policy formulation via a close-out report. Key statements have been captured from these close-out reports to summarise research impacts achieved. For some projects completed in 2024, close-out reports were received in 2025 and included here.

- **Feasibility of battery-electric school bus services in WA: Scaling up the transition** (DoE buses) (core) - "provided a clear understanding of technical feasibility…it will be used to continue to demonstrate the feasibility of fleet electrification…will inform future e-bus purchasing considerations. It will be particularly useful to the case study schools…individual cost/benefit analysis reports will provide the schools with information to make an informed decision towards reducing their carbon emissions and towards school and community benefits" (Callie Cummins, DTMI and Anne Sashegyi, DoE, 24 September 2025)

- **Tour-based mode choice model using revealed and stated preference data** (core) - “many practical policy implications and recommended a set of tour mode choice models to use and a clear path forward for implementation, which is valuable…PATREC put a lot of extra efforts into this challenging and complex project…ensure good quality of research products were delivered… important conclusion…model better and more suitable for transport infrastructure investment decision-making practice” (Renlong Han, DTMI, 30 September 2025)
- **Perth Freight Route Priority System Evaluation Trial** (external) – “The results demonstrate meaningful gains in speed for heavy freight vehicles (HFV) and tangible environmental impact on a corridor optimised for the coordination of traffic signals. The results are promising; however, further testing on both optimised and non-optimised routes is needed to assess the broader impact on HFV’s mobility and environmental benefits” (Ziad Boufajreldin, Main Roads, 28 July 2025).
- **Accounting for carbon in the planning for new residential suburbs** (core) – “The research outcomes are valuable inputs to both the Neighbourhood Design policy development project, and the department’s broader review of the planning system’s ‘fitness for purpose’ for the low carbon built environment future we need as we transition to Net Zero… we welcome further collaboration with PATREC / AUDRC as part of Stage 2 of this project… each of the deliverables were of a high standard and feedback was incorporated at all stages” (Callie Cummings on behalf of Steve Beyer, DTMI and Melinda Payne, DPLH, 15 April 2025)
- **Micromobility and freight: Opportunities for WA** – “This…investigative piece…is an important piece to start the conversation and build awareness of opportunities, which it has done. The literature review and research components were extensive and well-considered. The workshop component was well attended, positively facilitated and provided valuable insights. The final report was high quality and provides valuable information to inform next steps” (Sarah Court, DTMI, 2 February 2026)
- **Impacts of e-rideables on the transport task in WA** (core) – “This is the first time DTMI have sought a deeper understanding of personal e-rideable users and their impact on the transport system. By virtue of some of the difficulties experienced by the researchers … [experiential survey], this provides substantial insight for DTMI to inform future research methods for the collection of e-rideable user behaviour … intercept survey provides important insight into the profiles of users, and we anticipate further research … to understand this cohort further” (Michelle Prior, DTMI, 11 March 2026)

3.4.2. Awards, external board roles

The Director continued to serve as Chair of the **AURIN Scientific Advisory Committee** (SAC) and as a member of the international CUPUM Advisory Board (Computational Urban Planning and Urban Management).

Building on PATREC research, research associates were awarded tenders and grants (not managed through PATREC) as follows:

- Boorloo Bridge evaluation tender (DTMI) – awarded to Doina Olaru and team, UWA Business School – building on the relationships and project experience gained in the PATREC/iMOVE e-Rideables project as well as previous active travel projects
- Mid-career industry fellowship (Commonwealth) awarded to Jun Li, Curtin – Digital Twin and Vision-based Techniques for Bridget Health Monitoring – building on the relationships and project experience from PATREC/iMOVE project: Integrated IoT, computer vision and machine learning technologies for smarter bridge health monitoring and prediction

3.4.3. Stakeholder satisfaction survey results

The satisfaction survey for 2025, was conducted in March 2026, circulated to 110 stakeholders directly involved in PATREC research during 2025, with a response rate of 25% (n=27). University partners comprised 44% of respondents, with 52% government respondents and 4% “other”. A percentage overall satisfaction rate of 86% was achieved. This is down 7% from 2024 when the highest score ever (93%) was achieved (Figure 1a). The difference from 2024 is largely driven by a shift of around 43% government responses from ‘strongly agree’ to ‘somewhat agree’ (36%) and ‘somewhat disagree (7%) (Figure 1b).

96% of all respondents agree (‘strongly agree’ (63%) and ‘somewhat agree’ (33%) they are satisfied with PATREC performance (Figure 2a). Highest satisfaction (‘strongly agree’) was in relation to advancing knowledge (Q7), interactions (Q4) and extending networks (Q8) (Figure 2b). Lowest levels of ‘strongly agree’ relate to bridging the gap between research and policy (Q9) and understanding each other’s needs (Q6 (Figure 2c). More detailed results for each question are provided in Figure 3.

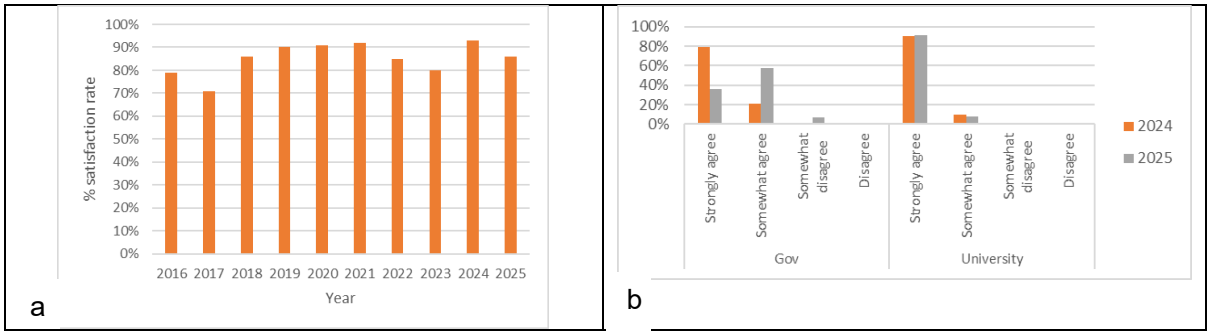


Figure 1: Trends in overall satisfaction with PATREC’s performance

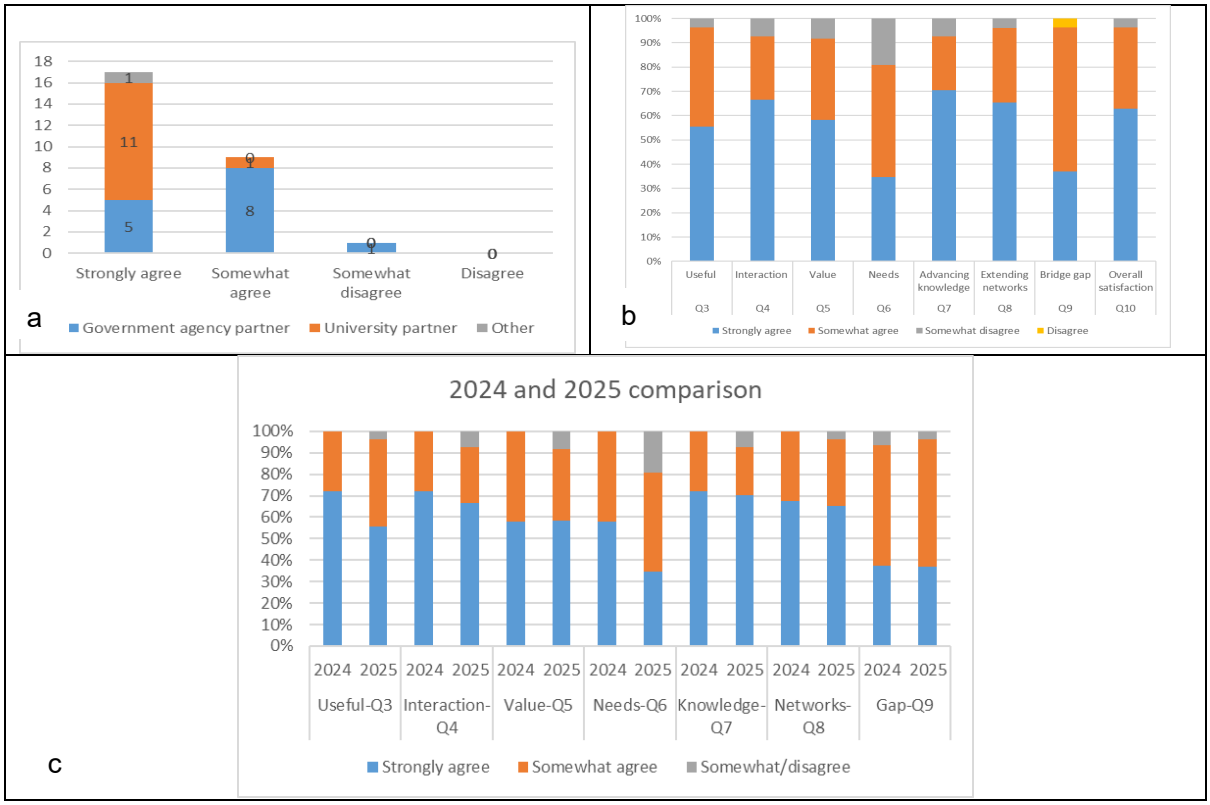


Figure 2: 2025 PATREC satisfaction survey response by group (a) and question (b) and a comparison between 2024 and 2025 (c)

Suggestions for improvement as provided by respondents (direct quotes):

- Projects may benefit from early discussion of policy/practice context to shape study design and method selection and how communication of findings can be most relevant to intended audience. Sometimes academic style impedes translation of results and implications in ways that are appropriate for those who could take these into their ongoing work.
- Greater focus on Applied research which would be more easily translated into action.
- One area that could further enhance PATREC's performance is strengthening the communication and visibility of research impact. PATREC supports a number of high-quality projects, but the broader value and outcomes of this work are not always clearly communicated to stakeholders outside the immediate research community. Developing clearer narratives around the real-world impact of funded research, including policy influence, industry adoption, and community benefits, would help demonstrate the value of PATREC's investments. In addition, PATREC could consider expanding its strategic communication channels to better highlight project outcomes, success stories, and translational impacts. This may include more regular dissemination through concise impact summaries, case studies, policy briefs, and industry-focused updates. Strengthening engagement with government agencies, industry partners, and the public through targeted communication would further position PATREC as a key driver of applied research that supports transport policy, planning, and innovation.
- It would be great if PATREC could organise an annual meeting bringing together universities and government partners to discuss ongoing research and identify opportunities for future collaboration.
- A regular update on possible projects will be great for resource management
- More collaboration is needed in developing the research topics 2- the team would benefit from stronger project management practices. 3- Academic commitments continue to challenge the team's cohesion, collaboration, and overall availability throughout the projects
- More research related to actual real life problems.
- Some form of project management training is required to ensure University participants understand the need to meet Scope and timeframes
- Main issue I find with research projects from universities is they have the answer and test for the positive answer. Not all research has a positive outcome, and this factual information is as valuable as a positive outcome. I find the research is biased for an answer and information which disproves the project is shuntered away or removed.

Suggestions for the survey:

- Allow to go back to the previous questions please

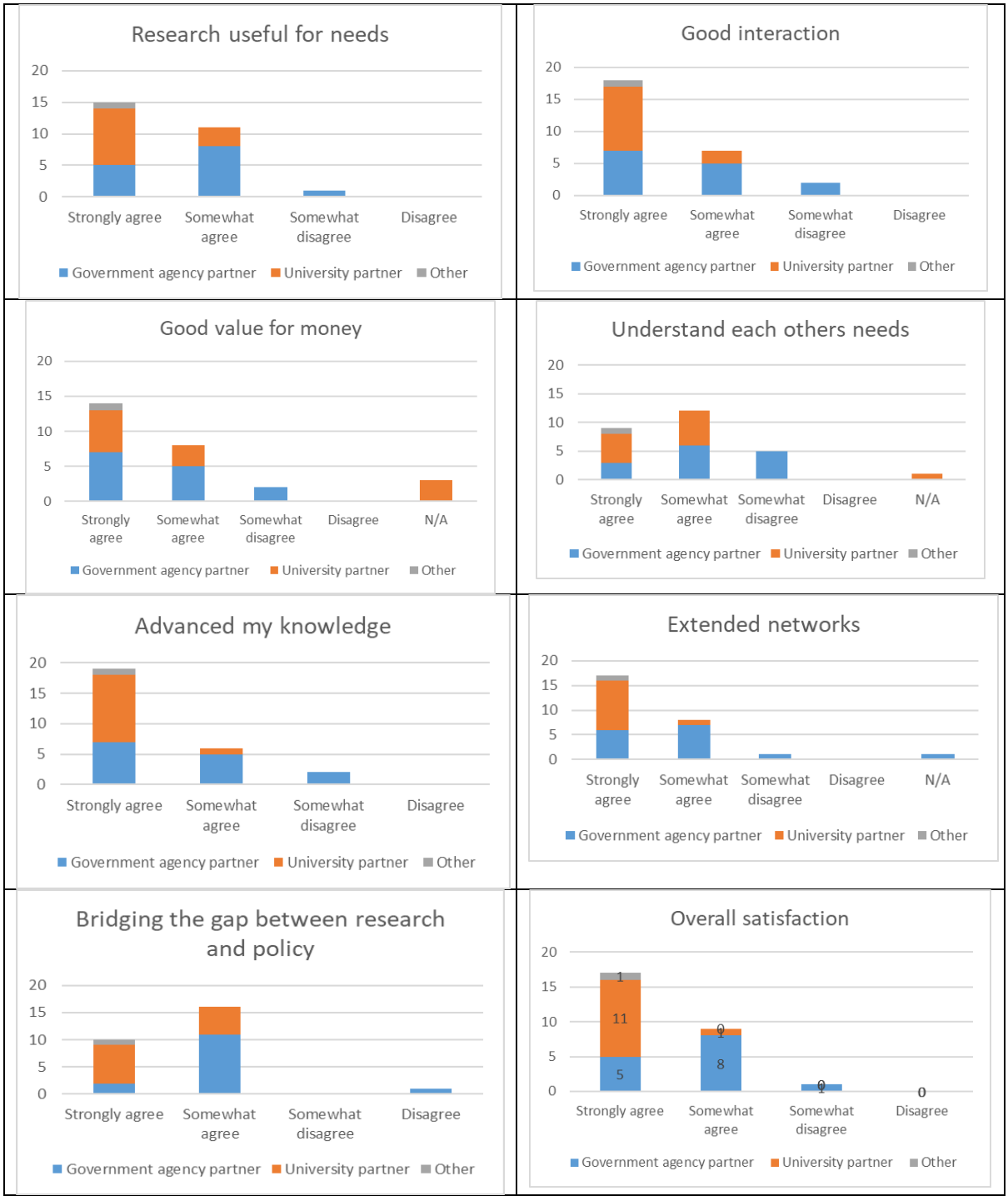


Figure 3: Individual question results

4. PEOPLE AND RESOURCES

4.1. Staffing

With leadership, administration and coordination by a small PATREC core team, a much wider team of PATREC project research associates from across partner universities and with some support from adjuncts, consultants and PhD students, were involved in conducting policy-informing, applied research in 2025.

The research team assembled to ensure resourcing to deliver on concluding and commencing core and external projects in 2025 is presented in Table 6. The new climate action program has broadened the range of expertise included in the PATREC team. Casual and fixed term contract staff play a vital role in delivering on the research.

In addition to the core team, PATREC involves a number of academics who are employed full time by partner universities to conceptualise and lead projects, direct research assistants, undertake research and identify opportunities (Table 7). Limited use is also made of consultants where relevant expertise is not available within the partner universities.

Table 6: PATREC project researchers in 2025

Sharon Biermann	PATREC office - Director
Charise Baker	PATREC office - Senior Administrative Officer
Chao Sun	PATREC Research Associate Professor – AI for transport analytics lead
Len Webel	PATREC Research Officer/Fellow – AI for transport analytics team
Sergio Banchero	PATREC Research Officer/Fellow – AI for transport analytics team
Liam Cummins	PATREC Research Officer/Fellow – AI for transport analytics team
Tom Lymburn	PATREC Research Officer/Fellow – AI for transport analytics team
Max Davidson	PATREC Research Officer/Fellow – AI for transport analytics team
Samson Ting	PATREC Research Officer/Fellow – AI for transport analytics team
Sheldon Feng	PATREC Research Officer/Fellow – AI for transport analytics team
Xiaoyun Liu	PATREC Research Officer/Fellow – AI for transport analytics team
Shun Fu	PATREC Research Officer/Fellow – AI for transport analytics team
Jinghe Yang	PATREC Research Officer/Fellow – AI for transport analytics team
Rahul Devaskar	PATREC Research Officer/Fellow – AI for transport analytics team
Doina Olaru	Research Associate, UWA Business School
Tristan Reed	Research Associate, UWA Business School
Lillian Wu	Research Associate, UWA School of Engineering
Miguel Loyola	Research Associate, UWA Business School
Ronnie Das	Research Associate, UWA Business School
Brett Smith	Research Associate, UWA Business School
Richard Gruner	Research Associate, UWA Business School
Thomas Stemler	Research Associate, UWA Mathematics and Statistics
Michael Small	Research Associate, UWA Mathematics and Statistics
Yuxia Hu	Research Associate, UWA Civil, Environmental & Mining Engineering
Colin Leek	Research Associate, UWA Civil, Environmental & Mining Engineering
Teresa Senserrick	Research Associate, WA Centre for Road Safety Research, UWA
Paul Roberts	Research Associate, WA Centre for Road Safety Research, UWA
Matt Albrecht	Research Associate, WA Centre for Road Safety Research, UWA
Julian Bolleter	Research Associate, AUDRC, UWA
Bill Grace	Research Associate, Adjunct, AUDRC, UWA
Nicole Edwards	Research Associate, AUDRC, UWA
Enamul Hoque	Research Associate, AUDRC, UWA
Caine Holdsworth	Research Associate, AUDRC, UWA
Anthony Duckworth-Smith	Research Associate, AUDRC, UWA
Bryan Boruff	Research Associate, UWA School of Agriculture & Environment; Centre for Water & Spatial Sciences

John Duncan	Research Associate, UWA School of Agriculture & Environment; Centre for Water & Spatial Sciences
Alex Saunders	Research Associate, Social Sciences, UWA
Farid Boussaid	Research Associate, Electrical, Electronic & Computer Engineering, UWA
Mohammed Bennamoun	Research Associate, Electrical, Electronic & Computer Engineering, UWA
Tele Tan	Research Associate, Electrical Engineering, Computing & Mathematical Sciences, Curtin
Jayne Bryant	Research Associate, CUSP, Curtin
Zhen Peng	Research Assistant, Civil & Mechanical Engineering, Curtin
Ritu Gupta	Research Associate, Electrical Engineering, Computing & Mathematical Sciences, Curtin
Andrew Grose	Research Associate, Electrical Engineering, Computing & Mathematical Sciences, Curtin
Himanshu Agrawal	Research Associate, Electrical Engineering, Computing & Mathematical Sciences, Curtin
Courtney Babb	Research Associate, Design & Built Environment, Curtin
Carey Curtis	Research Associate, Design & Built Environment, Curtin
Stephen Kovacs	Research Associate, Design & Built Environment, Curtin
S Zaung Nau	Research Associate, Business School, Curtin
Hui Xie	Research Associate, Business School, Curtin
Parisa Izadpanahi	Research Associate, Design & Built Environment, Curtin
Dora Marinova	Research Associate, CUSP, Curtin
Josh Hopkins	Research Associate, Adjunct, CUSP, Curtin
Roberto Minunno	Research Associate, CUSP, Curtin
Charlie Hargroves	Research Associate, CUSP, Curtin
Leo Hebert	Research Associate, CUSP, Curtin
Ranjodh Singh	Research Associate, Accounting, Economics & Finance, Curtin
Francesca Perugia	Research Associate, Design & Built Environment, Curtin

4.2. Finances

4.2.1. Summary of income and expenditure

Total income earned in 2025 was $4,484,641, considerably more than the budget due to three large external grants underway. Expenditure was accordingly also higher than budget but not to the same extent as income since upfront grant payments were received but expenditure lagged due to significant recruitment processes for those projects, delaying expenditure. The closing balance at the end of the 2025 financial year was $1,419,213, carried over to 2026 to fund the newly recruited staff members.

Table 7: Financial summary for 2025

PATREC Income and Expenditure 2025	Actuals at 31 Dec 25	Budget 2025	Variance
INCOME			
Traditional (WA gov core)	322,938	322,938	0
Traditional (WA uni core)	207,604	207,604	0
Traditional (iMOVE projects core)	428,000	400,000	28,000
Traditional (external)	2,676,440	900,000	1,776,440
Climate action (WA gov core)	290,000	290,000	0
Climate action (WA uni core)	72,500	72,500	0
Climate action (iMOVE projects core)	280,000	300,000	-20,000
Climate action (external)	149,661	200,000	-50,339
Interest balance	57,498	22,973	34,525
Total Income	**4,484,641**	**2,716,015**	**1,768,626**
EXPENDITURE			
PATREC OFFICE	**300,055**	**366,000**	**-65,945**
RESEARCH PROJECTS	**2,774,973**	**2,305,000**	**469,973**
Total Expenditure	**3,075,028**	**2,671,000**	**404,028**
YTD BALANCE	1,409,613	45,015	1,364,598
Balance Brought Forward	**9,601**	**9,601**	**0**
CLOSING BALANCE (incl Balance B/F)	**1,419,213**	**54,616**	**1,364,597**

4.2.2. University ROI

For performance reporting, university ROI is determined on a three-year rolling basis – 2023-25, in this case. It is calculated by dividing total non-university income by total university investment as presented in regular financial reporting to the PATREC Board, as summarised in relevant annual reports. For 2023-25, ROI for universities was 6.4 (Table 8). Individual ROI for universities are calculated according to specific university policy and reported directly to each university as part of the variation process to extend the PATREC collaboration for further periods.

Table 8: University ROI for 2023-25

	2023	2024	2025	TOTAL
University core	$260,344	$265,979	$280,103	$806,426
University external	$105,000	$70,000	$261,069	$436,069
Total university investment	**$365,344**	**$335,979**	**$541,172**	**$1,242,495**
Total income	**$2,483,021**	**$2,234,751**	**4,484,641**	**$9,202,413**

Total income less university invest.				$7,959,918
University ROI				**6.4**

5. GOVERNANCE

5.1. Board members

The PATREC Board comprises a senior representative of each of the collaborating parties and a Chair who is independent of all Parties. Reece Waldock continued as the Independent Chair of the Board. Board membership in 2025 remained relatively stable (Table 9). Alan Colegate replaced Peter Woronzow as Main Roads member and the new Chair of the WAPC replaced David Caddy. The PATREC Director is an ex officio member of the Board. The PRAC Chair and PTA are also invited to Board meetings.

Table 9: PATREC Board members 2025

Adjunct Prof Reece Waldock AM, Independent Chair
Ms Emma Cole, Chair, Western Australian Planning Commission
Mr Alan Colegate, A/Executive Director Strategy and Communications, Main Roads Western Australia
Mr Steve Beyer, Director, Transport Sustainability and Strategic Projects, Department of Transport and Major infrastructure
Prof Dora Marinova, Professor of Sustainability, Curtin University
Prof Amanda Davies, Head, School of Social Sciences, The University of Western Australia
Mr Ian Duncan, Executive Manager, Infrastructure, WALGA
Mr Peter Jones, Executive Director, Transperth, Regional & School Bus Services (non-voting)

5.2. Research Advisory Committees

Two PATREC Research Advisory Committees (RAC) provide oversight of core project selection and progress monitoring, ensuring research is aligned with policy needs. The PRAC provides oversight of the 'traditional' program of PATREC research (Table 10), with a separate advisory committee established in 2023 to advise the Board on the Climate Action program (CARAC) (Table 11).

Comprising senior representatives from each partner organisation, chaired by a nominated representative of one of the government partners, elected by the Board, the objectives of RACs are to:

- maintain an element of formality and rigour to the research project identification, selection, support, monitoring and dissemination process;
- enhance communication amongst partners; and
- advise the Board on project level matters, allowing the Board to focus on strategic matters.

Other relevant stakeholders were invited to join the RACs including PTA, DWER, IWA and DevelopmentWA and have made significant contribution during 2025.

RACs meetings are held three times a year, 2 - 3 weeks in advance of Board meetings.

Table 10: PATREC Research Advisory Committee (PRAC) members 2025

Name	Organisation
Ryan Falconer (Chair)	Department of Transport and Major Infrastructure
Steve Atkinson (Deputy Chair)	Main Roads WA
Sue Hellyer	Department of Transport and Major Infrastructure
Cory Ross	Main Roads WA
Tanvir Asgar	Department of Planning, Land & Heritage
Andrew Wilkinson	Department of Planning, Land & Heritage
Tele Tan	Curtin University
Courtney Babb	Curtin University
Doina Olaru	The University of Western Australia
Brett Smith	The University of Western Australia
Negar Nili	WALGA
Kerry Job	Public Transport Authority

Table 11: Climate Action Research Advisory Committee (CARAC) members 2025

Member	Position/Organisation
Steve Beyer (Chair)	Director Transport Sustainability and Strategic Projects, Department of Transport and Major Infrastructure
Deputy Chair - vacant	Transport Sustainability and Strategic Projects, Department of Transport and Major Infrastructure
Sam Wilkinson	Principal Policy Officer, State EV Strategy, Climate Change Division, Strategic Policy, Department of Water and Environmental Regulation
Helen McGettigan	Director Planning and Strategy (Energy, Climate Change and Sustainability), Infrastructure WA
John Clifton	Manager Strategy and Innovation, DevelopmentWA
Louis Bettini	Principal Advisor Sustainability, Strategy and Communications Directorate, Main Roads WA
Ryan Falconer	Director Transport Insights, Urban Mobility, Department of Transport and Major Infrastructure
Gemma Habens	Climate Policy Manager, Strategy and Engagement, Department of Planning, Lands and Heritage
Andrea Down	Rail Planning Coordinator, Infrastructure Planning and Land Services, Public Transport Authority
Dora Marinova	Professor of Sustainability, Curtin University Sustainability Policy Institute, Curtin University
Bill Grace	Adjunct Professor, Australian Urban Design Research Centre, UWA

5.3. Project steering committees

All PATREC core and most external projects are led by steering committees, comprising key researchers as well as government stakeholders and chaired by a government agency representative (Table 12). The iMOVE Programs Manager is automatically invited to each meeting. Steering committees have oversight on progress, provide access to information and data and review and accept key outputs. Steering committees are established in the process of project development and agreement execution and provide significant value in ensuring research is relevant to policy objectives and delivers impact.

Table 12: Core project government steering committee participation in 2025

Member	Position	Agency	Member	Position	Agency
Michelle Prior	Director Active Transport, Urban Mobility	DTMI	Cory Ross	Acting Manager Intelligent Transport Systems Operations	MRWA
Ensiyeh Ghavampour	Research and Evaluation Coordinator	DTMI	Raj Shah	Senior Traffic Engineer	MRWA
David Wake	Research and Evaluation Officer	DTMI	Richard Amoh-Gyimah	Road Safety Research Analyst, Planning and Technical Services	MRWA
Helen Ginbey	Manager Behaviour Change	DTMI	Sharon Forster	Traffic Services Manager, Network Operations	MRWA
Michelle Moyo	Policy and Project Manager, Freight, Ports, Aviation and Reform	DTMI	Georgina Gibbs	Acting Principal Analyst Strategic Planning, Strategy and Communications	MRWA
Madeleine Sammut	Freight, Ports, Aviation and Reform	DTMI	Steve Atkinson	Principal Analyst Strategic Planning, Strategy and Communications	MRWA
Claire Thompson	Policy and Project Manager, Driver and Vehicle Services	DTMI	Scott Fennelly	Director Realtime and ITS Operations Intelligent Transport Systems Operations	MRWA
Tracy Tan	Senior Policy Officer, Driver and Vehicle Services	DTMI	Ziad Boufajreldin	Intelligent Transport Systems (ITS) Operations	MRWA
Callie Cummings	Principal Sustainability Project Officer, Transport Sustainability and Strategic Projects	DTMI	Ivan Kiss	Traffic Signal Systems Operations Coordinator Intelligent Transport Systems (ITS) Operations	MRWA
Steve Beyer	Director Transport Sustainability and Strategic Projects	DTMI	Louis Bettini	Principal Advisor, Sustainability Strategy Strategy and Communications	MRWA
Stephanie Zhang	Research and Business Support Officer, Transport Sustainability and Strategic Projects	DTMI	Andrew Wilkinson	Forecasting Manager, Strategy and Engagement	DPLH
Ryan Falconer	Director Transport Insights, Urban Mobility	DTMI	Nilimesh Halder	Principal Demographic Forecaster, Strategy and Engagement	DPLH
Sarah Court	Manager Built Environment, Urban Mobility	DTMI	Gemma Habins	Climate Policy Manager, Strategy and Engagement	DPLH
Helen McGettigan	Director, Planning & Strategy	IWA	Meghan Castelli	Data Scientist, Strategy and Engagement	DPLH
Andrea Down	Rail Planning Coordinator, Infrastructure Planning and Land Services	PTA	Paul Macintyre	Geospatial Data Management Team Leader, Strategy and Engagement	DPLH

Cara Francis	Manager, Waste Policy	DWER	Haiyan Liu	A/Principal Economic Forecaster, Strategy & Engagement	DPLH
Rebecca Properzi	Manager, Infrastructure and Value Chains, Circular Economy	DWER	Matt Stack	Urban Design Manager, Strategy and Engagement	DPLH
Iva Munro	Project Manager, Net Zero Strategy	Westport	John Clifton	Head of Strategy and Innovation	DevWA

6. PERFORMANCE AGAINST KPI TARGETS

Broad key performance indicators set for PATREC relate directly to the value-add role or purpose for which PATREC was established. The university collaborators require an increase in research profile and impacts while the government partners require better evidence on which to base policy and operational decisions. Performance indicators comprise essential academic and policy impact indicators with a focus on outputs and outcomes. Performance for the year against 2025 targets as set in the Annual Business Plan 2025, is summarised in Table 13.

Table 13: Key performance indicator targets and achievements 2025

Performance Indicator	Target 2025	Achieved as at 31 Dec 25
Academic Performance Indicators		
Number of peer-reviewed academic publications (Table 3)	7	8
Number of post graduate research students attracted, retained and/or graduated (Section 3.3)	3	5
Value ($) of external research funding secured [non-core income]	$1,570,000	$3,412,000
University ROI (3-yr rolling 2023-25) (Section 4.2)		6.4
Policy Impact Performance Indicators		
Number of high impact, policy-informing projects/sub-projects completed (Section 2.1)	10	10
Number of substantive Technical Reports accepted/published and/or software tools (Table 3)	10	12
Number of news articles published on websites (Table 3)	8	8
Number of presentations at PATREC and other connection events (including conference presentations not published) (Table 5)	10	30
Number of connection events arranged and held (Section 3.2)	5	4
Number of short courses, unit contributions presented (Section 3.3)	3	1
Impact statements – completed projects (Section 3.4.1)	10	6
Stakeholder (academic and policy) satisfaction indicator *(Section 3.4.3)*	80%	86%