Project PRIME: Road markings for motorcycle casualty reduction – research, results and the road ahead

Prof Alex Stedmon[1], David McKenzie[2], Martin Langham[1], Kevin McKechnie[3], Richard Perry[2], Stuart Wlison[2], Morag Mackay[2], Stuart Geddes[3]

[1]Open Road Simulation Ltd, [2]Transport Scotland, [3]BEAR Scotland, UK

Prince Michael INTERNATIONAL ROAD SAFETY AWARDS

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A new approach to rider safety and behaviour change

- Motorcyclists are a priority group
  - less than 1% of all traffic in Scotland – but typically 14% of KSIs
  - one of the most vulnerable road users
- Scotland's Road Safety Framework to 2030
  - 'safe system' approach
  - 30% reduction in motorcycle KSI statistics
- Project PRIME
  - traditional methods do not always work – habituation effects
  - a simple tool – 'prime' positive behaviour
  - establishing the science base for behaviour change

PRIME sign – A82

PRIMEs

- **PRIME** = **P**erceptual **R**ider **I**nformation for **M**aximising **E**xpertise or **E**njoyment

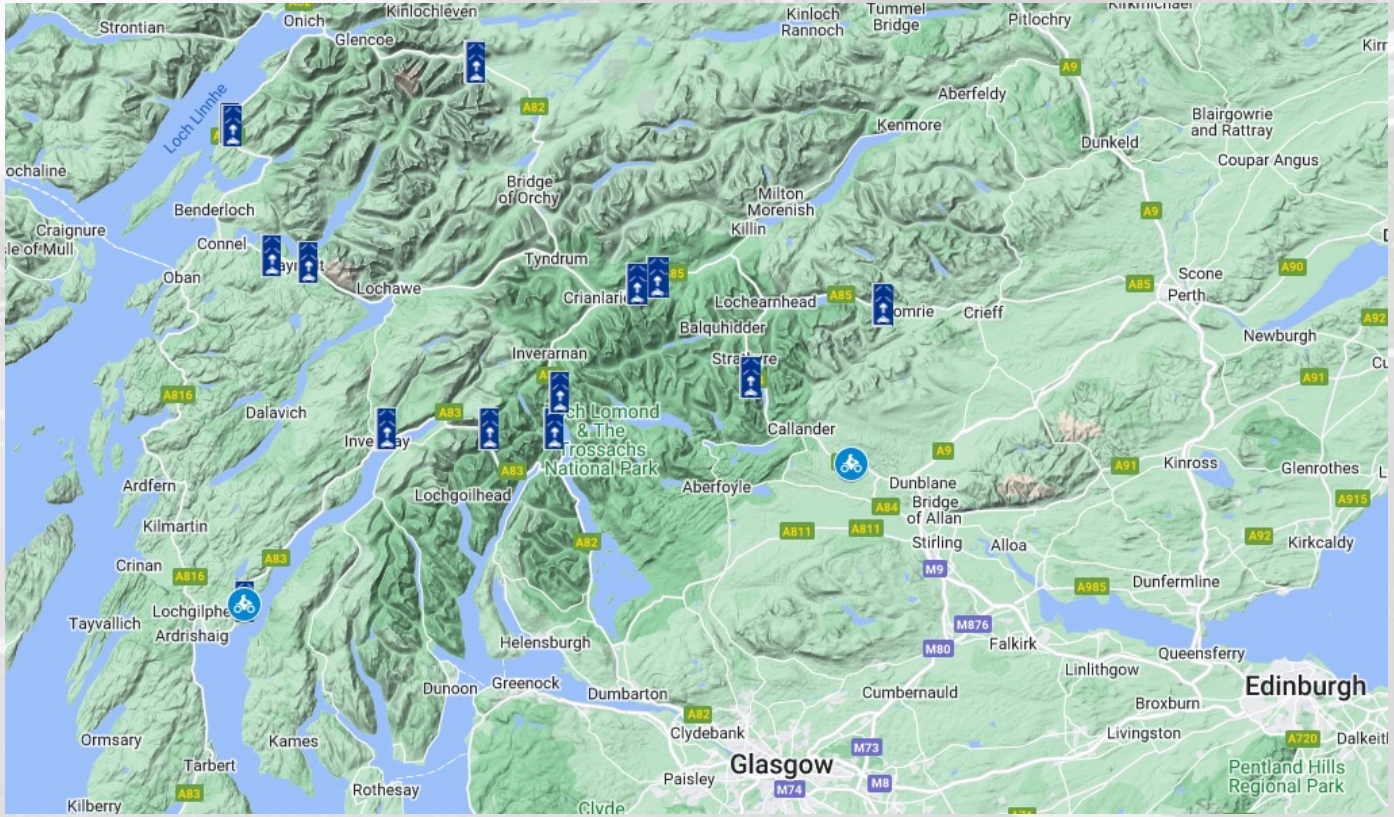
- gateway markings
  - speed
  - position
  - braking

- prime positive behaviours
  - adaptable tool for riders
  - ride ‘through the gap’
  - user-centred = for motorcyclists by motorcyclists
  - 200 riders x 200 drivers x 200 online + IAM workshop

PRIME gateway marking

Project PRIME – trial sites

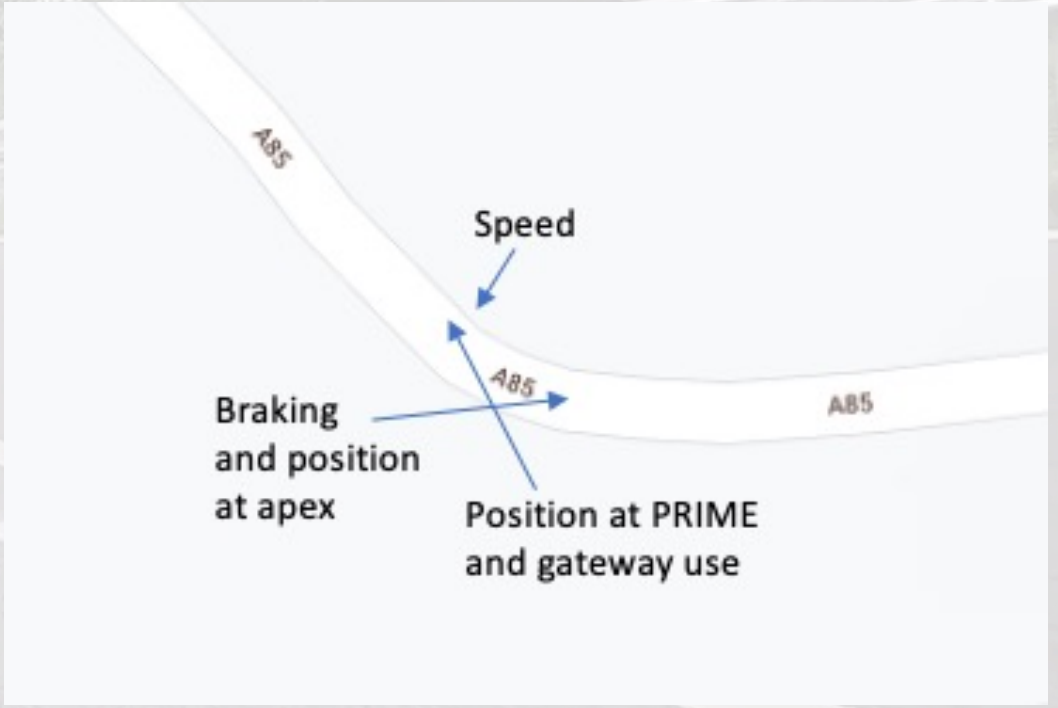
- Transport Scotland and BEAR Scotland NW review of collision cluster sites
- popular routes for motorcyclists on the A82, A83, A84, A85 and A828
- 22 trials sites over 750 sq miles



PRIMEs trial sites

Research approach

- research design
  - pre- and post-intervention - comparisons before and after PRIMEs were installed
  - sites were optimised (VRS, lines/signs, vegetation, etc)
  - weekends throughout the motorcycle seasons (May to Sept)
  - small cameras, video data
- dependent variables
  - speed
  - position at PRIME
  - position at apex
  - braking behaviour
  - use of PRIME gateway
- operational factors
  - ethics
  - risk assessments
  - road safety audits



Three cameras per trial site

Summary results: Phase 1 (2020 to 2022)

- opportunistic sample of motorcycles
  - 32,213 motorcycles across all sites (100%)
  - 9,919 lead motorcycles (30.8%)
  - 3,281 motorcycles with pillions (10.2%)
  - 19,568 group riders (60.8%)
- similar profiles across Phase 1
  - solo motorcycles riding in groups
  - reinforcing the social aspect of motorcycling

Site	Motorcycles			
	Lead (N)	Pillion (N)	Group (N)	Total (N)
2020				
Appin House *northbound*	188	44	223	395
Appin House *southbound*	205	55	247	412
Kingshouse *northbound*	315	170	1,041	1,225
Kingshouse *southbound*	382	128	772	1,601
Loch Lubhair *eastbound*	390	161	841	1,355
Loch Lubhair *westbound*	555	182	1,135	1,749
Rob Roy's Dip *eastbound 1*	452	163	827	1,354
Rob Roy's Dip *eastbound 2*	562	162	826	1,753
Rob Roy's Dip *westbound 1*	430	188	1,129	1,352
Rob Roy's Dip *westbound 2*	568	188	1,128	1,753
	4,047	**1,441**	**8,169**	**12,949**
2021				
Taynuilt	275	93	638	959
Inveruglas	207	113	665	1,171
Runacraig - *northbound*	311	154	959	1,566
Runacraig - *southbound*	330	135	725	1,305
Dunira	624	133	881	1,574
Bonawe	437	105	626	1,191
Landrick Bends (comparison)	364	203	968	1,828
	2,548	**936**	**5,462**	**9,594**
2022				
Dailnamac	290	87	532	879
Pulpit Rock	254	152	1,029	1,615
Butterbridge	513	127	868	1,362
Middle Kames	249	62	368	582
Salmon Draft – *northbound*	620	146	1,060	1,667
Salmon Draft – *southbound*	571	173	1,050	1,747
Carrick (comparison)	401	58	526	878
Dunira	207	42	217	445
Rob Roy's Dip	219	57	287	495
	3,324	**904**	**5,937**	**9,670**
Total	**9,919**	**3,281**	**19,568**	**32,213**

Summary results 2020 to 2022

- speed
  - significant reductions 10 sites, trends 4 sites
- lateral position at the final PRIME
  - significant changes 15 sites, trends 3 sites
- lateral position at the apex
  - significant changes 13 sites, trend 1 site
- braking behaviour
  - significant reductions 9 sites, trends 15 sites
- use of the PRIME road markings
  - significant increase 18 sites, trends 3 sites
- no negative effects
- no effects at comparison sites

Site	Rider Behaviour				
	Speed	Position at PRIME	Position at Apex	Braking	Use of Gateway
2020					
Appin House *north*		Sig			Trend
Appin House *south*	Sig	Sig	Sig	Trend	Sig
Kingshouse *north*	Trend	Sig			Sig
Kingshouse *south*		Sig	Sig	Trend	
Loch Lubhair *east*		Sig	Sig	Sig/Trend	Sig
Loch Lubhair *west*	Sig	Sig	Sig	Sig	Sig
Rob Roy's Dip *east 1*		Sig		Trend	Sig
Rob Roy's Dip *east 2*		Sig	Sig	Trend	Sig
Rob Roy's Dip *west 1*	Sig	Sig	Sig	Trend	Sig
Rob Roy's Dip *west 2*	Sig	Sig	Sig	Trend	Sig
2021					
Taynuilt	Sig		Sig	Trend	Sig
Inveruglas	Trend	Trend	Sig	Sig	Trend
Runacraig – *north*	Sig	Trend			Sig
Runacraig – *south*	Sig	Trend		Sig	Sig
Dunira	Sig	Sig	Sig	Sig/Trend	Sig
Bonawe	Sig		Trend	Trend	Trend
*Landrick Bends**	*No effect*	*No effect*	*No effect*	*Trend*	*No effect*
2022					
Dailnamac		Sig	Sig	Sig/Trend	Sig
Pulpit Rock			Sig	Sig/Trend	Sig
Butterbridge		Sig		Trend	Sig
Middle Kames	Trend	Sig		Sig	Sig
Salmon Draft – *north*	Sig			Sig/Trend	Sig
Salmon Draft – *south*	Trend	Sig	Sig		Sig
*Carrick**	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*

Long-term effects of PRIMEs

Dunira (one-year comparison)		
Year	2021	2022
Speed Reduction (↓) Sig. effect (Sig) Trend (T)	↓ Sig	↓ Sig
Lateral position - PRIME Towards centre of road (→) Towards roadside (←) Sig. effect (Sig) Trend (T)	← Sig	← Sig
Lateral position - apex Towards centre of road (→) Towards roadside (←) Sig. effect (Sig) Trend (T)	→ Sig	→ Sig
Braking - total Reduction (↓) Sig. effect (Sig) Trend (T)	↓ Sig	↓ Sig
Braking - late Reduction (↓) Sig. effect (Sig) Trend (T)	↓ T	↓ T
Braking - on bend Reduction (↓) Sig. effect (Sig) Trend (T)		
PRIME gateways Increased use (↑) Sig. effect (Sig) Trend (T)	↑ Sig	↑ Sig

Rob Roy's Dip (two-year comparison)		
Year	2020	2022
Speed Reduction (↓) Sig. effect (Sig) Trend (T)	↓ Sig	↓ Sig
Lateral position - PRIME Towards centre of road (→) Towards roadside (←) Sig. effect (Sig) Trend (T)	← Sig	← Sig
Lateral position - apex Towards centre of road (→) Towards roadside (←) Sig. effect (Sig) Trend (T)	← Sig	← Sig
Braking - total Reduction (↓) Sig. effect (Sig) Trend (T)	↓ T	
Braking - late Reduction (↓) Sig. effect (Sig) Trend (T)		
Braking - on bend Reduction (↓) Sig. effect (Sig) Trend (T)	↓ T	
PRIME gateways Increased use (↑) Sig. effect (Sig) Trend (T)	↑ Sig	↑ Sig

Before PRIMEs – After PRIMEs

PRIMEs: the road ahead

- Dissemination and recognition
  - value of behavioural science in transport initiatives
  - world leading scientific journal and conference papers
  - awards
- Phase 2 (2023 to 2025)
  - PRIMEs on standard roads (2023)
  - right-hand bend behaviour (2024)
  - greater speed reductions (2025)
- Installation toolkit and roll-out
  - implementing PRIMEs for casualty reduction
  - local councils and road safety partnerships

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Highways AWARDS
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Project PRIME in action

Thank you

- We would like to talk to anyone who might be interested in installing PRIMEs for motorcycle casualty reduction
- alex@openroadsim.com

PRIMEs – if you install them, motorcyclists will use them