



27 – 29 November 2017
Grafton Campus,
The University of Auckland



TRANSPORT KNOWLEDGE
CONFERENCE 2017



Regulation of e-bikes and other low powered vehicles

Dr Glen Koorey, ViaStrada Ltd



Co-authors:

John Lieswyn, ViaStrada Ltd

Simon Kennett, NZ Transport Agency



Background

SAFER JOURNEYS FOR PEOPLE WHO CYCLE

CYCLING SAFETY PANEL FINAL REPORT
AND RECOMMENDATIONS

DECEMBER 2014



“Investigate the adoption of the EU pedelec standard, and an age limit”

AS 15194:2016



Cycles—Electrically power assisted cycles—EPAC Bicycles (also known as pedelecs) (EN 15194:2009, MOD)

AS 15194:2016, Cycles—Electrically power assisted cycles—EPAC Bicycles (also known as pedelecs) (EN 15194:2009, MOD), is a modified adoption of EN 15194:2009, Cycles—Electrically power assisted cycles—EPAC Bicycles, and is reproduced with the permission of CEN, Avenue Marnix 17, B-1000 Brussels. All exploitation rights of the European Standards in this document are reserved worldwide to CEN and its Members, and no production may be undertaken without explicit permission in writing from CEN through Standards Australia Limited.

STANDARDS
Australia

MAKING CYCLING SAFER AND MORE ATTRACTIVE

The NZ Transport Agency's cycling safety action plan



*Acknowledges that legislation is dated
E-bike and other LPV
problem better
defined*

NZ TRANSPORT
AGENCY
www.nzta.govt.nz

Safer Journeys

New Zealand Government

Regulations and safety for electric bicycles
and other low- powered vehicles
July 2017

J Lieswyn, M Fowler, G Koorey, A Wilke (ViaStrada Limited)
S Crimp

*NZ Transport
Agency Research
Report 621*

Contracted research organisation - ViaStrada Limited

2014

2016

2017

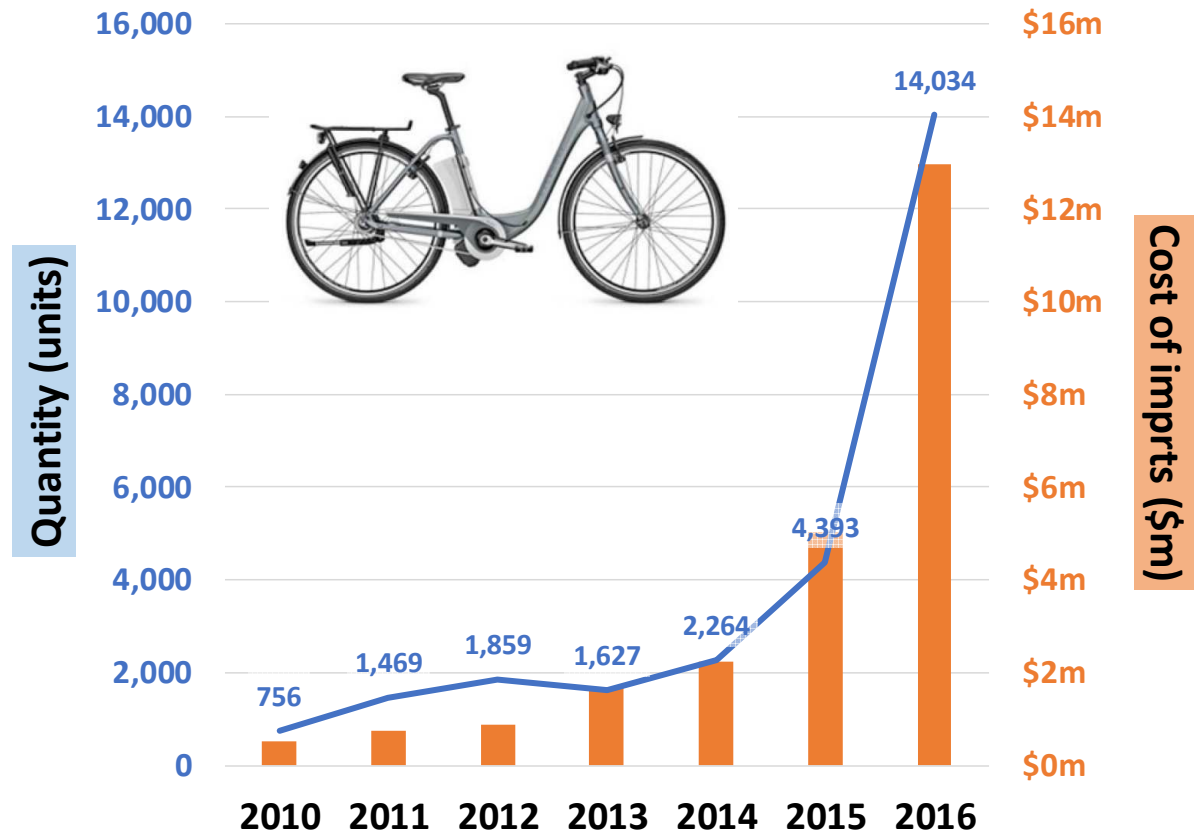
<https://www.nzta.govt.nz/assets/Uploads/Progress-on-making-cycling-safer-and-more-attractive.pdf>

Research motivation

Innovation outrunning legislation



Fast growth in NZ



Clarify existing regulations /terminology



« Back to search results

Land Transport (Road User) Rule 2004

wheeled recreational **device**—

- a) means a vehicle that is a wheeled conveyance (other than a cycle that has a wheel diameter exceeding 355 mm) and that is propelled by human power or gravity; and
- b) includes a conveyance to which are attached 1 or more auxiliary propulsion motors that have a combined maximum power output not exceeding **300 W**



The following are examples of **vehicles** that meet the definition of motor vehicle but have difficulties meeting the safety standards and other requirements. This means they **cannot be operated on the road**.

- Motorised skate boards, scooters, and roller skates
- Segways and similar
- Powered Self Balancing Unicycles
- Cycles fitted with petrol motors
- Low powered scooters/mopeds
- Cycles designed primarily to be propelled by an engine not the muscular energy of the rider

NZTA RR621: Research questions

- **What** is an LPV?
- **Why** regulate LPVs?
- What does the **public** and **industry** think?
- How **significant** is the issue? (e.g. market size)
- How **serious** is the issue? (safety)
- Should there be any **age/skill** restrictions?
- How will **new technology** help?
- What are **other countries** doing?
- What are the pros and cons of various **regulatory options**?
- How else can we address these issues (**non-regulatory**)?

Safe system approach

Vehicle safety



Road & path design



User behaviours



**Worrying vehicle
dynamics and
excessive 60 km/h
speed capability
(if true)...**

**ELECTRIC
CHOPPA!!**

30 - 60kph
**Super Cool
Cruiser**
60 km range

Full
Integrated
Kits
\$529

WINEGUARD
Fitted with
TV Dish
WINDUP KITS
KITS INCLUDE:
8M CABLE AND SATMETER

RD
KITS
IDE:
SATMETER

Adjustable
Power Settings
Speed Display

Harley E-bike

Mountain Bike
Be the King on the trails!
Downhill - uphill - off road
Range up to 40km
For more - if you please!
Paddle wheel and throttle

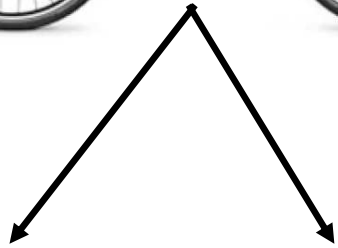
Lots of accessories available
Visit our website - www.estar.com

Est Rider
**ELECTRIC
Foldup Bikes**
Top
in
\$159

Est Rider
www.estar.com

E-bike types in NZ (per current regulations)

“Power-assisted pedal cycle”
designed primarily to be propelled by the muscular energy of the rider



Pedelec
(must pedal)

Throttle
(‘twist & go’)

“Power-assisted pedal cycle”
Ambiguous. Not really ergonomic to pedal.



“Power-assisted pedal cycle”
But at 70 km/h max, should it be?



“Pedal-assisted power cycle”
Term in case law only. Scooter-style electric bike (SSEB). Max 20-25 km/h. Looks like a motor scooter.



“Power-assisted pedal cycle”
Cargo trike



E-bike regulations in NZ and overseas

Place	Category / Class	Label	Throttle	Km/h	Watts	Kg	Age	Helmet
Australia	Power Assisted Bicycle	-	Yes	-	200	-	-	Yes
	Pedelec	-	No	25	250	-	-	Yes
Canada	Type label required	Yes	Yes	32	500	-	-	Yes
China	Pedal assist only	-	No	26	-	40	-	No
	Pedal or throttle	-	Yes	26	-	50	-	No
	Electric bicycle	-	Yes	50	-	55	-	No
EU (1/1/17)	Pedelec	Yes	Max 6 km/h	25	250	35	-	No
	Powered cycle	Yes	Open	25	1000	35	-	No
	S-Pedelec / moped	Yes	No / Yes	45	4000	-	Varies	Varies
Israel	-	-	-	25	250	30	14	Repealed 2011
Japan	Max. assist ratio 2:1	-	-	24	-	-	-	12 & under
NZ	Class AB	-	Yes	-	300	-	-	Yes
UK	Pedelec	Yes	Max 6 km/h	25	250	40	14	No
	S-Pedelec - unclear	?		?				
USA	Electric assist bicycle	-	-	32	750	--	Varies	Varies
California	Class 1	Yes	No	32	750	--	-	No
	Class 2	Yes	Yes	32	750	-	-	No
	Class 3	Yes	No	45	750	-	16	Yes

Speed is most common safety concern

- E-bikes, compared with ordinary bikes:
 - Heavier
 - Can accelerate faster
 - Higher average speed
 - Greater momentum on collision
 - Requires greater cognitive ability
 - Helps users to avoid conflict, take the lane
-
- However:
 - Evidence that riders adjust speeds to suit environment
 - We already regulate for user behaviour on shared roads and paths
 - Many unpowered cyclists can also go fast (>30km/h)
 - Many new e-bike riders may not be “fit and furious”

E-bikes: Regulatory criteria to consider

	Criteria	Regimes
VEHICLE	Motor power	<ul style="list-style-type: none"> • Limit continuous/peak power
	Speed	<ul style="list-style-type: none"> • Motor assist cuts out at threshold • Posted speed limits
	Means of motor control	<ul style="list-style-type: none"> • Pedal assist plus push (start) assist <6 km/h • Open throttle
USER	Age limit	<ul style="list-style-type: none"> • No age restrictions • Minimum age (12, 14, 16?) • Competency test and permit for young riders • Competency test and permit for older riders
USAGE	General traffic lanes	<ul style="list-style-type: none"> • Continue to allow
	Cycle lanes	<ul style="list-style-type: none"> • Restrict to a certain speed (device or user limited)
	Shared paths	<ul style="list-style-type: none"> • Restrict to a certain speed (device or user limited)
	Footpaths	<ul style="list-style-type: none"> • Restrict to a certain speed, age, or user group

Regulate by speed instead of power?

Regime	Pros	Cons
Limit motor assist cut-out speed	<ul style="list-style-type: none"> • Proxy for safety • Differentiates from mopeds 	<ul style="list-style-type: none"> • Existing bikes in NZ? • Widen gap in modes
25 km/h cut-out	<ul style="list-style-type: none"> • Consistent with Aust / EU • Safer in event of crash 	<ul style="list-style-type: none"> • Not as equitable with cars • Less selection of bikes
32 km/h cut-out	<ul style="list-style-type: none"> • Consistent w/ US, NZ fleet • Helps 'take the lane' • Majority support >25 km/h 	<ul style="list-style-type: none"> • Not a 5 km/h increment (35?) • Less safe in a crash • Worse shared path conflicts?

Regulate by speed instead of power?

Regime	Pros	Cons
Limit motor assist cut-out speed	<ul style="list-style-type: none"> • Proxy for safety • Differentiates from mopeds 	<ul style="list-style-type: none"> • Existing bikes in NZ? • Widen gap in modes
25 km/h cut-out	<ul style="list-style-type: none"> • Consistent with Aust / EU • Safer in event of crash 	<ul style="list-style-type: none"> • Not as equitable with cars • Less selection of bikes
32 km/h cut-out	<ul style="list-style-type: none"> • Consistent w/ US, NZ fleet • Helps 'take the lane' • Majority support >25 km/h 	<ul style="list-style-type: none"> • Not a 5 km/h increment (35?) • Less safe in a crash • Worse shared path conflicts?

Regulate by speed instead of power?

Regime	Pros	Cons
Limit motor assist cut-out speed	<ul style="list-style-type: none"> • Proxy for safety • Differentiates from mopeds 	<ul style="list-style-type: none"> • Existing bikes in NZ? • Widen gap in modes
25 km/h cut-out	<ul style="list-style-type: none"> • Consistent with Aust / EU • Safer in event of crash 	<ul style="list-style-type: none"> • Not as equitable with cars • Less selection of bikes
32 km/h cut-out	<ul style="list-style-type: none"> • Consistent w/ US, NZ fleet • Helps 'take the lane' • Majority support >25 km/h 	<ul style="list-style-type: none"> • Not a 5 km/h increment (35?) • Less safe in a crash • Worse shared path conflicts?

Mobility scooters: Existing NZ regulations

- Classification as a “mobility device”
 - No licence or registration
 - Up to 1500 W power
- Restricted to the footpath, where practicable
 - Can be used on the road if footpath is not practicable
 - No speed limit



Mobility scooter safety – crash data

- NZ Reported crashes involving mobility scooters in last 5 years:
 - 12 killed, 19 serious injury, >100 minor injuries*
 - High proportion of elderly users (poor eyesight, hearing, frailty, etc)
 - 20-30% of users will have some kind of injury
 - Getting on and off the scooter is a common injury factor

** As with all crash stats, many crashes go unreported*

- Many poor paths and crossings
- Conflicts with other path/road users
- Weight/speed of scooters an issue

A case for regulatory change?



<http://www.stuff.co.nz/waikato-times/news/4775247/Man-hurt-in-mobility-scooter-crash>

Mobility scooters are treated like a...

Country	Pedestrian	Bicycle	Road vehicle	Scooter
New Zealand, USA	✓			
Australia	≤ 10 km/h		> 10 km/h	
UK	≤ 6 km/h	12.9 km/h limit	≥ 6 km/h	
Denmark	Walking speed	15 km/h limit	✓	
Sweden	≤ 5 km/h	≥ 6 km/h		
Norway	Walking speed	> walking speed	(uncertain)	
Belgium	Walking speed	> walking speed		
France	≤ 6 km/h	≥ 6 km/h		
Netherlands, Switzerland	✓	✓		
Ireland, South Africa			✓	
Canada	✓		✓	✓

Mob. scooters: Regulatory criteria to consider

Criteria	Regimes
Vehicle speeds	<ul style="list-style-type: none">• No speed limit (<i>status quo</i>)• Speeds restricted to 6, 10 or 12 km/h• Different classes of mobility scooter, with different speed limits
Vehicle type and registration	<ul style="list-style-type: none">• No registration required (<i>status quo</i>)• Different classes of mobility scooter, with different registration requirements
Vehicle applications	<ul style="list-style-type: none">• Mobility scooters treated as pedestrians (<i>status quo</i>)• Different classes, with legal status as either pedestrian, bicycle, or road vehicle (e.g. UK, Denmark)• Specific designation for mobility scooter uses (e.g. Canada)
Driver licensing	<ul style="list-style-type: none">• No driver licensing (<i>status quo</i>)• Drivers required to pass skills test and medical examinations

Self-balancing devices include...

Segway PT



Segway Ninebot



Airwheel A3



E-unicycle



Hoverboard



Ogo



- Personal Mobility Devices (Australia)
- Electric personal assistive mobility device (EPAMD) (USA)
- Other power driven mobility device (OPDMD) (USA)

Other Low Powered Vehicles include...

E-Skateboard



Skate-Cycle



E-Scooter



Yike-Bike



Yike Bike (Declaration Not to be Motor Vehicles) Notice 2014

18
SEP
2014

Tags

Land Transport Act

Notices

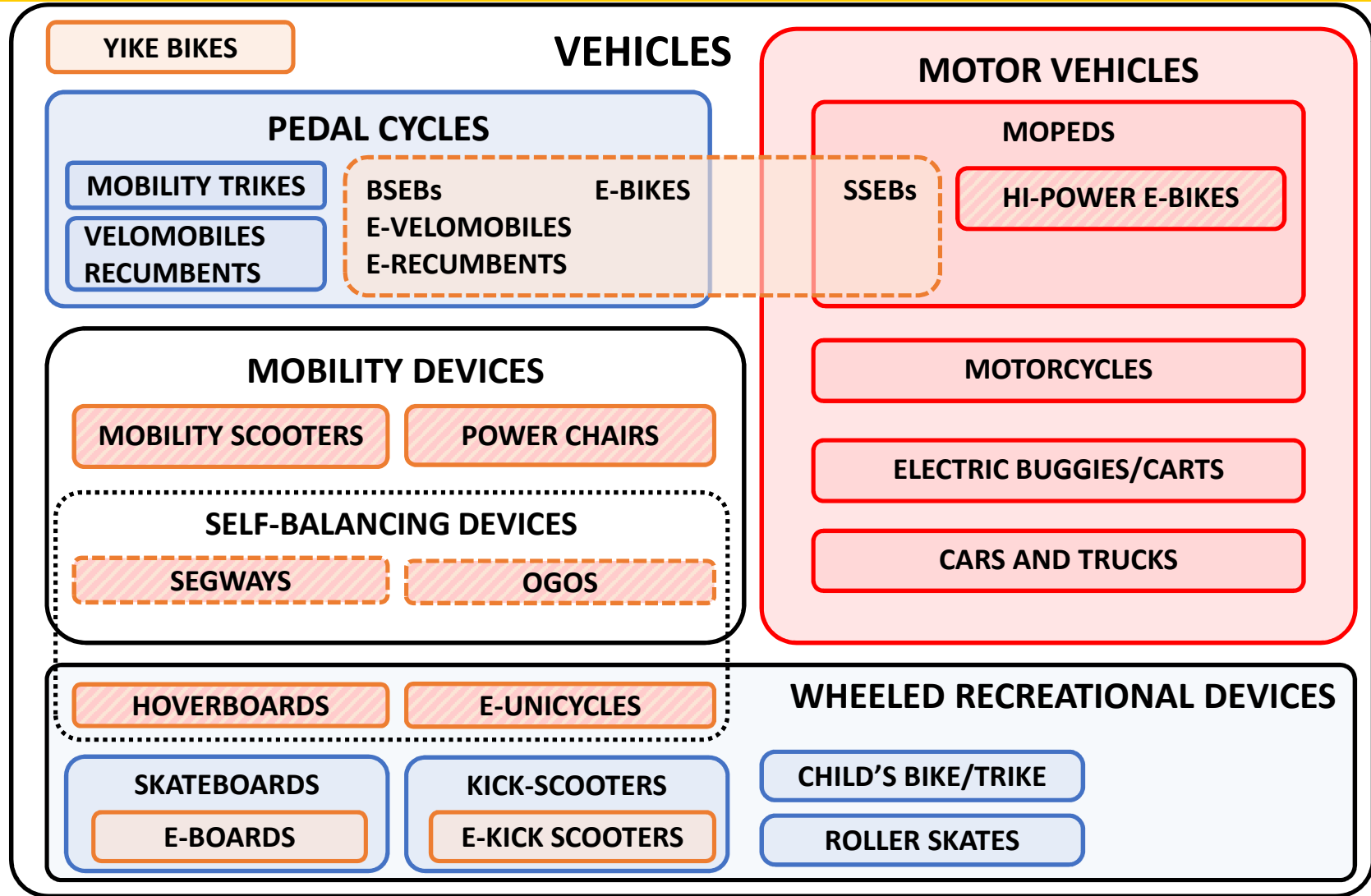
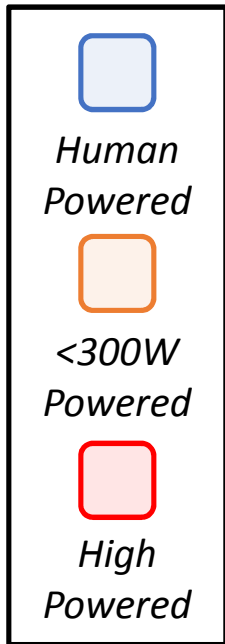
Pursuant to section 168A(3) of the Land Transport Act 1998, and pursuant to an authority delegated to me by the Chief Executive of the NZ Transport Agency, I, Ian David Baggott, Manager Technical Support, Certification and MVR, declare Yike Bikes not to be motor vehicles.

Under the authority of section 168A(4) of the Land Transport Act 1998, I further declare that the rider of a Yike Bike on any road or footpath must observe the following conditions:

- (a) Wear an approved cycle helmet; and
- (b) meet the provisions of clause 11.1 in the Land Transport (Road User) Rule 2004 that apply to "wheeled recreational devices".

This notice comes into effect on the day that is 28 days after the date of its notification in the New Zealand Gazette.

Categorising everything...



LPV safety concerns

- Collisions with others
 - If allowed on paths – interaction with pedestrians
 - If allowed on roads – interaction with motor vehicles

Problem is that we don't identify electric-power vehicles in CAS

- Falls off LPVs
- Battery fires/explosions - largely eliminated



LPVs: Regulatory criteria to be considered

Criteria	Regimes
Power or speed	<ul style="list-style-type: none">• Power limit• Motor cut-out speed• Posted speed limit
Vehicle applications	<ul style="list-style-type: none">• Treated as pedestrians – allowed mainly on footpaths• Treated as mobility devices – can be used anywhere by those with a disability• Different classes (e.g. by max speed), with legal status as either pedestrian, bike, or road vehicle
Locations allowed	<ul style="list-style-type: none">• Allowed on footpaths and shared paths only• Allowed on roads, cycle paths and shared paths• Allowed everywhere



Existing Road User Rule 11.1 – sufficient?

Path User	Footpath (RUR 11.1)		Shared path (RUR 11.1A)	
Pedestrian	<p>When practicable, must remain on the footpath when provided</p> <p>Must not unduly impede the passage of a mobility device or wheeled recreational device</p>		<p>Must use the path in a careful and considerate manner</p> <p>Must not use the path in a manner that constitutes a hazard to other persons using it</p>	
Cyclist	Not allowed to ride on a footpath		<p>Must not operate the cycle or device at a speed that constitutes a hazard to other persons using the path</p> <p>May not duly impede the passage of any other user, regardless of priority signed or marked</p>	
Mobility device	<p>Must operate the device in a careful and considerate manner</p>			
Wheeled recreational device	<p>Must give way to pedestrians and drivers of mobility devices</p>	<p>Must not operate the device at a speed that constitutes a hazard to other footpath users</p>		

Conclusions

- Regulating for e-bikes and other LPVs in NZ is tricky!
 - A huge variety of vehicle types and capabilities
 - Existing LPVs need to be “grand-parented” into any new regime
- Existing max.power-based system may not be most practical
 - Regulate by maximum speeds instead?
 - Limit certain LPVs to footpath, shared path or road?
- Any new system needs to have flexibility to deal with new LPVs
 - Define categories by generic LPV attributes (max.speed, balance, etc)
- Need to start monitoring safety record of e-vehicles
 - Introduce specific CAS factor code for electric-powered vehicles

Thank you - any questions?

Glen Koorey

glen@viastrada.nz

John Lieswyn

john@viastrada.nz

Simon Kennett

Simon.kennett@nzta.govt.nz

