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Cycle Regulations Review - Final Report

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Executive Summary

There is currently in place a wide range of pedal cycle legislation in Great Britain, covering construction standards, point-of-sale requirements and in-use issues. Some of this legislation is specific to pedal cycles (or just bicycles) or electrically assisted pedal cycles (EAPCs), while others are more general but contain pedal cycles within their scope (e.g. the General Product Safety Regulations and Vehicle Lighting Regulations).

Much of the existing legislation, however, was originally developed 20-30 years ago and may not adequately reflect more recent developments in cycle use/consumer markets or in technology. There are also some potentially confusing or burdensome anomalies and/or inconsistencies between individual pieces of legislation, e.g. with some differences between requirements for cycles at the point of sale and when in-use on public roads.

The Department for Transport is subject to a wide range of policy pressures, all having the potential both to conflict with and complement each other. Particularly significant and relevant are the pressures to simplify and reduce legislative burdens while maintaining or improving safety levels.

The fundamental objectives of the study described in this report were to gather, generate and expert-review evidence from a wide variety of sources (including Red Tape Challenge and EAPC consultation responses) on the forces and pressures influencing pedal cycle construction, sale and use in Great Britain, and provide DfT with costed, practical and appropriate options for legislative change.

The methodology chosen to achieve these objectives included reviews of published research literature, Red Tape Challenge responses, previous consultation responses, existing legislation, and of cycle accident data held within the STATS19 database, combined with thorough and comprehensive consultation with stakeholders from the cycle industry, cycling groups, local authorities, operators, professional bodies, road safety organisations and enforcement agencies.

The reviews and stakeholder discussions led to the development of the following major options for legislative change:

Option A – Do Nothing (retain all UK regulations in their current form)

Option B – EAPC harmonisation & Brakes simplifications

- Remove weight limits for EAPCs;
- Harmonise EAPC maximum power and assisted speed with EU at 250 W & 25 km/h respectively;
- Continue to classify as pedal cycles, subject to type approval, those EAPCs, with twist and go, that meet 250 W max output and 25 km/h power cut-off;
- Remove voltage marking requirement from the EAPC data plate;
- Allow 2,3 or 4 wheeled EAPCs;
- Keep handed brake levers but allow suppliers to swap left and right hand brakes if customer requests it;

Option C – as B + Lighting simplifications

- Remove all references to British (lighting) Standards, rely on manufacturer and consumer choice to ensure lights and reflectors give adequate performance;

- Minimum requirements would be fitment of front and rear light and rear reflector if the cycle is used at night, aimed to avoid dazzle or discomfort, properly maintained, etc.

Option D – as C + Reflector simplifications

- Remove requirement for pedal reflectors to be fitted at point of sale and in-use;
- Remove requirement for rear reflectors to be wide-angle type;
- Remove requirement for side and front reflectors to be fitted at point of sale.

Bells – treated as separate options, which are:

- **X** - keep the existing requirements (for a bell at point of sale);
- **Y** – simplify by allowing audible warning device as alternative at point of sale (subject to performance requirements);
- **Z**- de-regulate by removing requirements for a bell.

A formal impact assessment, carried out as far as practicable in accordance with the Better Regulation guidelines, has provided estimates of the net present value of the benefits of the various regulatory options over the period 2015-2024, most of which stem from encouraging the EAPC and goods-delivery markets, with a small additional potential benefit from simplification of the reflector requirements.

The overall NPV of benefits for EAPC harmonisation and simplification of the braking requirements is estimated to be in the range £551 million to £1,191 million (central estimate £871m) at current prices over the ten year evaluation period (all of which comes from the EAPC changes alone), **while simplifying the reflector requirements might take the overall maximum NPV up to £1,274 million (central estimate £912m)**.

Simplifying the lighting and braking requirements, and options for changes to the requirement affecting bells were found, on their own, unlikely to have any net overall cost or benefit.

Over the ten year period to 2024, with 2014 as the base year and using a discount rate of 3.5%, these savings would be shared amongst:

- **consumers** (through car operating cost savings and health benefits), **£0.42-£0.95 billion**;
- **businesses** (through congestion cost savings, point of sale savings and goods-delivery/van operational savings), **£0.13 - £0.32 billion** and;
- the **environment** (through greenhouse gas reductions), **£4 - £8 million**.

Allowing for the various uncertainties in the assumptions made to generate these savings estimates, the overall benefits range could be somewhere in the range £0.40 - £1.63 billion. The most significant influence on the overall savings estimate is the assumptions regarding EAPC sales growth, and particularly the difference in that sales growth that might result from the Option B implementation (harmonisation).

1 Introduction

There is currently in place a wide range of pedal cycle legislation in Great Britain, covering construction standards, point-of-sale requirements and in-use issues. Some of this legislation is specific to pedal cycles (or just bicycles) or electrically assisted pedal cycles (EAPCs), while others are more general but contain pedal cycles within their scope (e.g. the General Product Safety Regulations and Vehicle Lighting Regulations).

Much of the existing legislation, however, was originally developed 20-30 years ago and may not adequately reflect more recent developments in cycle use/consumer markets or in technology (e.g. LED lighting systems). There are also some potentially confusing or burdensome anomalies and/or inconsistencies between individual pieces of legislation, e.g. with some differences between requirements for cycles at the point of sale and when in-use on public roads.

The Department for Transport is subject to a wide range of policy pressures, all having the potential both to conflict with and complement each other. These include:

- Pressure to stimulate growth and consumer demand;
- Pressure to reduce legislative burdens on manufacturers and suppliers;
- Pressure to at least maintain current safety levels and, wherever possible, further improve them;
- Pressure to ensure policy and legislation keep pace with the development of new technologies and new markets;
- Pressure to reduce public expenditure;
- Pressure to encourage low carbon transport options; and
- Pressure to engage constructively with the EU, in support of the UK's interests.

Most, if not all, of these forces impinge on the topic of this study - the construction and safety of pedal cycles (including electrically assisted variants). Particularly significant and relevant are the pressures to simplify and reduce legislative burdens while maintaining or improving safety levels. As well as a formal consultation regarding the EAPC Regulations in 2010, in May 2011, the Department for Transport put all the existing cycling regulations online as part of the Government's Red Tape Challenge. The aim was to ask for the ideas of industry professionals, members of the public and civil servants to help cut down the burden of regulation on businesses and members of the public.

The fundamental objectives of the study described in this report were **to gather, generate and expert-review evidence** from a wide variety of sources (including Red Tape Challenge and EAPC consultation responses) on the forces and pressures influencing pedal cycle construction, sale and use in Great Britain, and **provide DfT with costed, practical and appropriate options for legislative change.**

1.1 Methodology

The study was conducted in two major Phases:

Phase 1 – Scoping Study, and

Phase 2 – In-Depth Analysis & Reporting

1.1.1 Phase 1 - Scoping Study (1 month)

This initial phase, completed in March 2012, gathered general stakeholder views on the cycle construction and safety issues they felt to be important (e.g. focused on safety, trade, economic, consumer, commercial or other matters). It also identified stakeholder groups with the capacity and will to commit to taking forward one or more of those issues as part of a collaborative approach during Phase 2 of the study, and the key individuals needed to make that happen.

Phase 1 included a preliminary desk-based examination of the existing legislative provisions and construction standards, and the major/most obvious inconsistencies or anomalies affecting GB, covering the full range of leisure, commuting and various commercial uses. This task further included a review of comments received for the EAPC consultation and Red Tape Challenge.

Phase 1 ended with a stakeholder workshop, held at DfT's London headquarters, which provided various cycle trade, cyclist, local authority, safety advocates and enforcement stakeholders with an opportunity to air their views, discuss them and agree the main issues that the study should review in more detail (with their continuing assistance) in Phase 2.

1.1.2 Phase 2 – In-depth analysis & reporting (12 months)

There were two core elements to Phase 2. The first was a series of specific-issue modules, each normally led by a stakeholder group under the guidance and supervision of TRL. The other was the production of the final report, including an impact assessment based on robust evidence. Part of this evidence comes from the modules, informed by evidence collected in Phase 1 and involving stakeholders identified in Phase 1 as wishing to engage on specific issues. Further evidence, based for example on published accident and market data, has been gathered by TRL, to further support and build a robust evidence base for the impact assessment.

As part of Phase 2, and to further provide background evidence, an update of the STATS19 review of police-reported cyclist casualty accidents and their contributory factors performed by Knowles et al in 2009 (TRL Report PPR445), using data from 2008-2011, has been performed. This effectively more than doubles the sample size (PPR445 could only look at contributory factors for the period 2005-2007 as they were not recorded in STATS19 prior to 2005), and allows a more focused and robust examination of those factors most relevant to construction and use standards, including lighting provisions.

The impact assessment has been carried out in accordance with the Government's Better Regulation guidance and template, and this final report also describes the project activities and evidence gathered, and provides options for amendment of GB cycle legislation. Non legislative options such as voluntary agreements are also considered.

2 The existing regulatory context

Five separate pieces of existing legislation were identified as being relevant to the study:

- The Pedal Bicycles (Safety) Regulations 2010 (referred to as "PBSR");
- The Pedal Cycles (Construction and Use) Regulations 1983 ("C&U");
- The Road Vehicles Lighting Regulations 1989 / The Road Vehicles Lighting (Amendment) Regulations 2005 ("RVLR");
- The Electrically Assisted Pedal Cycles Regulations 1983 ("EAPC Regulations");
- The General Product Safety Regulations 2005 ("GPSR").

Each of these regulations, and the key issues they present are described in the following sections (including, where relevant, those identified by the Red Tape Challenge[1] and recent formal DfT consultations). It should be noted, however, that the GPSR is mentioned here because it has a role to play in cycle safety but, unlike the other four pieces of legislation, is not subject to review.

2.1 The Pedal Bicycles (Safety) Regulations 2010

2.1.1 Overview

The Pedal Bicycles Safety Regulations (PBSR) are intended to ensure that new bicycles are safe when sold. The Regulations thus set out requirements relevant to the supply of bicycles (meaning "a two-wheeled vehicle that is propelled solely by the muscular energy of the person on that vehicle by means of pedals and has not been constructed or adapted for propulsion by mechanical power").

When first enacted in 1983, the major requirement of PBSR was to ensure that every new bicycle sold conformed to the British Standard for bicycles: BS6102 part 1. The Regulations (as most recently amended) no longer require compliance with a particular standard. The accompanying Explanatory Memorandum states that this was to eliminate overlap with the *General Product Safety Regulations* and remove reliance on an obsolete British Standard (obsolete because it has not been updated to keep up with advances in cycle design).

The Regulations thus now set out safety requirements (at point of sale) that cannot be ensured through the *General Product Safety Regulations* alone: particularly the **need to fit a bell and reflectors**; **the need for brake levers to be set to meet the UK convention** (right hand – front brake, left hand – rear brake); and the need for **unassembled bicycles to be supplied with instructions/tools** necessary to ensure safe and correct assembly is possible.

More detailed requirements include:

- White or yellow retro reflective material or a retro reflector (or a combination) must be attached to (or incorporated in) the front wheel or tyre and the rear wheel or tyre so that light is capable of being reflected to both sides of the bicycle (if not possible for rear wheel, reflectors may be fitted to the bicycle frame);

[1] The Cabinet Office ran a Red Tape Challenge public consultation via its website on the broad issues of "Road Safety & Cycling" in May 2011. In particular, views were sought on PBSR, C&U and the EAPC Regulations.

- Fitting of reflectors must not contravene Part 2 of Lighting Regulations;
- Must be fitted with wide angle white reflector to front, or a lamp to the front (in accordance with Lighting Regulations);
- Must be fitted with wide angle retro reflector to rear (in accordance with Lighting Regulations);
- Yellow retro reflector must be fitted to each of the pedals in a manner which complies with requirements of Lighting Regulations.

These regulations are specific to bicycles; unicycles, tricycles and quadricycles are exempt. They cover new bikes offered for sale, so second-hand bikes and any bikes offered for hire are not included. The regulations are intended for bikes to be used by adults on UK roads, so bikes with no brakes for racing on enclosed tracks (velodromes), bikes for export and bikes on which the saddle cannot be raised more than 635mm above the road are also excluded. The last exclusion is intended for small children's bikes, that are unlikely to go on the road, but also exempts most recumbent bikes.

Since the 2010 revision, the expression "bicycle" now includes a substantially complete vehicle (whether or not assembled) even if one or more parts are omitted.

2.1.2 Issues identified by earlier consultation (draft Regulations – 2009)

A consultation exercise regarding a draft of the amended regulations was carried out in 2009. 26 responses were received. As a result, the Regulations were amended to require fitting of wide angle reflectors (the earlier 2003 Regulations required this through reference to a British Standard but the original draft of the 2010 Regulations did not).

Relevant comments made by respondents can be summarised as:

- "Replace requirement for a bell with a horn" (DfT responded that a bell is thought to be the least obtrusive warning method and there is an absence of evidence to support alternatives to a bell, thus they chose to retain requirements but removed reference to an outdated ISO standard);
- Support for the proposal to end the exemption for tandems and tradesman's cycles;
- Calls to include second-hand bikes in the Regulations (DfT responded that it is impractical to expect owners to check that their cycles still comply with relevant point of sale standards prior to re-sale and it was in any event likely that bicycles will comply if they complied when new);
- Ability to swap brake levers to suit owner's preference (DfT responded that this is outside scope as the Regulations apply to supply of new cycles);
- Some respondents expressed the view that simplifying requirements for reflectors would be a "retrograde step" for safety (without providing supporting evidence).

An Impact Assessment accompanying the proposed amendments stated that as a deregulatory instrument there would be no direct costs. It was suggested, however, that Trading Standards would use European Standards as the benchmark for a safe bicycle when applying *General Product Safety Regulations*, which may lead to additional safety tests (cost for businesses £2-5million), but in practice, the majority of bicycles are produced for the European market and will already meet the European Standards (so likely costs will be less).

2.1.3 Red Tape Challenge – responses

Under the general title "Road Safety and Cycling", the Red Tape Challenge generated 607 individual responses. A large proportion of those, however, were actually providing commentary on the Cycle Racing on Highways Regulations 1960 or on other pieces of legislation outside of the scope of this study. A sample of some of the comments relevant to PBSR is provided here. It should be noted, however, that these are broad summaries, not necessarily individual quotations[2]. It is also important to realise that the issues raised by one or more individual respondents may be based on their own personal experiences and thus may not reflect wider practices. As a general rule, little or no supporting evidence was provided to back up the claims made or opinions expressed.

General Opinions

- "Scrap the 'need to supply tools if supplying bike with unassembled parts' – should be covered under consumer legislation, not bicycle safety laws";
- "The Regulations force cycles to be sold with a range of equipment – must be simplified and reflect changes to *Road Vehicle Lighting Regulations*";
- "It should not be mandatory to fit equipment for bikes at the point of sale that are not required under other regulations."

Views on reflectors

- General view expressed – "the requirement for pedal reflectors should be removed (or recommended rather than compulsory)", because:
    - "Most people remove them after purchase."
    - "Pedals bought separately rarely have reflectors fitted."
    - "They cannot be fitted to clip-less pedals; some pedals are very small and have no space/fittings for reflectors; technical developments – not possible for newer models; cannot be seen from behind when towing or using panniers";
- "Provision for alternatives to pedal reflectors (allow ankle-bands or allow reflectors to be fitted to rear of shoe, or allow a reflective trouser clip); or provide exemption for clip-less pedals; or just require reflectors, not specifically pedal reflectors";
- "Requirement for pedal reflectors could be replaced with requirement for lighting (*e.g.* new LED lamps – cheap)";
- "Wheel reflectors – little purpose and are nearly always removed after purchase – retailers have said if wheels are on separate invoice they are not required to attach wheel reflectors (if sold as a complete bike, they must attach reflectors)."

Views on bells

- "Requirement should be abolished because bells are useless in traffic";
- "Propose that should be able to fit horn instead."

[2] Quote marks are used here and in subsequent Red Tape Challenge sections to emphasise that the statements made relate to the opinions (often uncorroborated) expressed by respondents, rather than direct, word-for-word, quotes from individual responses.

2.1.4 Issues identified by stakeholders during Phase 1

Stakeholders identified during Phase 1, as represented at the stakeholder workshop held in March 2012, that the main issues to consider in greater depth were:

- Bells – whether or not there was a case for requiring them at point of sale (but not in-use) and whether alternative provisions ("audible warning devices") should be allowed;
- Reflectors – whether or not there was a case for requiring them at point of sale and their compatibility/relationship with lighting requirements;
- Brakes – consideration for whether consumers should have the option to ask suppliers to swap the brakes (to left = front and right = rear) at point of sale, while retaining existing UK convention as default option.

2.2 The Pedal Cycles (Construction and Use) Regulations 1983

2.2.1 Overview

Under powers provided to the Secretary of State for Transport by the Road Traffic Act 1988, it is illegal to ride a pedal cycle, including an electrically-assisted pedal cycle, on a public road in Great Britain, unless it meets the requirements of the Pedal Cycles (Construction and Use) Regulations 1983. Under separate legislation, it can also be an offence to sell a pedal cycle (even a second-hand one) that fails to meet these requirements – unless it's sold for racing off-road or on enclosed tracks.

'Pedal cycle' means a pedal cycle which is either:

- Not propelled by mechanical power, or;
- An electrically assisted pedal cycle (as defined by the EAPC Regulations).

If the *Electrically Assisted Pedal Cycles Regulations 1983* do not apply (i.e. the cycle is a conventional pedal cycle), the following requirements must be met:

- Pedal bicycles and tricycles with a maximum saddle height of no more than 635 mm must be equipped with at least one braking system, those with higher saddles (and quadricycles) must have at least two. Fixed wheel drives (i.e. no freewheel capability) count as a braking system;
- Each braking system is required to be in efficient working order, but apart from saying that a brake that bears directly upon a pneumatic tyre is not efficient, these regulations do not define the braking performance;
- A normal tricycle (with at least one wheel bigger than 460mm diameter and 'not constructed or adapted for the carriage of goods'), with two rear wheels, is allowed to have both braking systems acting upon the single front wheel, or if the tricycle has two front wheels: on the single rear wheel. Goods-carrying tricycles must have independent front and rear braking systems;
- Exemptions exist – pedals that act on any wheel/axle of any wheel without interposition of any gearing or chain (to allow continued use of historic, "penny farthing" type machines); pedal cycles brought temporarily into GB by a person resident abroad (and intending to make only temporary stay in GB). Alternative (lesser) provisions are allowed for cycles manufactured before 1 August 1984.

If the *Electrically Assisted Pedal Cycles Regulations 1983* apply, the following must be adhered to if a pedal cycle is to be ridden on the road:

- Must be fitted with a plate securely fixed in a conspicuous and readily accessible position showing:
    - Name of manufacturer of the vehicle
    - Nominal voltage of the battery
    - Continuous rated output of the motor of the vehicle;
- Electrically assisted cycles are not allowed any exceptions to the independent front and rear braking rule, and a fixed wheel does not count as a braking system on these cycles. Their brakes moreover, are required to perform to the level specified by British Standards (BS 6102: Part 1);
- Battery which doesn't leak so as to be a source of danger;
- Device biased to the off position which allows power to come from the motor only when the device is operated so as to achieve that result;
- Pedals and electric motor must be in efficient working order.

Whereas these regulations cater for pedal cycles with any number of wheels from two (bicycle) to four (quadricycle) – or even more – electrical assistance is not permitted with more than three (tricycle). This means that load-carrying, electrically assisted quadricycles are excluded and thus cannot receive any electrical assistance without themselves becoming classified as motor vehicles.

There is no requirement in these regulations for a cycle to be equipped with a bell at the point of use, nor to be fitted with reflectors (pedal and rear reflectors are required if used at night by RVLR).

Enforcement - any constable in uniform is empowered to stop a cyclist on a road and test the cycle for compliance with these regulations, and to enter the premises where a cycle is kept if it has been involved in an accident up to 48 hours previously.

2.2.2 Red Tape Challenge – responses

Responses relevant to EAPCs and lighting requirements are described in the sections of this report specific to the EAPC and lighting regulations. There were no substantive responses to the Red Tape Challenge on other C&U issues.

2.2.3 Issues identified by stakeholders during Phase 1

The main issues with existing C&U regulations identified at the outset of the study can be summarised as:

- Brakes – Consideration of performance requirements and whether PBSR (and GPSR) are sufficient on their own to ensure safe and efficient braking systems are fitted;
- EAPCs – whether C&U requirements are necessary or, if they are, can they be moved to the EAPC Regulations.

2.3 The Road Vehicles Lighting Regulations 1989 / The Road Vehicles Lighting (Amendment) Regulations 2005

2.3.1 Overview

It is illegal to cycle on a public road after dark without lights and reflectors. Exactly which lights and reflectors, where to fit them and when to light up, is defined by the Road Vehicles Lighting Regulations. The Regulations cover all lighting and reflector construction and use requirements of pedal cycles. Their main provisions are:

- Any cycle used between sunset and sunrise must be fitted with:
  - A white front light (up to 1500 mm from the ground)
  - A red rear light (between 350 mm and 1500 mm from the ground)
  - A red rear reflector (between 250mm and 900 mm from the ground);
- Amber/yellow pedal reflectors (front and rear on each pedal);
- Lamps may be steady or flashing (or mixture);
- If either front or rear lamp capable of emitting a steady light, it must conform to BS 6102-3 and be marked accordingly (even if used in flashing mode);
- Solely flashing lights are not required to conform to the above Standard, but the flash rate must be between 60 and 240 equal flashes per minute and the luminous intensity must be at least 4 candela;
- Pedal reflectors and rear reflectors must conform to BS 6102-2;
- Lights and reflectors not conforming to British Standards but conforming to a corresponding standard of another EC country and marked accordingly are considered to comply;
- Additional lighting is permitted if it does not dazzle other road users; it must be the correct colour (white to front, red to rear); and if it flashes it must conform to the required flash rate;
- Optional lights are not required to conform to BS 6102-3 and there is no minimum level of intensity;
- Lights/reflectors are not required on cycles used between sunrise and sunset;
- Lights (and reflectors) are not required when the cycle is stationary (provided it is kept to the left-hand or near side edge of a carriageway) or being pushed along the roadside;
- There are no mandatory requirements for side (or tyre) reflectors, nor for a front reflector.

2.3.2 Red Tape Challenge – responses

- "Requirements need updating and simplifying – bicycles used after dark must be equipped with a working front light (white) and rear light (red)."
- "Requirement should be solid white to front and solid red to rear (within set distance of ground and with minimum output)."

- "Issue with current need for approval number (some of the best lights don't meet requirements if they don't have an approval number) – instead, specify minimum standard for illumination and visibility (restrict sale of non-standard lights); legislation needs updating – modern LED lights can be more reliable, are light weight and have long battery life."
- "If a BS/EN/ISO standard is included, exclude the year so that when the standard is updated the regulation follows automatically."
- "Allow flashing lights to be used on rear only (distinctive and unique to cyclists)." Other respondents do not want flashing lights to be permitted at all.

2.3.3 Issues identified by stakeholders during Phase 1

The main issues with existing RVLR identified at the outset of the study can be summarised as:

- Lights – lack of availability of approved lights and options for simplification of the requirements to be considered;
- Enforcement – current practice focuses only on requiring a red light at the back and a white light at the front.

2.4 The Electrically Assisted Pedal Cycles Regulations 1983

2.4.1 Overview

An electrically assisted pedal cycle (EAPC) which complies with the following technical requirements is not considered to be a motor vehicle and therefore is not required to be registered or insured, or subject to vehicle excise duty:

- Kerbside weight not exceeding:
    - 40 kg – bicycle
    - 60 kg – tandem or tricycle;
- Fitted with pedals by means of which it is capable of being propelled;
- Fitted with no motor other than an electric motor which:
    - Has a continuous rated output which (when installed in the vehicle with the nominal voltage applied) does not exceed:
        - 0.2 kilowatts – bicycle
        - 0.25 kilowatts – tandem bicycle or tricycle
    - Cannot propel the vehicle when it is travelling at more than 15 mph[3];
- Power assistance ('Twist and Go'[4]) – if the vehicle is within the scope of the EAPC Regulations, it does not require registration, licensing or insurance.

[3] 15 mph = 24.1 km/h.

[4] 'Twist and Go' cycles (also known as e-bikes) are defined as those where pedals are fitted and operable but where the motor can provide power without the rider pedalling, e.g. at the twist of a throttle, at speeds above 6 km/h.

2.4.2 Issues identified by earlier consultation (2010)

A consultation was carried out in January 2010. It sought views on whether to amend the EAPC Regulations to simplify the legislation and provide closer alignment with European provisions[5]. A total of 79 responses were received and summarised in Department for Transport (2012a).

The main proposals, and the responses they generated, were:

- **Power limit** - amend EAPC Regulations such that the maximum continuous rated power is 250 W for bicycles as well as tandems and tricycles. This was presumed to involve no cost and to enable manufacturers to use the same motor across the range of their cycles and allow opportunities to source motors that are already used on European cycles. Respondents expressed overwhelming support for aligning with the European power limit (from 200 W to 250 W);
- **Pedal assistance** – amend EAPC Regulations to clarify that EAPCs manufactured from a certain future date may only supply power assistance when the rider is pedalling (other than perhaps at very low speeds to assist start up *e.g.* 6 km/h). Respondents expressed concerns over removing 'Twist and Go' products (i.e. those not dependent for motor assistance on the pedals being turned) from EAPC Regulations and treating them as motor vehicles (advantage offered to those who may have difficulty pedalling). Some also expressed concerns that sales of EAPCs would fall if 'Twist and Go' was prohibited (or at least no longer exempt from Vehicle Excise Duty, insurance and licencing). Others, however, felt that fully harmonising with EU rules and classifying 'Twist and Go' cycles as mopeds was essential to ensure EAPCs are genuine pedal cycles and not simply electric mopeds fitted with function-less pedals;
- **Bicycle and tandem weight** – remove reference to a weight limit for bicycles and tandems (NOTE – not tricycles). This was also presumed to involve no cost – enables manufacturers to produce the same bicycles and tandems for the GB and European markets. Respondents expressed some concerns that removing the weight limit would allow electric mopeds, heavier cargo cycles and electric pedi-cabs to be used on cycle/track lanes (safety issues relating to shared space). Others suggested that the weight of bicycles/tandems is likely to be self-limiting (heavier bikes less appealing to consumers);
- **Tricycle weight** – The proposals did not suggest changing the 60 kg weight limit for tricycles, but the consultation document did seek comments on this. A majority of respondents expressed a view that the weight limit should be removed. There were general comments that the 60 kg limit made it impossible to build an electrically assisted tricycle suitable for carrying loads. Some suggested that a heavier tricycle designed to withstand higher payloads is safer than a lighter, less substantial cycle that may not be able to cope with the stresses imposed by the load. Those in favour of retaining a weight limit mentioned safety concerns with heavier tricycles which might be a hazard to others. A number of correspondents considered that a limit on the physical size of

[5] EU Type Approval rules dictate that pedal cycles with pedal assistance and an electric motor having a maximum continuous rated power output of not more than 0.25 kW where the electrical assistance is cut off when the machine reaches a speed of 25 km/h or where the cyclist stops pedalling shall be exempt from (motorcycle) Type Approval requirements. There are no weight restrictions.

tricycles should be considered if they were to be used for commercial purposes. There were also concerns raised about the ability of the brakes to cope with higher weights.

As a result of the consultation exercise, the Department for Transport published its support for recommendations to harmonise power limits – to provide consumers with access to a wider range of electrically assisted pedal cycles. Given, however, on-going developments to amend EU Type Approval rules, the Department further stated that it would not be making any changes to national rules until the EU discussions had completed. It promised that regulatory proposals will be developed once EU discussions on wider group of 2-, 3- and 4-wheeled vehicles conclude and, in the meantime, it would carry out further work to consider whether other parameters (e.g. weight limits) could also be simplified or updated (hence the inclusion of EAPC Regulations in this study).

2.4.3 Red Tape Challenge – responses

- "EAPC Regulations should include all human-powered vehicles, not just those which are pedalled (include electric-assist trailers)."
- "Increase weight limit to make electrically assisted cargo bikes a possibility."
- "Make it possible to walk with bike (*e.g.* uphill) and have the electric motor provide assistance."
- "Weight limit removed, allowing freight cycles and pedicabs to use electrical assistance."
- "Remove weight limit for electric bikes – improve usage and encourage more freight delivery using electric bikes."
- "Current Regulations do not provide high enough weight limit for cargo cycles and refer to an old British Standard (BS) – request to increase un-laden weight to 100 kg; specify motor power as a peak power of 0.5 KW for all cycles (reasons: allow cargo cycles to be built which are suitable for urban deliveries as a practical alternative to petrol/diesel vans; BS does not take into account duty cycle)."
- "Keep 15 mph limit."

2.4.4 Issues identified by stakeholders during Phase 1

The main issues with existing EAPC regulations identified at the outset of the study can be summarised as:

- Weight limits – consider particularly the 60 kg limit for tricycles;
- Twist and Go – consider justification for retaining GB classification as pedal cycles (assuming <250 W and <25 km/h), even if such EAPCs would need EU Type Approval;
- Power and speed limits – ensure clarity in distinguishing between pedal cycles and mopeds;
- Conversion kits – consider options to ensure converted pedal cycles comply with same/similar provisions to new EAPCs;
- Enforcement – usefulness of a plate and options for classification of different forms of EAPC.

2.5 The General Product Safety Regulations 2005

2.5.1 Overview

These regulations transpose Directive 2001/95/EC on general product safety into UK law. The purpose of the Directive is to ensure that all products intended for or likely to be used by consumers under normal or reasonably foreseeable conditions are safe.

The Directive:

- Specifies that products placed on the market or supplied by producers and distributors must be safe;
- Defines a safe product;
- Imposes obligations on producers and distributors consistent with marketing safe products;
- Lays down a framework for assessing safety;
- Requires enforcement agencies to be empowered to take the necessary action to protect consumers from unsafe products.

A 'safe product' is any product which under normal or reasonably foreseeable conditions of use presents no risk or only minimum risk compatible with the product's use and which is consistent with a high level of protection for consumers. Safety of a product is assessed with regards to:

- Product's characteristics;
- Packaging;
- Instructions for assembly and maintenance, use and disposal;
- Effect on other products with which it might be used;
- Labelling and other information provided for the consumer;
- Categories of consumers at risk when using the product.

The Regulations apply to the supply of all new and second-hand products, excluding products supplied for repair or reconditioning prior to being used. Where a product is covered under other Regulations, those Regulations will still apply to that product – *GPSR* will apply where these go further than the other Regulations (in terms of safety, extent of obligations and powers available to enforcement officers).

The Regulations provide that a product which complies with certain safety standards is presumed to be safe. For pedal cycles, there are various European Standards that can be used in this way, most notably:

- EN 14764 – City and trekking bicycles (i.e. most normal bikes);
- EN 14765 – Bicycles for young children;
- EN 14766 – Mountain-bicycles;
- EN 14781 – Racing bicycles;
- EN 15194 – Electrically power assisted cycles.

Note that these all cover bicycles; there are no current standards for tricycles or quadricycles, nor for the various other forms of bicycle (e.g. recumbents or goods-

delivery). Although EN 15194 covers "cycles", it actually only specifies requirements for the electrical-assist systems and refers all other issues to EN 14764.

Whether or not a Standard exists, the Regulations also:

- Require producers to inform customers about the risks of products and to monitor the risks their products pose;
- Require distributors to act with due care so as not to supply unsafe products and to cooperate in monitoring the safety of products;
- Require producers and distributors to notify an enforcement authority if a product placed on the market poses risks that are incompatible with the general product safety requirement.

2.5.2 Issues identified by stakeholders during Phase 1

Stakeholders identified the main issues relevant to the study were concerning those cycle types not covered by EN standards. Of particular importance were commercial cycles, i.e. those used for goods-delivery or as pedicabs.

2.6 Summary of legislative issues

The review of existing legislative provisions and initial (Phase 1) discussions with stakeholders from the cycle industry, cyclist community and regulatory/enforcement authorities identified a variety of issues, as summarised in the preceding sections. To address the issues in greater depth during Phase 2 of the study, they were grouped into four modules, with each module assigned to a particular stakeholder to lead on the development of legislative change options in those broad fields. The modules, lead stakeholders and specific issues to be addressed are summarised in Table 1 below.

Table 1. Modules and issues to be addressed in Phase 2

Module 1 – Brakes & Bells	**Module 2 – Lights & Reflectors**
Lead: BAGB	**Lead:** CTC
Issues: Brakes – Consideration of performance requirements and whether PBSR (and GPSR) are sufficient on their own to ensure safe and efficient braking systems are fitted Brakes – consideration for whether consumers should have the option to ask suppliers to swap the brakes (to left = front and right = rear) at point of sale, while retaining existing UK convention as default option. Bells – whether or not there was a case for requiring them at point of sale (but not in-use) and whether alternative provisions ("audible warning devices") should be allowed	**Issues:** Lights – lack of availability of approved lights and options for simplification of the requirements to be considered Enforcement – current practice focuses only on requiring a red light at the back and a white light at the front Reflectors – whether or not there was a case for requiring them at point of sale and their compatibility/relationship with lighting requirements

Module 3 - EAPCs	Module 4 – Commercial Cycles
Lead: DfT	**Lead:** TRL
Issues: Weight limits – consider particularly the 60 kg limit for tricycles Twist and Go – consider justification for retaining GB classification as pedal cycles (assuming <250 W and <25 km/h), even if such EAPC[6]s would need EU Type Approval Power and speed limits – Ensure clarity in distinguishing between pedal cycles and mopeds Conversion kits – consider options to ensure converted pedal cycles comply with same/similar provisions to new EAPCs Enforcement – Usefulness of a plate and options for classification of different forms of EAPC Whether C&U requirements are necessary or, if they are, can be moved to the EAPC Regulations	**Issues:** Standards/requirements for goods-delivery cycles and pedicabs, including electrically-assisted variants.

[6] Note that although the European terminology is for "electric power assisted cycles" (EPACs), UK stakeholders consulted for this project were strongly in favour of retaining the UK description of "electrically assisted pedal cycle" (EAPCs), and that convention is followed throughout this report.

3 The wider societal and safety context of cycling

To better inform and assist the development of options for legislative change, a wider review of cycling was conducted, to contextualise its role in UK society and its capacity to contribute to other policy goals.

This review took two approaches, both of which are described in the following sections. The first was to look at accident and casualty data from STATS19 and elsewhere, including updating the contributory factors analysis carried out in an earlier TRL study for DfT into cycling safety (Knowles et al, 2009). The second considered published evidence regarding cycling's wider role in public policy, e.g. health, environment and urban development.

3.1 Cycle Regulations Review - Final Report

In 2011, 107 pedal cyclists were killed and 3,085 seriously injured. The total of 3,192 killed and seriously injured (KSI) casualties in 2011, accounted for 13% of all KSI road casualties, as shown in **Figure 1**. This proportion has been increasing since 2002, when it was 6%.

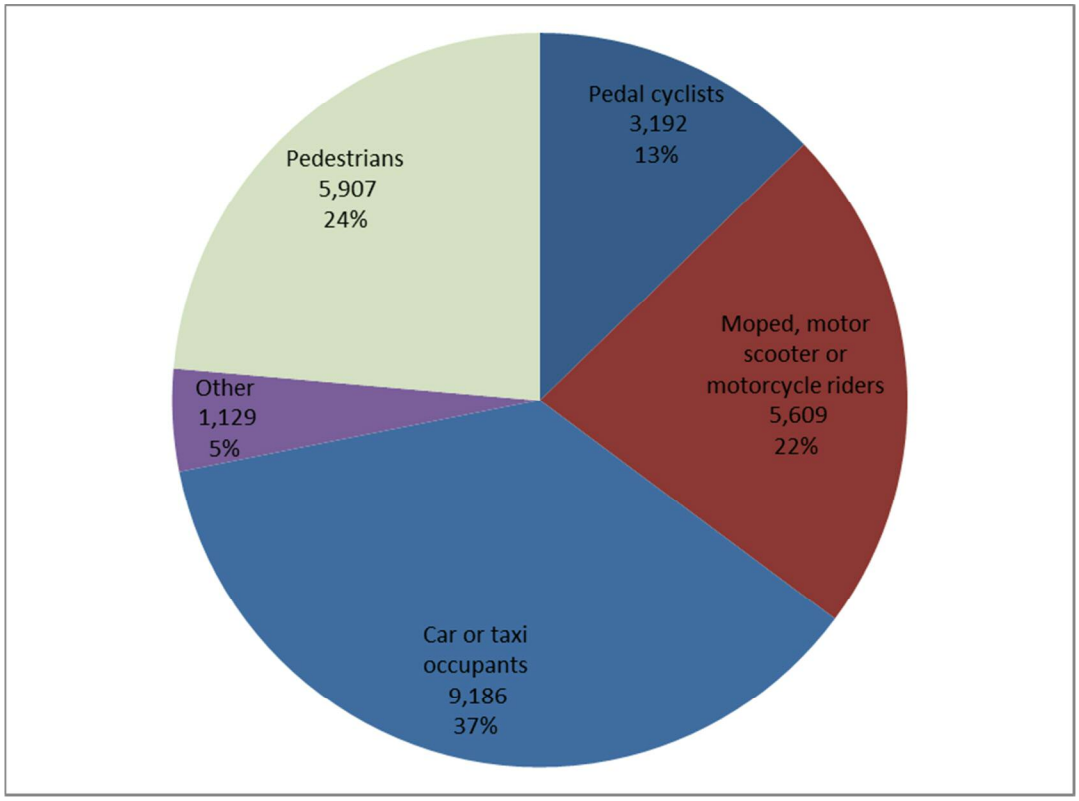

Figure 1. KSI casualties split by road user group, 2011

The number of pedal cyclists killed was lower in 2011 than in all but one of the previous 12 years. However, 2011 had the highest number of seriously injured pedal cyclists throughout this period and the number of seriously injured pedal cyclists has been increasing since 2004. **Figure 2** shows how the numbers of pedal cyclists killed and seriously injured have changed since 1999. Figure 3 shows a similar recent upward trend in reported KSI injuries to pedestrians in impacts with pedal cycles.

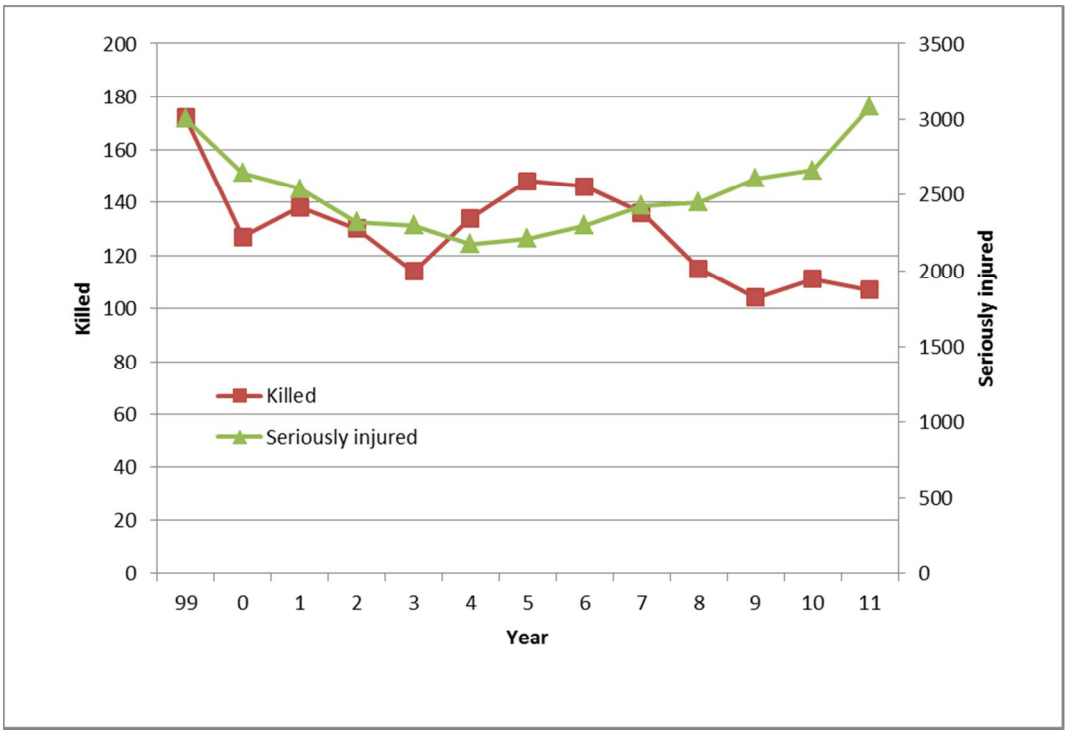

Figure 2. Pedal cyclist casualty trends

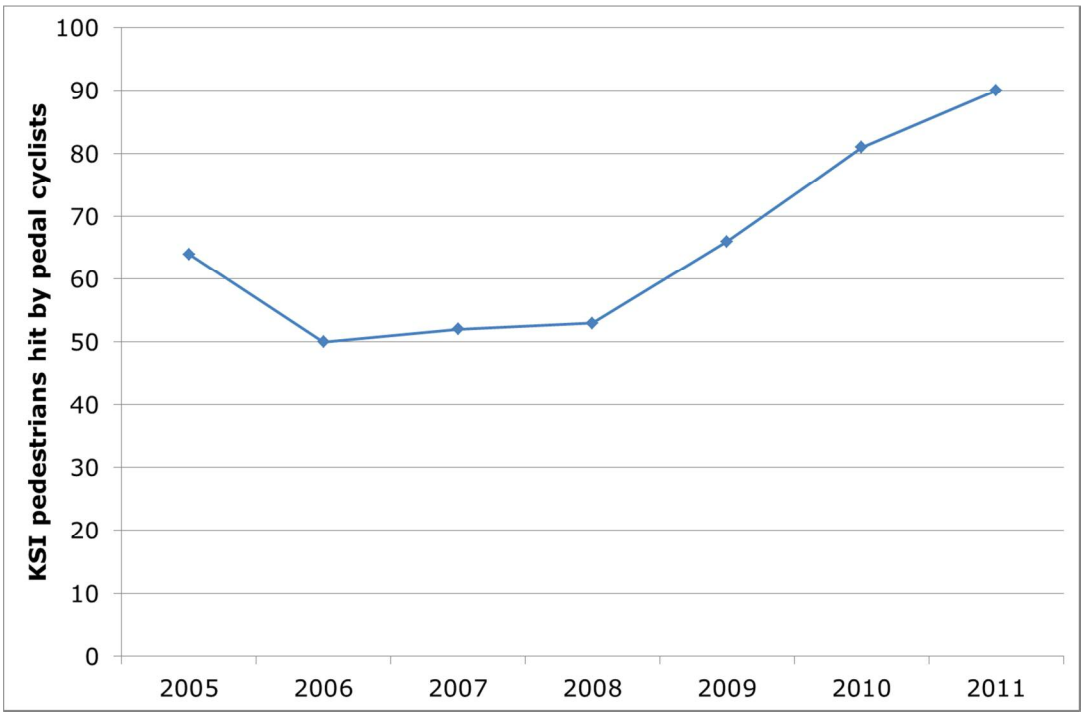

Figure 3. KSI Pedestrians hit by pedal cyclists trend

It is possible that some of this apparent upward trend is due to increasing reporting rates, i.e. that a higher proportion of cycling accidents are being reported to the police, but this is purely conjecture. While the precise scale of the rise may not be certain, it does seem that serious injuries both to pedal cyclists and to pedestrians resulting from pedal cycle accidents do seem to be increasing.

Another possible explanation for the increase is that cycling itself is on the rise. According to Transport Statistics Great Britain (Department for Transport, 2012b), total cycling has increased from 4.1 billion vehicle-kilometres in 2004 to 4.9 billion in 2011. While this increase (about 20%) is proportionately not as high as those seen for reported serious injuries (about 40-50%), it is possible that much of the increased cycle traffic was travelled by new/novice/inexperienced cyclists, which may help to account for the apparent extra risks.

3.1.1 Road type

Figure 4 shows how reported pedal cyclist casualties during the years 2009-11 are distributed between different road types, while Table 2 shows the distribution by speed limit.

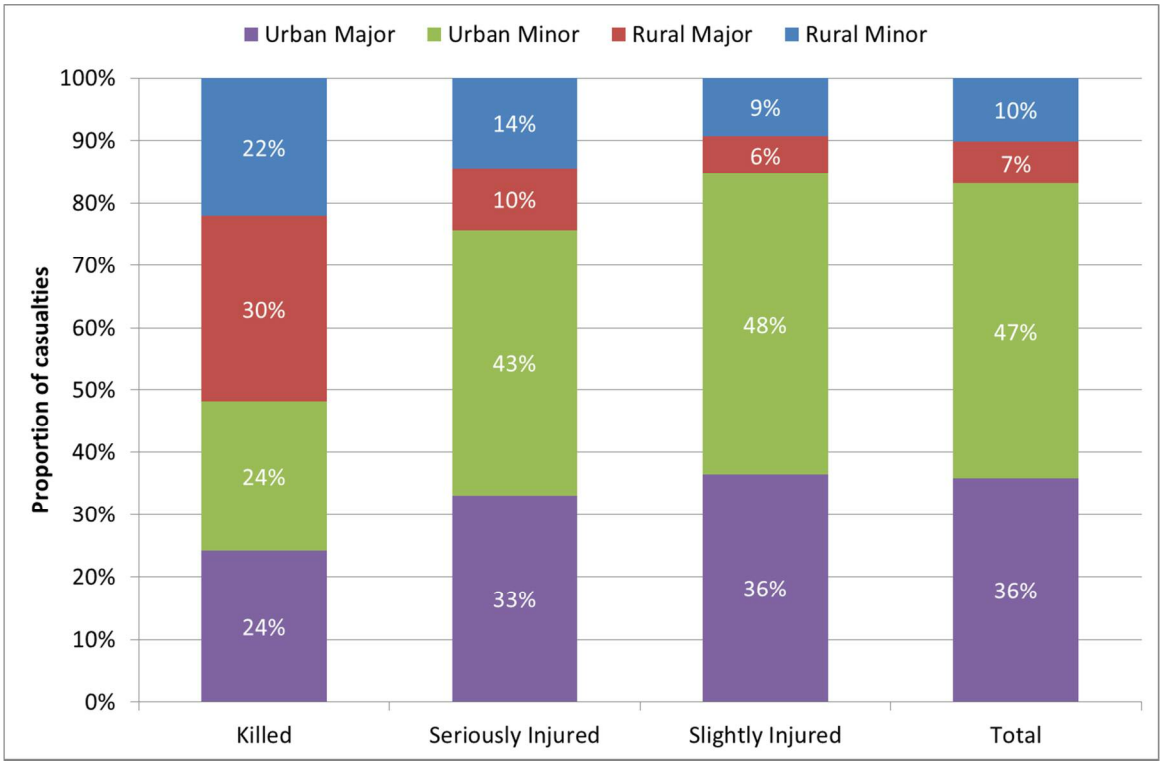

Figure 4: Pedal cyclist casualties by road type 2009-11

Table 2: Pedal cyclist casualties by speed limit, 2009-11

Speed Limit	Killed	Seriously Injured	Slightly Injured	Total
20	0%	1%	2%	2%
30	45%	78%	87%	85%
40	11%	8%	6%	6%
50	6%	2%	1%	1%
60	25%	10%	4%	5%
70	12%	1%	0%	1%
Total	**322**	**8,351**	**44,791**	**53,464**

3.1.2 Age

Figure 5 shows the age distribution of pedal cyclist KSI casualties by road type, showing that older rider casualties tend to be much more evenly distributed between rural and urban roads, whereas younger rider casualties occur much more often in urban areas.

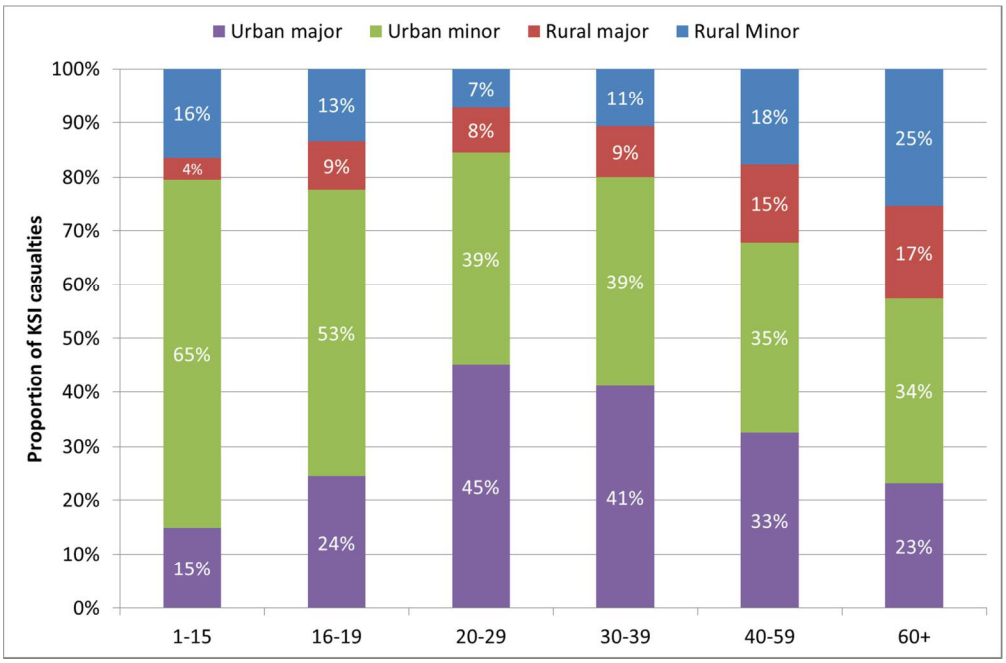

Figure 5: Age distribution of pedal cyclist KSI by road type (2009-11)

3.1.3 Time of day and lighting conditions

Figure 6 shows that pedal cyclist casualties are most prominent in the morning and, in particular, evening peaks, with very few occurring between the hours of 9pm and 6am.

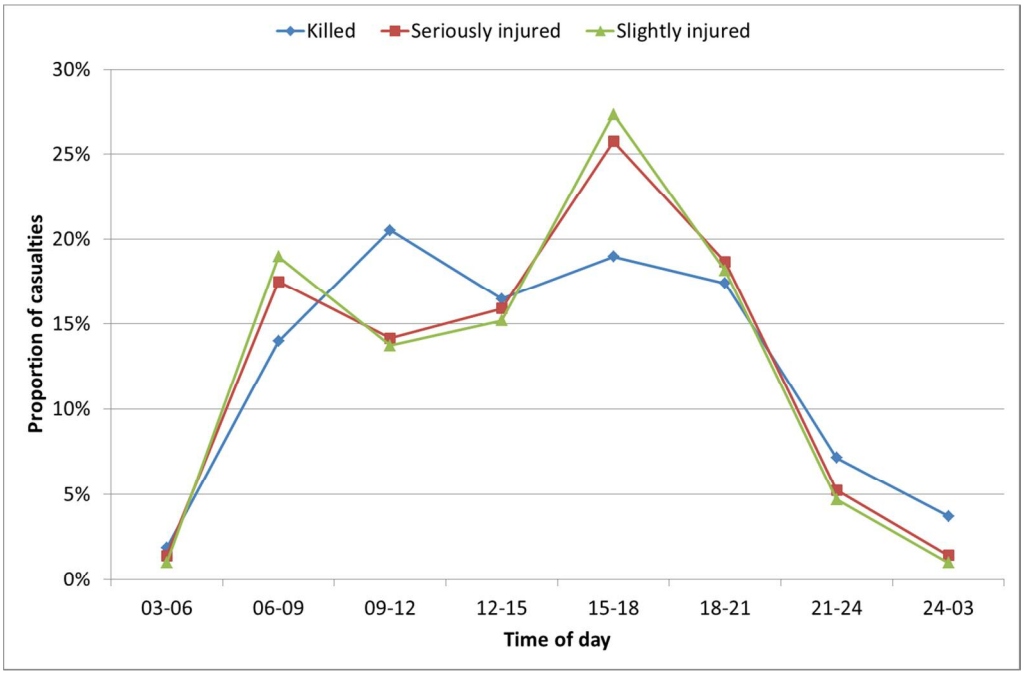

Figure 6: Pedal cyclists by severity and time of day (2009-11)

Table 3 shows that about four-fifths of all reported KSI pedal cyclist casualties occur in daylight, while most of the remainder occur at night on roads with street lights lit. That leaves just 8% of fatalities and 2% of serious injuries occurring on unlit roads at night.

Table 3: Proportion of pedal cyclist casualties by light condition, 2009-11

Casualty injury	Light conditions	Urban	Rural	Total
Killed	Daylight	79%	77%	78%
	Darkness, street lights lit	20%	8%	14%
	Darkness, no street lighting	1%	15%	8%
	Total	155	167	322
Seriously injured	Daylight	78%	84%	80%
	Darkness, street lights lit	20%	8%	17%
	Darkness, no street lighting	1%	8%	2%
	Total	6,322	2,029	8,351

3.1.4 Road surface conditions

Table 4 shows that most casualties occur on dry road surfaces, outnumbering wet surfaces by at least four to one.

Table 4: Pedal cyclist casualties by road surface condition, 2009-11

Casualty class	Road surface condition	Killed	Seriously inj	Total
Rider/Passenger	Dry	81%	81%	81%
	Wet/damp	17%	18%	18%
	Snow	0%	0%	0%
	Frost/ice	2%	1%	1%
	Flood	0%	0%	0%
	Unknown	0%	0%	0%
	All riders/passengers	322	8,351	8,673
Pedestrian (hit by cyclist)	Dry	83%	85%	85%
	Wet/damp	17%	15%	15%
	All pedestrians	6	231	237

3.1.5 Contributory factors

The contributory factors are the key actions and failures that the reporting police officer judges to have been likely to have led directly to the impact. They are thus subjective and should be treated as indicative only. For the pedal cyclist KSI accidents in 2009-11, Table 5 shows the distribution of assigned contributory factors. Four of the factors relate to the cycle itself:

- 506 – not displaying lights at night or in poor visibility;
- 203 – defective brakes;
- 202 – defective lights;
- 201 – defective or underinflated tyres.

Of these, not displaying lights was the most commonly cited factor, believed to have contributed to something like 2-4% of the KSI casualties. Defective brakes were a factor in 2% of cases, while defective lights were judged to be relevant in no more than 1% of cases and defective tyres in only 0.2%.

Table 5: Contributory factors for KSI pedal cyclists, 2009-11

Pedal cycle factor		% of fatal PC collisions	% of serious PC collisions
405	Failed to look properly	20%	26%
410	Loss of control	14%	9%
403	Poor turn or manoeuvre	12%	6%
406	Failed to judge other person's path or speed	8%	10%
507	Rider wearing dark clothing	7%	3%
602	Careless, reckless, in a hurry	7%	9%
310	Cyclist entering road from pavement	6%	9%
501	Impaired by alcohol	6%	3%
506	Not displaying lights at night or in poor visibility	4%	2%
999	Other	4%	2%
307	Travelling too fast for conditions	3%	3%
701	Stationary or parked vehicle(s)	1%	2%
203	Defective brakes	2%	2%
202	Defective lights or indicators	1%	0.4%
201	Tyres illegal, defective or under inflated	-	0.2%
KSI Pedal cyclist accs – scene attended by police officer, at least one factor in accident		309	6,303

The earlier analysis of 2005-07 accidents also found "not displaying lights" to be the most prevalent factor relevant to the cycle itself (rather than the cyclist or other vehicle driver). It was judged relevant to 5% of fatalities and 4% of serious injuries at that time. Combining both data sets together suggests that this factor was relevant to a little over 4% of pedal cyclist fatalities and 2.5% of the serious injury accidents.

3.2 Other published accident data

Various international comparisons of cycling safety statistics have been published in recent years (since the drafting of Knowles et al, 2009), summarised below.

SafetyNet (2009) presents a EU-wide review of scientific studies on the magnitude and nature of cyclist (and pedestrian) accidents. It described data from Great Britain and the Netherlands to suggest that no more than 33% of serious cyclist injuries and no more than 21% of slight injuries were reported to the police. It also describes the importance of cycle/cyclist visibility (the lack thereof) in accident causation, particularly its relevance in countries where cycling is not very common – "car drivers do not see cyclists because they do not expect to see any". In Dutch and Scandinavian studies, 35-37% of cyclists did not have lights on during darkness. The report goes on to describe a Dutch study that found a technical defect on the cycle to be relevant in about 7% of crashes, with the poor conditions of the brakes being the most common single defect.

ETSC (2012) reviews pedal cycle accident data and trends across 24 EU Member states over the period 2001-2010. It compares the cyclist deaths per billion km cycled against the average distance cycled per person-year in five countries; Denmark, Sweden, Norway, GB and the Netherlands. Great Britain (2008-10) is reported as having both the lowest average distance cycled per person-year (<100 km) and the highest deaths per billion km cycled (22.4). It is suggested that the death rate falls as average distance cycled rises. The Netherlands, for example has a death rate of 12.4 deaths per billion km cycled (about half the GB rate), while its average distance cycled per person-year is almost 900 km (at least 10 times that of GB). The report says that these figures provide "some support" for the suggestion that cycling becomes safer as more people take it up,

an argument known as "Safety in Numbers". It also acknowledges that "other elements of the traffic system, such as the safety of infrastructure, road users' education and awareness, and vehicle safety probably also help to account for the remaining differences in the countries' observed level of cycling risk".

Further evidence on the Safety in Numbers argument is provided by PRESTO (2010a). In a section titled "Cycling is Safe", this report describes data from the Netherlands showing that between 1980 and 2005 there was a 45% increase in cycling activity but a 58% decrease in cyclist fatalities. In Odense (Denmark) between 1996 and 2002, cycling increased by 20% and fatalities fell by 20%. The report states similar results being experienced in GB and Germany. The report goes on to state:

"*The reason for the decline is not only that cyclists become safer with experience. Equally important, other road users become more used to and aware of cyclists as they become more numerous in traffic, as more car users start cycling themselves, they understand better how their driving affects other road users, and the more people cycle, the greater is the political will to improve the conditions for cyclists. These improvements further increase the number of cyclists, which again increases the overall safety.*"

This report also compares death rates and average distances cycled, but this time for 10 different EU countries, reproduced in Figure 7. Great Britain has the lowest average distance cycled per day[7] (about 0.1 km), and the third highest deaths per 100 million km cycled (about 6). While these data are based on accidents and casualties occurring in the 1990s, they might suggest that if the average distance cycled in Great Britain per person per day increased by a factor of 3, for example, the fatality rate might fall by 40-50%, assuming such an increase in cycling was accompanied by appropriate improvements in other relevant factors, e.g. cycling infrastructure and driving skills. Such a drop in involvement rate in this scenario, however, would still imply an increase in overall cyclist fatality numbers (of about 50-80% for the assumed 200% increase in cycling).

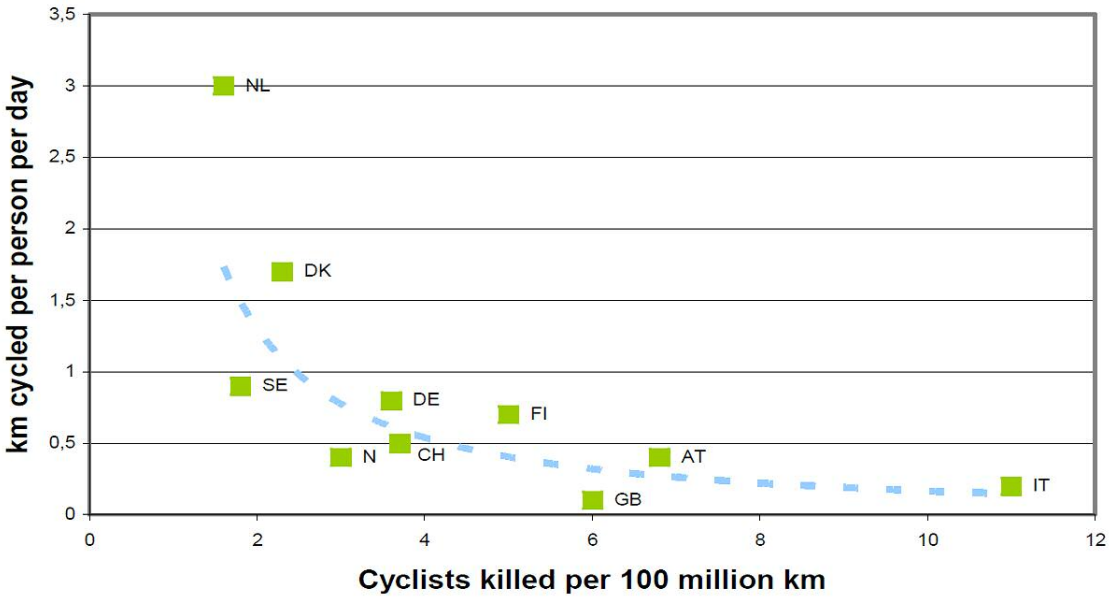

Figure 7. Correlation between accident rate and km cycled per person (source: PRESTO, 2010)

[7] This is a whole population average – i.e. total distance cycled per annum divided by average population in that year, and thus does not represent the average distance cycled by individual cyclists.

3.3 Cycling's wider societal role

In developing options for legislative change affecting cycle construction standards and requirements, and assessing their potential impacts, it is important to have some understanding of cycling's role in other policy areas, e.g. health, environment, the economy and urban development. The following sections review some relevant evidence.

3.3.1 Cycling in general

PRESTO (2010a) goes further than describing (promoting) the safety of cycling, it also contains sections headed:

- **Cycling Makes a Difference to Health** – this cites WHO evidence that physical inactivity is second only to tobacco consumption in health risk factors, and that a lack of physical activity leads to premature deaths, disease and higher costs through absences from work. It says cycling is good for the heart and circulatory and immune systems, leads to fewer aches and pains, better posture and a better quality of life, including better mental health – all of which reduce health care expenditures. The report also describes WHO's Health Economic Assessment Tool (HEAT) which quantifies the benefits of increased walking and cycling. In Austria, for example, it estimated that cycling saves more than 400 lives every year through avoidance of physical inactivity (the box overleaf presents an equivalent calculation for the UK, based on applying the HEAT methodology to UK data);
- **Cycling Has a Favourable Effect on the Pocketbook** – this mentions both savings achieved in the costs of owning and operating a cycle (compared to a car) and savings in travel time costs (as cycling short distances of up to 8 km can readily be faster than a car at peak times in urban areas and journey times are certainly more predictable). Cycles are also said to have much lower external costs than cars (e.g. infrastructure, emissions, noise, congestion, land use, stress and accident costs). There is also evidence presented of a favourable return on public investment in increasing the number of cyclists. It cites, for example, research by Cycling England that indicates that savings from reduced congestion, pollution and health service costs outweigh the costs of the measures implemented to achieve higher cycling levels, particularly if targeted at the 45+ age groups in urban areas. Other PRESTO resources mention economic returns of between 4 and 7 times the implementation costs for cycling infrastructure investments, and cycling's increasingly attractive role in providing guided tours for city visitors and bike hire options for them;
- **Cycling Improves Quality of Life** – reductions in noise pollution/nuisance are cited, with road traffic being the most significant single source of noise in Europe. Constant noise can disturb sleep, lead to health problems such as stress and high blood pressure and have a serious impact on quality of life. The report also points out that cycling "*makes urban areas more liveable places. Riding a bicycle enables people to interact with their environment, instead of passing it by and makes streets safer by improving communication between people*." In cities where cycling is particularly common "*riding a bicycle is not just a transport mode but an expression of a lifestyle. It represents freedom of movement, makes you independent, and is fun. Cycling is simply cool*";
- **Cycling is Green** – by shifting some journeys from car or bus to cycle, there are obvious benefits in terms of reduced consumption of fossil fuels and thus reduced

production of greenhouse gases, as well air quality benefits through avoided pollutants and particulates. Since emissions from a car with a cold engine are considerably greater than of the same vehicle with a warm engine, short trips contribute disproportionately to total exhaust emissions. The report cites evidence that throughout Europe, 30% of all car trips are shorter than three kilometres, 50% are shorter than six kilometres, leaving huge potential for bicycle use. A study of the British Cyclists' Public Affairs Group in 1995 is cited as demonstrating that even a modest increase in cycling could rapidly reduce transport emissions by 6% in Great Britain. An increase to cycling numbers comparable to those in the Netherlands (where 27% of all trips were done by bicycle) could lead to a reduction of up to 20% in CO_2 emissions.

UK calculations with the WHO Health Economic Assessment Tool (HEAT) for Cycling:
(www.heatwalkingcycling.org, tool run March 2013)

Assumptions:
4 million regular cyclists (from LSE, 2011), cycling 4.9 billion vehicle kilometres (Transport Statistics Great Britain, TSGB), at an average of 1,225 km per cyclist per year. Equivalent to about 5 km per person per day if cycling 245 days per annum on average. Note that TSGB does not include any off-road cycling so these figures of average distances cycled are likely to be conservative.

Results:
This level of cycling **prevents 2,371 deaths per year**, valued at an average annual benefit of €3.1bn (**about £2.7bn**) over a 10 year period with a 3.5% discount rate.

LSE (2011) sets out to define the 'cycling economy' of the UK, including the economic benefits generated by each individual cyclist, taking into account factors such as bicycle manufacturing and retail, accessory purchases and employment. In 2010, the report concludes, this reached £230 per cyclist and £2.9bn in overall contribution to the UK economy (of which the 3.7m bike sales contributed £1.6bn, accessory sales a further £0.8bn and the balance, £0.5bn, coming from wages paid to the estimated 23,000 people employed in the UK cycle industry). This, the report goes on to postulate, would mean that 1m extra cyclists would contribute £141m to the UK economy by 2013 (it says there were 1.3m new cyclists in 2010). The report also estimated that the health benefits of cycling save the economy £128m per year in avoided absenteeism alone, and that a 20% increase in cycling by 2015 could save the economy £207m in reduced congestion, £107m through reduced premature deaths, £52m in health service costs and £71m in pollution costs. Along with these opportunities, however, the research also flagged up some potential barriers:

- Safety, road confidence, self-belief and time available for cycling;
- There has been an almost doubling of the proportion of children being driven to school over the past 20 years, despite 80 per cent owning bikes;
- The proportion of GDP spent on public cycling infrastructure in the UK has been lower than equivalent government spending in many other countries.

The LSE report also cites research that shows returns on investment for cycling measures in the UK of 19:1 on average.

3.3.2 Commercial cycling

Commercial cycling (cycle-based enterprises carrying goods or passengers) has also featured in recent research and is reported to contribute to various policy objectives.

The Intelligent Energy Europe project "cycle*logistics*", for example, has examined the potential for energy (fuel) and CO_2 savings from cycle freight in Europe (Cyclelogistics, 2012). The project looked at a very broad range of freight transport applications, including private consumers carrying goods (shopping), tradesmen carrying tools and equipment, own-account delivery services such as of flowers or pizzas, and third-party logistics carriers, haulage firms, postal companies, couriers, etc. Assuming commercial cycles could carry up to 200 kg, would have 400 - 800 litres of carrying volume, and could travel up to 7 km per trip[8], the study concludes that such cycles could replace up to 25% of all urban transport journeys. Approximately one-third (8% overall) of these savings were found to potentially come from the "professional logistics" sectors and two-thirds (17% overall) from private shopping, leisure and commuter trips. This, the study team suggest, would lead to a theoretical annual EU-wide fuel saving of about 15 million tonnes of fuel and 37 Mt of CO_2[9]. Even making a very conservative assumption that only 1 in every 1000 freight-carrying trips currently performed by car/van is replaced by a cargo bike, annual savings of 15,000 tonnes of fuel and 37,000 tonnes of CO_2 were suggested as possible.

TfL looked at the potential for cycle freight in London (Transport for London, 2009). In particular, the study attempted to identify the barriers to widespread adoption of cycle freight operations. The study concluded that there were various advantages associated with cycle freight operations:

- **Purchase costs** (cycles are cheaper than vans);
- **Running costs** (tax, insurance, storage and depreciation are lower than vans);
- **Parking and congestion-charge costs** (particularly avoiding Penalty Charge Notices);
- **Speed in congestion** (journey time reliability is much better for cycles as they are much less affected by variable traffic conditions);
- **Driver training requirements** (the low availability of drivers with a C1 licence, i.e. qualified to drive 3.5-7.5t vehicles, is a problem, particularly for larger fleets);
- **Low environmental impact, and associated PR benefit** (corporate social responsibility drivers affecting large firms particularly, though speed/cost/reliability advantages of cycle freight were found generally to be more important than, or at least as important as, any 'green' benefits).

The study, which involved examination of various case studies on existing cycle users and interviews with potential users/customers, highlighted some key disadvantages, or at least perceived disadvantages:

- **Security** (a concern for those not currently using cycles but experience of actual cycle freight companies is that these fears may be exaggerated as there were almost no instances of theft of cycles or payload reported);

[8] 7 km for electrically assisted cycles, 5 km for un-assisted pedal bikes

[9] The equivalent figures for the UK only would be about 1.8 million tonnes of fuel and 4.5 Mt CO2, based on a 60 million UK population and assuming all other parameters remain the same.

- **Limited range and payload** (less so when secondary city-centre distribution hubs were considered, or the use of vans themselves as mobile hubs, rather than logistics models based on out-of-town distribution facilities);
- **Driver fatigue** (particularly an issue when considering transferring existing staff from vans to cycles);
- **Seasonality** (a perceived problem for one operator surveyed but thought to be addressable via changes to contractual arrangements).

The report also summarises work by a major mail-delivery company to trial electrically-assisted pedal cycles (tricycles). Overall the company are reported as having been pleased with the results, with users commonly saying that they felt fresher at the end of the day than without the equipment (i.e. EAPCs address the driver fatigue issue). The trials had to be cancelled, however, because of the legal position with regard to EAPC tricycles weighing more than 60 kg (i.e. not being legally classifiable as pedal cycles).

4 Option Development

The following sections describe the results of deliberations within each of the modules, addressing specific technical issues relevant to the existing legislative provisions and each developing a set of broad options for change. It is important to note that all the stakeholder comments made in the following sections are the views and opinions of those involved in the groups and not necessarily those of the Department for Transport or of TRL, unless specifically attributed as such.

This chapter concludes with a brief discussion of the implementation options (possible new regulatory structures), the non-regulatory (voluntary) options, and by describing the process for refining the broad technical (and regulatory) options into a final set of options subject to impact assessment.

4.1 Module 1 – brakes & bells

This module was led by the Bicycle Association of Great Britain (BAGB), with the additional involvement of the Cyclists' Touring Club (CTC), the Royal Society for the Prevention of Accidents (RoSPA) and the Association of Cycle Traders (ACT). A variety of options were identified, including for consolidation of all the various existing point of sale and in-use regulations into one single document, supported by an industry Code of Practice, hereafter referred to as "the Regulation" and discussed in more detail in the later section on implementation options. The main technical options emerging from this module can be summarised as:

4.1.1 Bells

Option – some members of the module group suggested that "the fitting of a bell, or alternative auditory warning device, should be at the purchaser's discretion, with guidance from retailers at point-of-sale."

The module team agreed that the present regulation is sub-optimal, frequently resulting in the token provision, separate from the bicycle, of a cheap and ineffective bell purely for "compliance". A counter-argument, to keep the existing provisions, was also made, by one member of the group, citing concern that the number of complaints from pedestrians, regarding cyclists giving no warning, would increase. They felt that the automatic provision of a bell was a useful mechanism to deflect such complaints.

The module team further acknowledged that the question of bells may have a strong political aspect, and ultimately, therefore, must be a matter of political judgement.

The team noted that The Vienna Convention on Road Transport requires a fitted bell for on-road use; this Convention is in force in Northern Ireland, which has a separate version of the Road Traffic Acts and, under the terms of the Road Vehicles (Traffic) Regulations (NI) 1933, pedal cycles used on a public road must be fitted with an "efficient and effective bell or horn". If the provisional fitting of bells were removed from the regulation, a bicycle sold in all other parts of the UK would not be legal for use in Northern Ireland without the user separately purchasing and fitting a bell.

One member of the module team noted calls from pedestrian groups for bells to be required when a cycle is ridden in England, Wales and Scotland too. He suggested that these calls should be resisted, since a bell is useful only on paths shared with pedestrians, so it is unreasonable to require a cyclist to carry a bell if they ride

exclusively on the road – where something much louder would be required (e.g. a horn, as is also allowed in Northern Ireland). He further noted that the provision of bells at the point of sale adds little or nothing to the price of a new bike, many of which came with bells before this was a sales requirement in Great Britain, because other countries require them. In his view, this provision largely satisfies the demands of pedestrian groups, while still allowing cyclists to remove the bell if they see no need for it, and thus bells should remain part of the specification of a new bicycle only.

4.1.2 Brakes

Options:

- Bicycles should be equipped with two independent braking systems, one to operate the front wheel, and one the rear wheel;
- The existing convention of the right-hand lever operating the front brake and the left-hand lever operating the rear should be retained.

The team's unanimous recommendation was that the UK convention for brake levers should be retained, as an important safety measure. They suggested that the most dangerous manoeuvre on a bicycle is the right turn; a right hand signal dictates that the left hand must apply the brake, and for safe, stable braking this should be the rear brake. They further suggested that such a regulation, however, should not preclude the customer choosing to swap the braking configuration, without recourse to after-sales alteration.

The module team also expressed the view that all tricycles/quadricycles should be equipped with two independent braking systems – one to operate the front wheel(s), and one for the rear. To clarify, two independent brake systems are currently required on all tricycles (except some older ones) but while goods-delivery tricycles must have one system acting on the front wheel(s) and one on the rear, passenger tricycles may have two independent systems operating on the same single wheel, be that wheel at the front or rear. Stakeholders are thus suggesting that the current requirements for goods tricycles should be extended to passenger tricycles. A stakeholder also raised some concerns with the suggestion to require two independent front and rear braking systems on tricycles, as this, he suggested, may have implications for disabled tricyclists. This concern was confirmed through separate discussions with a disabled cyclist group, who provided evidence to indicate that single front wheel only braking on some tricycles (e.g. "handcycles") is safer than braking of the (dual) rear wheels, through avoided lateral instabilities. This proposal from the module team is thus not considered further.

One member of the module team expressed concerns that under the existing regulation it is possible for someone unwittingly to buy a competition bicycle (exempt from the regulations) that is actually illegal to ride on the road. He suggested that many people legally buy 'track racing bikes', designed for the velodrome, with no brakes apart from their fixed rear wheel, but then ride them in the street. Noting that "reputable retailers will be advising customers appropriately, but that the present regulation offers no protection against the unscrupulous sale of competition bicycles, whilst impeding legitimate customer choice", the stakeholder suggests that both matters may be taken better care of by deleting the competition exemption and replacing it with a simple and transparent means by which any customer may buy a bicycle that differs in some way from the regulation, on the basis of informed consent.

For completeness, but not as an option for legislative change, the module team also agreed that fixed wheel systems should continue to be accepted as rear brakes on non-EAPC bicycles, as currently allowed by the C&U Regulations.

4.2 Module 2 – lights & reflectors

This module was led by CTC, and also engaged BAGB, ACT and RoSPA in its deliberations. CTC also provided some background information, shown in the box opposite.

4.2.1 Lights

Options - rear lamps:

"BS6102-3 has become irrelevant". All module participants are reported as being satisfied with a requirement for a flashing or steady red light of at least 4cd intensity. All references to standards should be deleted. Other requirements, regarding the mounting position and direction of visibility may remain the same.

Options - front lamps:

The module team acknowledged one option was for same minimal requirement for front lamps – but white of course.

An alternative option suggested is to recognise the inadequacy of low powered lights[10] on roads at night without street lighting and on the other hand the use by cyclists of very bright flashing lights causing problems for other road users (including other cyclists). CTC, for example, stated that the "strongest complaints" they receive "come from those who are affected by photosensitive epilepsy", and whilst they were "not aware of anyone suffering a seizure from a flashing cycle lamp (apart from one person, looking at their own lamp to check it was working), there are many reports of headaches and nausea, especially where cyclists and pedestrians share the same path". CTC did not, however, quantify the numbers of reports or complaints they receive.

CTC background information on cycle lighting:

"It is useful to think of conspicuity as a three-stage process:

1. Detection
2. Identification
3. Location

TRL work by GR Watts in the 1980s found a red rear light gave the most distant detection and pedal reflectors the soonest identification of a pedal cyclist to the driver of a motor car with dipped headlamps approaching from behind.

Since the 1980s there have been some additions to and deletions from the range of lighting products available to cyclists. Flashing LED lights are the most obvious addition and were approved by RVLR in 2004. Since then it has been possible to ride legally with no other light than flashing ones, white front, red rear, emitting at least 4 candela, which is the same as the minimum central output of a motor vehicle front or rear position lamp, or a BS6102-3 cycle rear lamp.

The main deletion has been the almost total disappearance of BS-approved lamps from the market. Most shops do not now have any such lamps available for sale. And though the flashing lamps they sell may emit at least 4cd, they are not approved either, since they are also capable of emitting a steady light, in which case approval is denied unless they conform to BS6102-3 when switched to that mode. Some might, but their manufacturers do not trouble to make such a claim or have them tested. Thus it has become almost impossible for a British cyclist to ride legally at night. Apart from a few rare flashing-only lights, he/she may do so only by using German-approved dynamo lights, since that is the only other EC approval regime that can be assumed to provide a level of safety corresponding with BS6102-3."

[10] The basic requirements are suggested as being equivalent to the lighting conditions specified in RVLR under which motor vehicles may proceed with only position lamps.

To deal with this, the CTC stakeholder expert suggested putting an upper limit on the intensity of flashing light that may be emitted from the front lamp of a pedal cycle. According to ECE Regulation 50, a motorcycle front position lamp may not exceed 100cd. A flashing light is useful only as a position lamp, not to see by, so, in the view of the CTC expert, "it seems sensible to apply the same limit."

Options – headlamps:

The module team suggest that lights to see by need to be steady and it is common-sense to use a proper headlamp when cycling in unlit places. Industry stakeholders believed it should be left to common-sense, as is currently the case, but the CTC stakeholder suggested that a steady headlamp of at least 400cd output (the BS6102-3 requirement) should be required on unlit roads. As such a headlamp (required in unlit areas) emits more than 4cd and does not flash (hence it is not subject to the suggested 100cd limitation), it would also be usable under street lights. "People who ride only where there are streetlights at night (i.e. most people) may nevertheless fit just a cheaper, less bright, possibly flashing, front light."

4.2.2 Reflectors

Industry stakeholders suggested that only a red rear wide-angle reflector should be required to be fitted as standard. Their justification was that every road vehicle has a red rear reflector, and the bicycle should be no exception. No stakeholders provided any detailed justification for requiring front and side reflectors, which are currently required (by PBSR) at point of sale, but not in use. A CTC expert, for example, stated that even where they are retained after sale, "they have not proven to be of any benefit".

Pedal reflectors cannot be fitted to all types of pedals, especially those for use with higher specification bicycles/sporting bicycles. Given the immense improvement in cycle lighting options, they recommend a major simplification with regard to reflectors.

While the broad thrust of these suggestions was accepted by all the stakeholders involved in this module, some alternative options were also put forward:

- The regulations should not only allow wide-angle rear reflectors, as this would "create a problem for the supply of bikes with built-in dynamo lighting, where the reflector is integral with the rear lamp and is not the wide-angle type". Such bikes, the stakeholder suggests, "are not often sold at present in Britain but it would be counter-productive to create obstacles to their sale and use, since built-in lighting is more reliable, hence safer". The additional benefit of the wide-angle reflector over the flat variety is, in their opinion, small and much less than the benefit of reliable lights. They did not, however, explain if or why dynamo lights can't be fitted with integral wide-angle type reflectors;
- That two rear lamps be required, one steady and one flashing, on a bicycle that lacks pedal reflectors. This was proposed to ensure that the vehicle identification benefit of pedal reflectors was properly replicated where such reflectors were absent (with a steady light providing the locational benefits);
- The requirement for pedal reflectors should apply only to any face of any pedal that may face rearwards when the cycle is being pedalled. "No use has ever been demonstrated for front pedal reflectors, for when a bicycle is facing oncoming headlights it is usually stationary, rarely in the other vehicle's path and the unique motion effect is absent. The only clear purpose of a front reflector is to face

rearwards when the other side of a pedal is engaged. So when a pedal has only one usable side, reflectors are needed on one face only".

4.3 Module 3 – EAPCs

This module was led by DfT, with participation from various stakeholders, including the British Electric Bicycle Association (BEBA), BAGB, CTC and various commercial cycle (pedicab and goods-delivery) stakeholders (who were particularly interested in the 60 kg weight limit for electrically-assisted tricycles).

The issues and potential options identified by DfT are summarised here, as are the results from a stakeholder workshop held to discuss and refine them in November 2012.

Regarding electric pedal cycles, five key issues have been identified:

1. Power limit.
2. Weight limit.
3. E-bikes (twist and go).
4. Data plate.
5. 4-wheeled EAPCs.

These are discussed (by DfT, in italics and quote marks) together with possible policy options in the following sections. To distinguish between the two types of EAPC, DfT have used the term pedelec for EAPCs where the power is only available when the rider is pedalling and E-bikes for "twist and go" style EAPCs where power is available at the twist of the throttle irrespective of whether the rider is pedalling as well.

4.3.1 Power limit

"*The Department consulted on the EAPC regulations in 2010 and concluded that there was a case for increasing the power limit for bicycles from 200W to 250W. This aligns with the current limit for tricycles and tandems and harmonises with EU Directive 2002/24.*

Questions:

- *Is the proposed power increase likely to cause any problems for stakeholders?*
- *Are any stakeholders likely to be more affected than others by the change?*
- *What effect is the change likely to have on the market for EAPCs?*
- *Is there any evidence that the increase will have safety implications?*
- *Are there likely to be any environmental impacts from the power increase?*"

At the stakeholder workshop, there were no objections expressed to a 250W power limit being the dividing threshold between EAPCs (250W or below) and motorised vehicles (anything over 250W).

4.3.2 Weight limit

"*The Department commissioned TRL to investigate why a weight limit was included in the GB regulation (Sparey, 2008). They could find no definitive reason but noted a number of issues that were discussed during the development of the regulation that may*

have influenced the decision. These included factors such as stability and handling, the consequences of an accident and the desire to ensure that EAPCs remain "cycle like".

In practice most bicycle EAPCs for personal use weigh under the 40 kg limit and it is likely consumer demand discourages the production of heavier bicycles. Cargo and passenger carrying cycles must be sufficiently robust to transport a reasonable load which generally increases unladen weight or requires the use of expensive materials.

Responses to the 2010 consultation indicate that a realistic unladen weight for a cargo tricycle is between 125kg – 150kg, well above the current weight limit of 60 kg. Some replies raised further concerns that the current weight limit forces manufacturers to use parts and materials which are not suitable for commercial use leading to safety concerns.

The consultation also highlighted concerns that the use of heavier EAPCs may pose a greater risk of injury to pedestrians in the event of a collision especially if they are used on cycle paths and shared spaces.

Riders of E-bikes may be less worried about the weight since these can be ridden without the need to pedal. This may lead to greater numbers of large, heavy cycles on cycle paths.

Removing the weight restriction may also lead to a greater number of moped like cycles and while this does not in itself represent a problem, it can lead to confusion among the public especially if moped like EAPCs are used on cycle paths.

4 options have been identified:

- *Keep existing weight limits, 40 kg for 2 wheeled pedal cycles and 60 kg for tricycles and tandems;*
- *Revise the weight limits upwards giving better opportunities for cargo cycles;*
- *Remove weight limits for pedelec EAPCs, retain revised weight limits for E-bikes;*
- *Remove all weight limits.*

Questions:

- *Who is most likely to benefit from increasing/maintaining weight limits and will any stakeholders be particularly advantaged/disadvantaged?*
- *What effect would changing weight limits have on the market for EAPCs?*
- *What are the wider implications of retaining, raising or removing weight limits?*
- *Are there any safety implications associated with higher weight limits? If so what can be done to mitigate these?*
- *Are there any environmental factors that need to be considered?*
- *Should there be a distinction between E-bikes and pedelecs when considering weight limits?"*

At the stakeholder workshop, there were also no objections to removing the weight limits from the current EAPC regulations. The view was expressed that these limits had been introduced to mitigate concerns about the stability of bikes with heavy, carrier-mounted lead-acid batteries. With lighter, modern batteries, such issues were no longer a concern.

The width of tricycles/quadricycles and their suitability for use on cycle paths was also discussed. Concerns were raised by some that many cycle paths were too narrow for these cycles, while others felt that common-sense would likely prevail – users of cycles too wide to fit sensibly would not try to use them on that cycle path. A subsequent dialogue with an expert from Sustrans further suggested that this "common-sense" argument was valid – "in those locations which have these tricycles using cycle paths there is no experience of problems with them…. Given that most large trikes are used by commercial operators, it is reasonable for them to be expected to identify restrictions on routes and avoid any obvious difficulties."

4.3.3 E-bikes (Twist and go)

"*DfT understand that E-bikes represent a significant proportion of EAPCs sold in the UK. Disabled riders and the elderly may particularly benefit from this type of EAPC. A different view is that the health benefits of using EAPCs are lost if riders are not required to provide any pedal assistance.*

The Department has no evidence to suggest that E-bikes should be excluded from the market place but if their use is to continue we must consider the implications of new EU rules that will impose type approval measures for the first time.

New EU Regulations on the type approval of 2, 3 and light 4 wheeled vehicles were adopted in March 2013 and will enter into force for new types of vehicles approved from January 2016. Pedelecs are excluded and member states can continue to permit their placing on the market and use according to national regulations. E-bikes fall into the moped category and will need to be type approved before being placed on the market but member states remain free to regulate their use at the national level. The exact technical requirements that must be met for type approval are still under discussion and are likely to be agreed during 2013.

There is a further complication for E-bikes in the form of the 3rd driving licence directive. Currently E-bikes, like pedelecs, can be ridden in the UK without a driving licence. It is our understanding that the UK can continue with this approach under the new directive but further clarification is needed to confirm this situation and this may have a bearing on our flexibility to regulate at a national level for E-bikes.

We have considered 2 options (subject to EU regulations)

- *Continue to permit E-bikes to be classified as EAPCs in the UK but require those first placed on the market after 1 January 2016 to be type approved before being placed on the market;*
- *Exclude E-bikes from the GB regulations. Their use would only be permitted under the same rules as apply currently for mopeds.*

Questions:

- *What challenges does type approval bring stakeholders?*
- *Is type approval carried out at present? What additional costs does this impose?*
- *What share of the EAPC market are E-bikes and what effect is type approval likely to have on this?*
- *What, if any, differences are there in the safety or environmental performance of E-bikes and pedelecs?*"

Further consensus was evident at the stakeholder workshop that there should be no distinction in GB in-use law between pedelecs and e-bikes; the 250W power limit and 25 km/h speed limit were sufficient. E-bikes in throttle only mode, restricted to these limits, would be unlikely to accelerate any faster than a pedelec (and probably less) or have any higher top speed, so both types would have broadly similar in-use performance characteristics and would look like pedal cycles, rather than mopeds.

One stakeholder felt there was a need for a sub category to cover cargo bikes and pedicabs with a dedicated set of specifications and use requirements to reflect the different needs for these cycles, including minimum rider ages and a maximum laden weight limit. However, the general view from the group was that no further categorisation would be necessary, i.e. they could apply regardless of the use or the number of wheels, to bicycles, tricycles or quadricycles.

Concerns were expressed that if the CEN Standard EN15194 was not designed to cover anything other than bicycles, equivalent standards would need to be developed for pedelec tricycles and quadricycles, either in CEN or nationally. Single vehicle/small series national approval requirements might also be needed for e-bikes that were outside of EU Type Approval scope by virtue of being produced in low numbers.

As described above under "weight limits", in response to apprehension about the possible use of electrically-assisted commercial tricycles/quadricycles on cycle paths (which would be too narrow for many such vehicles), Sustrans subsequently suggested "given that most large tricycles are used by commercial operators, it is reasonable for them to be expected to identify restrictions on routes and avoid any obvious difficulties".

Finally, the subject of retrofitting was raised – i.e. converting a conventional bike into a pedelec or e-bike. DfT stated that such e-bikes might need single vehicle approval. There was also the question of whether pedelec conversion kits are covered by EN15194.

4.3.4 Data Plate

"*The requirement for a plate to be fixed to the cycle helps consumers and enforcement bodies such as the police to identify whether a cycle meets the EAPC power restrictions. The harmonised European standard for EAPCs, EN 15194, contains requirements to mark the speed and power on the cycle so there is scope to delete the GB requirement. However, EN 15194 does not apply to E-bikes. Enforcement bodies favour the requirement for a plate which allows them to make a simple and quick check of the legality of the vehicle.*

Possible options include:

- *Continue to require a plate showing voltage and power.*
- *Require a plate that complies with EN 15194 showing speed and power*
- *Remove the requirement for a plate.*
- *Permit alternatives to the data plate.*

Questions:

- *Is the data plate required?*
- *Does the requirement to fit a data plate bring any practical issues for stakeholders?*

- *If the data plate is retained, are the current requirements or those in EN 15194 sufficient?*
- *Are there any suitable alternatives to a data plate?"*

At the stakeholder workshop, it was agreed that it would be sufficient for EU Type Approved e-bikes to display the statutory plate required by the approval regulations, while pedelecs meeting EN15194 would be fitted with a plate showing the power and top speed but not voltage which is a requirement of the current GB regulations. Equivalent arrangements would be needed for cycles outside the scope of EN15194.

There was then a discussion about voltage limits, with many views expressed that a 50V limit would minimise electric shock risks. There is, however, no requirement for system voltage to be limited or displayed, either in EU Type Approval or by EN15194. The consensus view was therefore that the Low Voltage Directive and EMC Directive[11] may already be sufficient to ensure bikes operated at less than 50V or have features to minimise risks.

4.3.5 4 wheeled EAPCs

"*The current GB regulations are limited to two and three wheeled cycles and the Department is not aware of any requests to include cycles with 4 or more wheels. The EAPC definition used in EU regulations does not mention the number of wheels so it may be appropriate to harmonise and remove the restriction from the GB regulations.*

Options might include:

- *Retain existing requirements which exclude 4-wheeled vehicles;*
- *Extend existing requirements to include 4-wheeled vehicles;*
- *Extend existing requirements to include 4- or more wheeled vehicles.*

Questions:

- *How does the current exclusion of 4 wheeled EAPCs influence the current market?*
- *Would the introduction of 4 wheeled EAPCs disadvantage any existing stakeholders, e.g. tricycle manufacturers?*
- *Are there any safety or environmental issues regarding 4 wheeled EAPCs?*
- *Are there sufficient reasons to continue to exclude 4 wheeled cycles?*
- *Are any specific requirements needed to regulate 4 wheeled cycles?"*

At the workshop, stakeholders saw no reason to separate cycles according to number of wheels. However some questioned the need for 4-wheeled EAPCs stating that they offered no advantages over tricycles.

4.4 Module 4 – Commercial cycles

TRL led this module, and it involved discussions with various goods-delivery and pedicab operators, their suppliers, local authorities, enforcement agencies and the Chartered Institute of Logistics and Transport (CILT) UK Cycling Forum, during the second half of

[11] The Low Voltage Directive, 2006/95/EC and the Electromagnetic Compatibility Directive, 2004/108/EC.

2012. By far the most important issue identified, particularly for goods-delivery services, was the matter of the 60 kg weight limit in the existing EAPC Regulations, discussed above. Other issues identified during this module focus on pedicabs, summarised here.

4.4.1 Pedicabs

In cities such as London, the issue of pedicabs is highly politicized. The Mayor of London, for example, has recently stated his wish to see changes in the law to allow "dangerous pedicabs" to be banned (TfL, 2012). It is important to note that the legislative framework affecting pedicabs is far broader than the regulations which form the scope of this current study, as they potentially include local private-hire vehicle licencing regimes and other pieces of legislation.

Most of the complaints about pedicab operators seem to centre on the riders and how they behave, rather than the cycles. Very little evidence has been identified or provided by stakeholders to support the view that the cycles themselves are frequently un-roadworthy or dangerous, or even that pedicabs are involved in disproportionate numbers of injury accidents. A Texas study (Mundy, 2011) highlighted clear safety concerns (though no accident data) with some pedicabs used in Austin that placed the passengers in un-braked trailers attached (often poorly) to the back of conventional bicycles. The authors had no such concerns with tricycle-based designs which, it is believed, are much more prevalent in the UK and elsewhere in Europe. An unpublished TRL study in 2002 for the Public Carriage Office is summarised in Sinclair Knight Merz, (SKM) 2004. The findings included:

- there is no basis on which a member of the public can have any expectation of a given standard of vehicle maintenance or driver and vehicle competence or operating practice;
- some models of pedicab seem to pose particular hazards in respect of pedestrian safety;
- there are indications of a demand for pedicab services;
- pedicabs add to the vibrancy of the street scene in certain areas;
- the pedicab trade is economically marginal;
- operators and riders can exacerbate or minimise risk by the manner in which vehicles are maintained and ridden and their associated practices in respect of rider training and monitoring, policy on what sort of fares are accepted and what sort of journeys are made.

The SKM report also notes the importance of fitting wheel guards to prevent entanglement of clothing (as happened in an accident in Edinburgh), and goes on to outline possible routes to a London-wide licencing regime.

Given the de-regulatory emphasis of this current study for DfT, the lack of robust evidence regarding the safety of existing pedicab designs, and the opportunities for enhanced vehicle standards to be incentivised by appropriately-designed future licencing schemes, no further options relevant to existing cycle legislation are proposed.

In theory, removing the 60 kg tricycle weight limit for EAPCs might allow electrically-assisted pedicabs to operate in the same ways as existing designs, but in reality it is likely that local rules would still treat such vehicles as motorized and thus subject to the

same rules as taxis, effectively outlawing them. At the fundamental vehicle level, it seems unlikely that a small (250 W) motor fitted to a laden pedicab would have a very significant effect on vehicle performance – in some respects it may help, e.g. by allowing an easier pull-away and/or by allowing the vehicle to better maintain pace with the general traffic flow when going up (slight) inclines.

4.5 Implementation options

As well as issues of "what" the technical requirements should be in any amended cycle regulations, stakeholders also made proposals regarding "how" those requirements should be structured.

BAGB proposed that there should be one composite Regulation, in place of the various regulations currently spread across various pieces of legislation. They were also supportive of the introduction of a Code of Practice/Check List for consumers to provide informed consent for the retailer to fit or omit various components, e.g. lights or a bell, at point-of-sale. They noted that many retailers already have pre-delivery inspection (PDI) lists themselves, and a retailer/customer check list and final sign-off can readily be developed. In their view, this would "serve both to ensure that the needs and the specific safety considerations of the purchaser are met; that a written safeguard is provided for the retailer in case of subsequent disputes, and that an increased professionalism is introduced to the industry". In summary, they propose that:

- "*All regulations should be set out in one single, concise document - this review provides the opportunity to simplify, harmonise and bring together regulations from different sources and dates – including 'Construction and Use' and 'Point-of-Sale' regulations;*
- *The scope of the regulation should cover all bicycles, tricycles and quadricycles that are to be used on public roads;*
- *The regulations should be simple, clear and easy to enforce - the regulations should set minimum safe requirements, leaving consumers the opportunity to 'upgrade' as appropriate to their particular cycling requirements;*
- *To this end, there should be an industry-wide Code of Practice to support the regulations - this code of practice would include a pro-forma pre-delivery safety inspection document, and a retailer/customer sales delivery check. These should inform the customer on the detailed use of the bicycle, and advise on specific requirements for its use on public roads, both during daylight and night-time.*"

An expert from CTC, however, suggested that implementing such an idea would not be at all simple. He made the following points to support this view:

- "*Selling versus using - selling a bicycle is a very different activity from that of riding a bicycle. If the two activities were regulated within the same document, there is a danger it would effectively become two separate documents sharing little more than a title page. In that case two documents will be simpler: one for retailers and trading standards officers, the other for riders and the police. The key intention of a single regulation is technical consistency, and that can simply be achieved with a requirement that to be sold, a cycle shall be legal for on-road use;*

- *Lights - combining lighting with the other construction and use requirements should be easier, especially if lights are required to be fitted to pedal cycles at all times. But they are not and nobody is proposing that they should be required in daylight. The existing Lighting Regulations contain all the clauses necessary to define when it is dark and much more besides, such as forbidden colours of additional lights and the requirement not to dazzle other road users. The addition of all these necessary conditions to a single statute will render it far from simple. Meanwhile, the subtraction of pedal cycles from the Lighting Regulations leaves a conspicuous hole. All other vehicles are there, including horse-drawn vehicles and even handcarts. The absence of pedal cycles would create an inconsistency within the Road Traffic Acts;*
- *Resource implications - the drafting of this new statute would obviously require a substantial administrative resource and also parliamentary time. We should look to achieve our aims through secondary rather than primary legislation, i.e. by amendment of existing regulations rather than the creation of new ones. A further complication is that Northern Ireland has its own legal system, with at least one difference for pedal cycles: a bell is required. Would this composite regulation apply to the whole of UK, like the existing Pedal Bicycles Safety (i.e. sales) Regulation, or only GB like the Pedal Cycles Construction and Use Regulation?*
- *Towards a Cycle Code - At the root of this idea there lies a vital need for clarity and consistency in the regulations, which must be at the forefront of our considerations of how they should be amended. In the circumstances, the desire for a single simple statute may be satisfied by a summary document, analogous to how the many tangled strands of the Road Traffic Acts are brought together in the Highway Code."*

He further noted the UK industry's past failures in helping cyclists to ride legally, for example by not stocking BS-approved lights and selling bicycles without pedals to avoid the pedal reflector requirements. He thus felt that ensuring that bicycles are safe and legal to use when they are sold cannot be left to a retailer's interpretation of a voluntary code of practice - "the Pedal Bicycles Safety Regulation is still needed to protect the consumer", he said.

There is also a possibility with any system of "informed consent" that disreputable retailers might simply use it as an excuse to sell non-compliant bikes and get the consumer to sign a consent form without properly explaining what they are agreeing to. This would effectively place the burden on the consumer rather than the retailer, which is likely to be unwelcome.

4.6 Non-regulatory (voluntary) options

Though not subject to detailed costing or impact assessment, discussions with stakeholders did make allowance for opportunities to improve cycling safety or otherwise contribute to economic, environmental or societal goals through voluntary mechanisms. Two such mechanisms were identified, and are described in more detail in the following sections; standards and communication campaigns.

4.6.1 Standards

Existing EN standards cover many forms of bicycle, but not all and no standards exist for commercial tricycles. Such standards, developed by the industry, provide consumers with reassurance; ensure minimum levels of safety (perhaps over and above legislative requirements) and help to protect consumers from inferior, designs. There seems to be a genuine willingness by many sections of the industry consulted during this study to work towards the further improvement of existing standards and the development of new ones. The most notable areas in need of such new standards are perhaps:

- Commercial tricycles, including those used for goods-delivery and as pedicabs, and electrically-assisted variants;
- Cycle lighting. This could, for example, usefully help to update some of the BS 6102-3 requirements that may otherwise not be considered (and would not be part of the proposed new legislative requirements), e.g. beam patterns and visibility angles;
- Braking systems. Developments with CEN (and/or ISO) could address the performance of fixed wheel brakes, which are currently not adequately addressed by, for example, EN 14764.

4.6.2 Communication campaigns

As LSE (2011) and various other cycle commentators have said, probably the greatest single barrier to increased cycling levels in the UK is the poor public perception of the safety of cycling, especially on public roads. Local and national government have clear roles to play in, for example, the development of good, dedicated cycling infrastructure, ways to better integrate cycles into other traffic, and achieving a cultural shift in motorist attitudes to cyclists. The industry itself can also play a big part in promoting the wider benefits of cycling and correcting public misperceptions.

There is huge potential for growth and innovation in cycling in the UK, if:

- The regulatory framework acts as an enabler, and
- Industry acts responsibly to promote safety

At present, the most high profile cycling campaigns seem to be run by national newspapers or local cycling groups. There is, perhaps, scope for much stronger involvement of the industry itself, for example in:

- Developing and funding cycle training courses, e.g. aimed at particular target groups such as existing motorists or women
- Establishing a safety-rating scheme for new cycles, e.g. to give credit for (and encourage sales of) bikes with particularly good brakes or with good quality lights fitted as standard
- Facilitating corporate support for cycling, e.g. through bike-to-work schemes and sponsorship of cycle hire initiatives and cycling events

4.7 Summary and rationalisation of options for impact assessment

The findings of the various modules were reviewed by the study team and DfT in January 2013. From them, the following "long list" of options were produced, and circulated to the various stakeholders who had been involved in the modules. Stakeholders were at

the same time asked to provide feedback on the options relevant to the impact assessment, and their responses are discussed in the following Chapter.

Note: The following options are in addition to the do nothing options (i.e. leave existing legislation in place without modification).

4.7.1 Pedal Bicycles (Safety) Regulations 2010

Option 1 - Maximum simplification

- Delete Regulation;
- Rely on General Safety Regulation to ensure the safety of cycles at point of sale;
- No requirements to fit a bell, reflectors, lights or handed brake levers.

Option 2 - Retain Regulation but with maximum simplification

- Remove requirement to fit a bell;
- Remove requirement for side and front reflectors;
- Remove requirement for pedal reflectors;
- Keep handed brake levers but allow suppliers to swap left and right hand brakes if customer requests it;

Option 3 - Partial simplification

- Keep requirement to fit a bell;
- Remove requirement for side and front reflectors;
- Keep requirement for pedal reflectors.

Option 4 – Simplify by requiring all bikes to be sold in condition legal for on-road use at all times (day or night, with or without streetlights) as default option, with consumers able to remove items from basic spec with signed acknowledgement that this means bike no longer fully legal:

- Front and rear lights conforming to RVLR to be fitted.

4.7.2 The Pedal Cycles (Construction & Use) Regulations 1983

Option 1 - Maximum simplification

- Delete regulation;
- Fitment of brakes captured by point of sale regulations (if retained), rely on consumer to maintain them correctly;
- EAPC requirements for fitment of plate would be deleted or moved to EAPC regulation.

Option 2 - Partial simplification

- Move EAPC requirements to EAPC regulation;
- Retain existing requirements for pedal cycles; brakes, etc.

4.7.3 Road Vehicles Lighting Regulations 1989

Option 1 maximum simplification

- Remove all cycle lighting requirements from regulation;
- Put minimum requirements elsewhere, e.g. Construction and Use regulations;
- Minimum requirements would be fitment of front and rear light and rear reflector if the cycle is used at night, aimed to avoid dazzle or discomfort, properly maintained, etc.

Option 2 Retain Regulation but with maximum simplification

- Remove all references to British Standards, rely on manufacturer and consumer choice to ensure lights and reflectors give adequate performance;
- Remove requirement for pedal reflectors;
- Remove requirement for rear reflectors to be wide-angle type.

Option 3 partial simplification

- Remove references to British Standards but require front and rear lights to have a minimum light output of [4 cd];
- Remove requirement for pedal reflectors.

Option 4 partial simplification

- As option 3 but retain pedal reflectors.

4.7.4 Electrically Assisted Pedal Cycle Regulations 1983

Option 1 Maximum simplification

- Delete regulation and rely on EN standards - may result in the possibility that all EAPCs would be classed as motor vehicles.

Option 2 Partial simplification

- Harmonise maximum power to 250W;
- Harmonise maximum speed at 25 km/h;
- Remove weight limits;
- Retain fitment of a plate but remove voltage marking (NB. Plate requirements are currently in the Construction and Use regulations);
- Remove restriction that limits the regulation to 2 and 3 wheeled vehicles;
- Require compliance with EN standards or type approval for twist and go bikes.

Option 3 Partial simplification (as option 2 but:)

- Introduce a sub-category for commercial cycles with higher age limit [16 years] and maximum laden weight [TBD].

4.7.5 Implementation options

Option 1

- Create one consolidated Regulation covering point of sale, construction and in-use requirements replacing all four existing regulations.

Option 2

- Two Regulations, one covering point of sale and construction and one covering maintenance and use.

5 Impact Assessment

The impact assessment was carried out in two phases. The first involved the circulation (in January 2013) of the 'long list' of options to as many of the stakeholders who had contributed to the project as possible (in total about 15 individual organisations or trade associations). These were accompanied by a free text questionnaire seeking their views on a wide range of potential economic, market development, environmental and societal impacts, based on official Impact Assessment guidelines (HM Government, 2011). This phase ended with a concluding stakeholder workshop, held at Great Minster House in February 2013. This workshop provided an opportunity for the impacts identified by individual questionnaire respondents to be shared and discussed, for further contributions to be made and for the long list to be refined into a short-list of major, grouped options for legislative change, with accompanying detailed justifications. This short-list of options was then used to produce the formal Impact Assessment, again in accordance with official guidelines, in the second phase. This formal assessment provides a mix of both quantitative analyses of the likely costs and benefits of the options and summarises the key qualitative impacts identified by stakeholders. The completed IA Template is included with this report at Annex 1.

5.1 Stakeholder views on the 'long list' of options

The stakeholder questionnaire was organised into four sections – economic/financial impacts; societal impacts; environmental impacts, and; market-specific impacts. In general, respondents showed quite a high degree of consensus support for the following:

- Allow front & rear brake levers to be swapped over if customer specifically requests it;
- Remove references to BS 6102 for lights;
- Remove EAPC weight limits;
- Harmonise EAPC power limit and maximum assisted speed with EU at 250 W & 25 km/h respectively;
- Continue to classify as pedal cycles, subject to type approval, those EAPCs, with twist and go, that meet 250 W max power output and 25 km/h power cut-off;
- Remove voltage marking requirement on the EAPC data plate;
- Allow 2,3 or 4 wheeled EAPCs;
- Regulations must be clear and simple.

The options that tended to generate stronger points of disagreement were:

- Bells;
- Lights – fitment at point of sale;
- Reflectors.

A further point was raised regarding future-proofing of legislation, particularly with regard to 'speed pedelecs' (e.g. those with top speeds of 45 km/h) and high-powered cargo cycles (e.g. those with a 500W motor, but still with a 25 km/h top speed). Although these would clearly not be classifiable as pedal cycles, and are thus strictly speaking out of scope of this current study, it was felt important to note that UK markets

for such vehicles are likely to exist (and already exist in other EU countries) and thus issues such as driver/rider licensing and helmet use requirements may need to be considered. At present, such vehicles would be treated in exactly the same way as low-powered mopeds, which may not be appropriate (e.g. requiring the use of a motorcycle helmet). A stakeholder cited experience in Germany, where "they found that people ignored the prevailing law and chose to use readily available speed pedelecs [as if they were pedal cycles. They have now made provisions for such products – it is easier than prosecuting thousands of people".

In summary, the detailed (mostly qualitative) justifications for the supported options provided by stakeholders in each sub-category were:

- Economic – encouraging growth of EAPCs, goods delivery cycle services & innovation;
- Environmental – air quality, noise & CO_2 benefits through removal of some car and van journeys;
- Social – health, safety & employment opportunities.

The following Tables provide more detailed summaries of the (anonymised) stakeholder responses to the impact assessment questions included in the questionnaire.

Table 6. Summarised responses to economic/financial impact questions

Q1. How will these options impact generally on the market (consumers and businesses)?
"It [type approval of e-bikes] will make it more difficult for small start-up businesses to enter the market, however it will ensure confidence is injected into the market and overall safety is brought to a higher level. This will encourage further investment into the UK cycle market"
"For mass adoption of hard-working utility trikes and bikes, we need electric assist options that are fit-for-purpose. Most cities in the UK are hilly… The opportunity now exists for cities in the UK and around the world to: save costs on vehicles, fuel and running costs, displace cars, vans and lorries from city centres with silent, low impact vehicles, provide low cost additional employment to riders and logistics hubs operatives & dramatically improve the urban environment"
"Removing the weight limits for electrically assisted cargo bikes would encourage more businesses to start-up and offer cargo carrying services"
"For consumers, the changes will mean opening up the market to cheap imports, built to lower standards. For UK manufacturers, the changes will mean increased competition to the point that UK production is likely to become unviable" [Note: this point was disputed by most attendees of the concluding workshop, who felt that remaining provisions would adequately protect consumers]
"Removing outdated regulations could assist small businesses selling bicycles"
Q2. Do these options imply additional costs to businesses?
"Reducing the legislation would mean cost of entry for electric assist cargo bikes would fall"
"Items such as pedal reflectors, rear reflectors, bells etc. add very little to the cost of a cheap bike – i.e. those that retail under £100 (trade price approx. £40) and are often not fit for purpose. Including lights in any new regulations will lead to cheap lights that will break easily/malfunction and most likely not be replaced. People who buy bikes with a higher value will mainly purchase fit for purpose light/pedals/audible warnings. PBSR Option 2 is most practical but should take account of possible political issues with not including a bell, perhaps substitute wording with 'audible warning'. Consider adding 'pedal reflectors required when pedals fitted' - little additional costs"
"Yes. Further testing required, estimated cost per product is circa: £20k, most manufacturers have between 3 – 12 bikes in their range so the overall cost will be between £60k and £240k per

Manufacturer. These costs will also be applicable when they launch a new model and will be passed down to the consumer making EAPCs more expensive." [Note: this comment relates to the type approval of e-bikes which is an impact of changes to EU legislation and outside of the scope of this review.]

Q3. Do you foresee any savings from combining regulations?

"Clear and simple is the best strategy – combined or not"

"UK market is too small to operate independent and different standards"

"No, there is no interest in enforcing current rules, let alone new ones!"

Q4. Do these options imply cost savings for businesses?

If so, please quantify/estimate at a GB level (specifically where we are proposing to relax requirements on fitting certain components such as pedal reflectors, bells, front and wheel reflectors. What is the cost of supplying and fitting these?)

"Bell fitment. A regular ping bell as normally fitted OEM retails at £5.99. More traditional bells are available between £3.99/£4.99 fitment would be included within the costs. To have a bell fitted would incur a factory cost of £1.50 and a part cost of £1.35/2.00.

Pedal reflectors. Pedal reflectors are not normally sold separately due to the fact that at lower pedal specifications the reflector is integrated into the pedal body. Higher performance pedals such as those used on race bicycles etc require fitment of reflectors at point of sale. Fitment at point of sale cost £3.50/£5.00. Pedal costs at GB level with reflectors fitted (integrated) range from children plastic £6.00 to alloy trekking/MTB £20.00.

Side reflectors. Retail cost. £3.50. To have side reflectors fitted would incur a factory cost of £1.50 and a part cost of £1.20.

Front reflector. Retail cost. £3.50. To have front reflectors fitted would incur a factory cost of £1.50 and a part cost of £1.20.

Rear reflector. Retail cost. £3.50. To have rear reflectors fitted would incur a factory cost of £1.50 and a part cost of £1.20"

"For our vehicles, all safety fittings will be standard anyway"

"If installed when bike put together, minimal time and expense compared to total % of time and expense of manufacturing"

"Trade costs of current regulations are minimal with most cycles and often substandard. Cost of checking brake levers again minimal and should in any case be part of pre-sale cycle check (to ensure brakes properly set-up). Cost of lights- should not be regulated. Lights provided will most likely be substandard and should be left to customer. Very few effective lights meet BS standards and this should be removed from regulations"

"Handing of brake levers. The majority of bicycles imported into the UK have the correct brake lever position. To change conventional brake systems (V brakes) GB factory cost £1.50. Cost for race bicycles and those fitted with hydraulic brakes will be substantially increased due to the replacement cost of parts etc. at retail level.

Cost of BS lamp. Currently only one maker who has this specification available within the UK and there are only minor cost differences when purchasing these or other lamps of improved performance. The majority of consumers purchase higher performance lights that are totally effective at a similar cost.

What % (if any) of the market for lamps currently meet the BS? We would estimate that 99% of lights purchased in the UK do not comply with BS requirements"

Q5. Will these costs and/or benefits be distributed evenly or will some businesses gain or lose disproportionately?

"Harmonising with EU makes buying bicycles or electric bicycles easier and less expensive and

gives consumers more choice since the EU is a significantly larger market" "Will be distributed evenly".
Q6. Are there wider economic impacts, e.g. on the labour market? "There could be more electric or bicycles on the roads, meaning more small cycle dealers, less expense on transport infrastructure if UK law was similar to USA or EU standards" "EAPCs represent an area open to innovation, the market is providing income to an increasing labour force. As long as the UK regulations allow innovation we can create jobs, design work, marketing, R&D, and hopefully manufacturing etc. In the last 100 years many cycle innovations transferred into the auto industry. The future of transport will involve electric propulsion with innovations that may originate from pedelecs" "User bought lighting more likely to provide cycle shops etc. with additional profit. EAPC simplified regulations will lead to more employment prospects especially in 'last mile' businesses as well as enabling new businesses to enter the market. This will be a very positive outcome. Likely to encourage new cycles designed either in the UK or EU leading to business opportunities and CO_2 savings. Additional safety benefits with removal of HGVs in inner cities replaced by EAPCs"
Q7. What are the impacts on competition? "The US and Canada do not have the same restrictions as UK/EU. This is potentially a huge market" "Will allow GB businesses to compete and tailor designs to specific journeys. Will also allow different motors to be retro-fitted to existing units for local circumstances" "For EAPCs the harmonisation of motor wattage will allow them to enter European markets with one product" "GB are currently at a disadvantage having to deal with peculiar UK laws that are different from larger markets. There is less choice, higher prices, and less competition" "Harmonising laws for EAPCs with the EU will create a level playing field but currently non GB companies are benefiting the most. Switzerland, which has had less restrictive pedelec laws for over 10 years now, has an established industry producing fantastic hub motors, batteries, frames and complete bikes"
Q8. Will these options impact on innovation? "Yes – our inner cities are clogged up with lorries and vans making in a majority of cases only small sized deliveries which could easily be undertaken by cargo bike or electric vehicle. By creating out of town drop off points for lorries and vans to leave their goods would allow city centres to be freed for deliveries by more sustainable transport options and reducing congestion, pollution and noise. Cargo bike operators will innovate to meet the requirements for their customers in the same way as the motorised industry innovates for the same customer base" "The four wheel electric cycle does open some exciting potential" "Yes – will assist local companies to innovate as well as importing units" "For EAPCs continuing to allow the use of the throttle will leave the opportunity for future innovation. Companies are more likely to invest in new product and innovation if it can be sold within the European community" "Absolutely. Innovation is the key to the future and this review has taken steps in the right direction (sigh of relief) but it is far from future proof. GB has just caught up with the EU on similar legislation but as they evolve their rules we are in some respects almost immediately behind again. EAPCs provide the perfect test-bed for electric transport technology reaching many more customers than electric cars and GB has to give the domestic industry a fighting chance"

Table 7. Summarised responses to societal impact questions

Q9. Will these options have impact on social, wellbeing or health inequalities?
"Whilst not intended as a long distance vehicle, we believe that our vehicle will become a useful alternative for a mobility scooter for many less-abled people who currently require a simple, low cost and easy to use vehicle but who do not want the limitations of a mobility scooter"
"I have concerns that type approving e-bikes with throttles will reduce the available options for people that require throttles. Therefore type approval of throttles may actually increase health based inequalities should the options reduce and prices rise as a result. Throttles aside, EAPCs are cycles that do get used. It is exceptionally rare that a customer buys one with good intentions and doesn't use it, as many have done with traditional cycles. So a little more power @250Watts and a few other lessened restrictions and hopefully more people can cycle with assistance and benefit from controlled exercise and the health benefits"
"For EAPC's keeping a throttle will ensure EAPC's continue to be available to a wider audience including the elderly"
"Yes – less motorised vehicles and more use of human-powered vehicles – with many electric assisted – leading to better air quality with reduced motor vehicle usage"
Q10. How, if at all, will these options influence the risk of accidents or casualties?
In particular, proposals to remove the requirement to fit side, front and pedal reflectors at the point of sale might be expected to increase night time accidents. Similar concerns might exist for removing the need for lights to meet the British Standard. Removing the need to fit a bell might also be seen as increasing the risk of accidents with pedestrians.
"I am not aware of any evidence that removal of reflectors would significantly increase collisions during hours of darkness, nor that the presence of a bell increases pedestrian safety. However, these low-cost measures are often fitted at the factory and the benefit of removing these requirements is likely to be small set against the benefits which common sense suggests exist"
"Sensible to have as many reflective points as possible, and it seems better to have a bell than not"
"We understand that a considerable number of consumers request retailers to remove reflectors and prefer to purchase Hi-Vis clothing and improved lights if intending to ride at night"
"We would oppose the removal of side, front and rear reflectors as we believe that cycles need to be more visible rather than less visible"
"No retrograde steps in visibility of any vehicle should be made"
"Bells should be made compulsory for new and in use"
"Remove word bell and substitute audible warning. Political rather than practical issue"
"Yes – benefits to safety of vulnerable road users in city centres from HGV delivery vehicles. Added safety benefits from greater pedal cycle usage (safety in numbers, etc.)"
"For EAPC's if manufacturers have to abide to EN15194 for all EAPC's and if they wish to enter the market with a throttle powered bike they have to pass type approval this will improve the safety of all new products. The inclusion of a throttle assists weaker riders to be able to get up to traffic speed faster and aids control through slow moving traffic"
"The mass of a rider and bicycle is about 100 kg. The mass of an electric bicycle and rider is about 110kg. 10% increase in mass will not create a significant new risk"
Q11. Will these options affect the rate of crime or crime prevention or create new opportunities for crime? Can they be enforced effectively?
This last point is especially relevant to EAPCs where there is a risk of riders using cycles that exceed the power or speed requirements.
"Any potential for EAPCs to exceed power or speed limitations is concerning. However, when one

considers that the rest of the UK uses cars and motorcycles for traffic enforcement, this concern is put into perspective and I would not object to these proposals on these grounds"

"There are thousands of electric pedal assist cycles on the roads of Britain that do not conform to the current EAPC requirements. I cannot see that the proposed changes will make any difference to this whatsoever. However, thousands of cheap imported bicycles are sold on eBay every year that do not conform to UK legislation on construction and use. Similarly, non-conforming cycle lights are sold online and on the High Street. The proposed changes will lower the bar and ensure that many of these companies and many cyclists are no longer breaking the law"

"Based on our experience the proposed legislation as it stands is already behind what consumers expect from the products with regards to speed and power. Most of the market will be satisfied but a significant number of people will use higher power and speed levels. If I was to make a recommendation it would be 500 Watts and 45 Km/h and most of these people would be satisfied. I do not see how you can effectively enforce lower power & top speed levels without huge effort and cost. I can only hope you see the sense in making an allowance for them similar to Germany and other EU neighbours. People will decide what they want and there will be ways to purchase the products"

"No change to current regulations. If people want to tinker with e-bikes then they will do so whatever the regulations say. Updating regulations makes them more fit for purpose rather than relying on outdated standards which technology has overtaken"

"Option 2 (partial simplification) for EAPC regulations should specify that if a twist and go bike is type approved and conforms to EN15194 it is classed as a bicycle. It should also include granting grandfather rights to any product already in the market with a 250W motor and a throttle up to 25kph… For EAPC's a data plate will allow the Police to easily identify illegal bikes."

Q12. Will these options affect the quality of life in local communities?

"Yes. If adoption of local delivery is hampered by legislation rural/community usage will be affected. We are aware that healthy, low cost/low impact transportation is something many communities are interested in"

"Can only be an improvement. Less motorised transport and more opportunities for electric assisted bikes and e-assisted load carrying vehicles. Greater awareness of e-bikes will encourage greater use and can link local communities together where today they are too far apart for unassisted cycle journeys"

"Yes, positively improve. Cycling helps to relieve road congestion and improves health"

"The use of electric cycles is on the increase. However, I do not think changes to the legislation will make a big difference to how fast this market is growing. What will make a difference is new vehicle types and innovation"

"With bus routes being cancelled people could consider commuting into cities by e-bike if the options on the market suit their requirements. Older people can be more mobile with an EAPC"

"For EAPC's with so many bus routes being cancelled the use of EAPCs allows communities outside of towns to commute in with ease and encourages communication between villages"

Q13. Will the impacts on rural areas be different to urban areas?

"Electric assist cargo bikes are unlikely to have an impact in rural areas"

"The availability of e-bikes in rural areas could greatly assist travel from 5-10 miles especially with limited public transport. Proposed new regulations will encourage innovation and therefore lead to greater usage of these vehicles"

"Yes – EAPCs can be used to get to the pub and back (many of our rural customers use their EAPC to ensure they never drink drive)!"

"For EAPCs the impact on rural and urban areas will be both beneficial and different. In rural areas communications are improved between local villages and towns. In urban areas there are huge beneficial impacts in terms of less congestion and less pollution"

Table 8. Summarised responses to environmental impact questions

Q14. How will these options impact on the emission of Greenhouse Gases? Do you see these proposals significantly changing travel modes?
"Cycles in the EAPC category are attractive particularly for the cargo industry, and as such, if replacing motor vehicles, would reduce emissions. As the market develops and with the resultant innovation (for both pedicabs and cargo bikes) on behalf of manufacturers to meet the needs of a larger and growing market, this would certainly move travel and goods deliveries away from motor vehicles, particularly in inner city areas"
"Yes. Positive benefits from 'last mile' logistics journeys, no weight restrictions mean heavier loads can be carried by EAPCs and new e-bikes will encourage uptake of pedal cycles – electric-assisted or not"
"Electric bicycles are a substantial alternative to cars. The is an indisputable market growth and trend in adoption of this form of transport"
"Again, innovation on vehicle design will have an impact on moving people away from motor vehicles to pedal cycles. We believe our cargo cycle could carry up to 25% of all freight being delivered into city centres, and will do it at least as fast and efficiently as a traditional 'white van', but at a lower cost"
"Increasing the power available to electric assist definitely has potential to change travel modes"
"For EAPC's although we believe that they will significantly change travel modes away from motor vehicles these proposals will not significantly change what is already in place"
Q15. Will these options impact significantly on air quality?
"Very positive improvements can be made if some restrictions placed on times HGVs can deliver into city centres. Even without this the reasoning for having to use HGVs is lessoned due to e-alternatives"
"Yes improve if we simplify and harmonise laws"
"A large number of our customers use their e-bikes instead of a car. Many have sold a household car"
"If enough people uptake, then yes"
"For EAPCs where they are used as an alternative form of transport to a car or public transport air quality will significantly improve"
Q16. Will these options affect the number of people exposed to noise or the levels of exposure?
"Yes, encouraging cycling in all forms reduces noise"
"Potentially. Figures recently released by the Japanese government show that EAPCs have overtaken all other forms of 2 wheeled transport reducing noise pollution from mopeds and motorbikes dramatically"
"I can't imagine even 20 electric assist bikes having the same noise level as 1 car"
"The number of people exposed to air and noise pollution will be significantly reduced"

The fourth and final section of the questionnaire sought responses on issues specific to the potential development of EAPC, goods delivery and pedicab markets, summarised in Table 9.

Table 9. Summarised responses to market-specific impact questions

Q17. What is the size of the current EAPC market in Great Britain and what is the split between E-bikes and pedelecs? **At the last consultation in 2010 estimates of a market for EAPCs between 12,000 and 25,000 were given. One value of the market was £13 Million, is this correct? The split between twist and go and pedelec was estimated between 50/50 and 80% twist and go - are these figures still valid? What proportion of the overall pedal cycle market do these figures represent?** "About 10-20,000 units sold per year. It could be substantially more if we adopt EU regulations" "The split between pedelec and twist and go is 60:40. Many customers prefer twist and go and this certainly opens the market up to less able customers who would otherwise not be able to use a pedelec cycle" "The split between e-bikes using twist and go and pure pedelecs is changing. As the average age of the market decreases and the average health improves less of our customers need twist and go. It is difficult to provide exact figures because many e-bikes come with twist and go whether the customer needs it or not. I would guess in 2012 less than 20% of our customers would have needed or demanded a throttle with twist and go feature" "Currently there are some 900 flimsy and potentially dangerous rickshaws operating in London. Assuming these are made illegal in some way, then this opens up the opportunity for much safer EAPC pedicabs to fill that void. If, conservatively, 200 EAPC pedicabs fill the gap then the market potential for this type of vehicle (I am not qualified to speculate on the EAPC 'bicycle' market) is £1.8m for London alone" "We estimate the market to be at 25,000 units and the split between e-bike and pedelec to be 60:40 in favour of e-bikes. The EAPC market represents 0.8% of the whole bicycle market in the UK, however it has the potential to represent 50% in terms of value of the whole market"
Q18. Are there estimated projections for market growth over the next 5 – 10 years? "We are where Germany was 5 years ago; they now sell 400,000 units per year. In 10 years we could be selling up to 1M units per year in the UK" "We envisage significant market growth. This is global growth. We are receiving enquiries from every continent" "EU will double. UK 10-20% growth" "We've grown at 30%-40% every year (except 08/09) for the last 8 years"
Q19. Are there any costs associated with complying with the UK 200W limit or any other costs associated with any of the UK specific requirement for EAPCs, e.g. weight limits? "The sourcing and development of motor controllers. Sourcing, testing and approving of motors capable of operating at the limits of their capacities (constant loading). Unnecessary and potentially dangerous engineering of vehicles NOT strong and robust enough to do the job they are intended for" "YES!!!!! The UK market is too small to justify bespoke UK only designs" "Electric bike manufacturers don't supply 200W motors specifically for the UK market. They reprogram their motor controllers to give a maximum continuous output of 200w and label them as 200W motors. Complying to the weight limit for a cargo trike means innovative design and the use of more expensive materials. In terms of manufacturing cost to our trike, this costs us around £400 per vehicle" "I'm sure there are scale costs but the biggest cost is the reduced capability and therefore the reduced market" "Yes. The motors are more expensive as they are in lower demand and advertising for a global company has to be more specific for the UK"

"While the limits are in consultation stage, couriers such as ourselves are unable to invest in the new technologies for fear that the bicycle will be outdated if the level was increased"
Q20. Are there any UK manufacturers and what sort of volumes do they produce? "We are now planning to produce up to 40 units per month with scaling of production in the autumn" "3-6,000" "We anticipate manufacturing 3,000 vehicles this year, rising to 50,000 vehicles within 3 years" "As far as we are aware there are currently no manufacturers of EAPCs in the UK"
Q21. Is it possible to estimate projected sales of pedal cycles and EAPCs over the next few years and do you have any thoughts on how the proposed options might affect these, if at all? "Sadly, it is doubtful that change will happen soon. Therefore we suspect slow and sluggish growth in the market in the UK and thus focus more on Europe" "I do not believe the proposed options will make any difference in terms of unit sales" "Pedal cycle sales will broadly be unchanged by removal/harmonisation of rules/regulations. Proposed changes will lead to an increase in EAPCs due to harmonisation of regulations throughout the EU and removing the weight limit on these cycles will encourage many more journeys using these vehicles" "We have no experience of pedal cycles, but if we continue to follow the German and Dutch examples we estimate projected sales reaching 400,000 units within 5yrs and up to 1m in 10 years"
Q22. How would removing the weight limit for EAPCs encourage the development of the cycle logistics market in GB? "Without any proactive marketing and selling we are attracting a lot of interest from Town Councils, Primary Care Trusts (NHS) as well as logistics operators in the private sector. These institutions recognise the economic, health and environmental potential of these vehicles" "There is NO QUESTION...every city, town, village and rural community could be benefiting from a 'no weight limit' trike/bike. The displacement of lorries and vans will encourage LOCAL employment, not only to riders but a whole new industry of local operators and urban distribution hubs. Clean, healthy, low-cost transport/delivery solutions everywhere ...including hilly areas" "With the costs associated with motor transport we anticipate that EAPCs (without the weight limit) would become a very attractive non-polluting option in the logistics market across the country. EAPCs for cargo deliveries would be very cost-effective and more versatile for 'last mile' deliveries, and for pedicabs making relatively short journeys in inner town & city areas, sustainable jobs would be created and a cleaner quieter environment would result" "'Encourage'? It would 'revolutionise' the EAPC pebicab market in UK, providing jobs and start-ups for many small businesses throughout UK" "For pedicabs, a 250w electric motor simply provides assistance on starting off and on gradients. Provided that these are fitted to comply with the regulations (without the weight limit), then adding an electric motor wouldn't increase the top speed at all, but would make the vehicle easier and more efficient to ride, and would increase the potential range" "This will encourage more companies to supply EAPCs to market products in the UK and therefore increase competition. Positive advantages throughout the UK, potentially in all towns/cities leading to new job sectors and environmental advantages associated with a reduction on motor delivery journeys" "New markets in hillier towns might be open to e-assisted pedicabs leading to environmental advantages where this happens. Many existing units will still use human power as now but e-assisted might encourage more women to work in the industry"

5.2 Short-listing of options for formal impact assessment

Following discussions at the concluding stakeholder workshop, the following shortened list of main (technical) options for change were arrived at by the TRL study team and DfT. Note that these are not necessarily either-or options, as some elements from each could be combined and others not. They are designed, however, to move through the apparent levels of consensus achieved amongst stakeholders, i.e. the EAPC and brake requirement changes being the most widely accepted, followed by simplification of the lighting regulations and then, with perhaps the greatest degree of disagreement, options for the removal of requirements for various reflectors.

Implementation options remain unchanged from the earlier Questionnaire (e.g. whether to have one consolidated regulation, or one for point of sale and one for in-use, or retain the existing basic structure).

The fitting (or not) of a bell has been left out of the main options and is dealt with separately due to the sensitive nature of this issue.

Option A – Do Nothing (retain all UK regulations in their current form)

Option B – EAPC harmonisation & Brakes simplifications

- Remove weight limits for EAPCs;
- Harmonise EAPC maximum power and assisted speed with EU at 250 W & 25 km/h respectively;
- Continue to classify as pedal cycles, subject to type approval, those EAPCs, with twist and go, that meet 250 W max output and 25 km/h power cut-off;
- Remove voltage marking requirement from the EAPC data plate;
- Allow 2,3 or 4 wheeled EAPCs;
- Keep handed brake levers but allow suppliers to swap left and right hand brakes if customer requests it;

Option C – as B + Lighting simplifications

- Remove all references to British (lighting) Standards, rely on manufacturer and consumer choice to ensure lights and reflectors give adequate performance;
- Minimum requirements would be fitment of front and rear light and rear reflector if the cycle is used at night, aimed to avoid dazzle or discomfort, properly maintained, etc.

Option D – as C + Reflector simplifications

- Remove requirement for pedal reflectors to be fitted at point of sale and in-use;
- Remove requirement for rear reflectors to be wide-angle type;
- Remove requirement for side and front reflectors to be fitted at point of sale.

Bells – treated as separate options, which are:

- **X** - keep the existing requirements (for a bell at point of sale);
- **Y** – simplify by allowing audible warning device as alternative at point of sale (subject to performance requirements);
- **Z**- de-regulate by removing requirements for a bell.

An additional suggestion was made in the latter stages of the study, namely to remove the 635mm minimum saddle height used to distinguish adult from child bikes in both the point of sale regulations and the construction and use regulations. The suggestion is that all bikes used on the public road should meet similar levels of safety requirements, regardless of saddle height. Recumbent bicycles, for example, are currently exempt from many of the regulations (although there is no suggestion that such bikes are in any way dangerous). Of more concern are BMX-style bikes that stakeholders suggest have very low saddles and are often supplied without adequate brakes – these are apparently used commonly by youths and can only be braked by the rider rubbing his/her foot against the top of the rear tyre! Even pedal cycles with saddle heights below 635 mm are required by C&U Regulations (for use on a public road) to have at least one braking system, but such bikes may be sold as being not for on-road use, yet are so used.

To extend the current regulations, however, to cover bikes with saddles lower than 635 mm would inevitably add to the regulatory burden rather than diminish it. For that reason, this option has not been included in the detailed impact assessment analyses, but remains available for consideration.

5.3 Summary costs and benefits of short-listed options

5.3.1 Costs

As all the technical options (over and above the do-nothing option) are de-regulatory, and no evidence has been provided or otherwise identified that suggests any significant (quantifiable) additional safety (accident/casualty) or other costs, the impact assessments all assume negligible costs.

For lights, in the view of the TRL study team, systems that are not approved to BS 6102-3 or an equivalent standard, but are of the suggested (by RVLR) brightness, colour and, where appropriate, flash rate, should offer adequate levels of safety. In addition, as the likelihood is that very few existing cycle lights in use are approved, removing such a requirement from the statute books would be very unlikely to compromise current safety levels. It is possible that a proportion of existing cycle lights would, if tested, meet the BS 6102-3 requirements (a detailed testing programme would be needed to properly assess this), and in time it is also possible that an EN standard will be developed (by industry experts) that is similarly comprehensive, e.g. by covering visibility angles, beam patterns and effective aiming systems.

For front and side reflectors, and again in the view of the TRL study team, it is similarly unlikely that removing the PBSR requirements for them to be fitted at point of sale would materially alter the accident/casualty statistics. They are already not required in use, and even if they do remain fitted they would be of no benefit in daylight (when most cycling takes place and most accidents occur). At night, a front reflector would not be an adequate substitute for a proper light, and side/wheel reflectors could only be of any use in very rare and unlikely accident scenarios, e.g. where a cycle crosses an unlit road across the path of a car/other vehicle, having presumably not seen that vehicle or failed to judge its speed properly. Even then, to be of benefit, the driver of that other vehicle (or any on-board accident avoidance technologies), would need to be able to recognise the approaching hazard, in a way that would not have occurred if side/wheel reflectors were not fitted, and still be able to take effective avoiding action.

Implementation costs can be assumed to be higher for the "one consolidated regulation" option than for less complex options involving amending existing statutory instruments and/or regulations. These would be incurred at the discretion of ministers and would be likely to be relatively small, and are thus also excluded from the impact assessment.

5.3.2 Benefits

Conventional bicycles

The evidence gathered for this study, including the views of several key stakeholder groups, strongly suggests that these proposals would have very little, if any effect on the mainstream UK bicycle industry. The main areas where savings may be possible concern removing requirements for some reflectors (Option D) and for bells to be fitted at point of sale (Option Z).

For side and front reflectors, some stakeholders suggest that these currently add about £5 to the average cost of a cycle in the UK, while others simply say that the costs are so small as to be negligible. If side reflectors, in particular, were no longer fitted as standard, some consumers may wish to add them at point of sale (at retail costs perhaps approaching £4-5 per cycle), while others may wish to pay even more for tyres with reflective sidewalls. It is also by no means certain that cycle retailers/suppliers would actually discount the purchase price by as much as £5, if at all, but may instead simply choose to take a higher profit margin. As most bicycles sold in the UK are manufactured overseas, these additional profits would not necessarily benefit the UK economy. It is also possible that many bikes will continue to be supplied with side reflectors because they remain a requirement in other major markets.

For pedal reflectors, the fitment costs are also very small. Some reflectors are integrated into the pedal design and would probably continue to be fitted even if not strictly required (rather than incur re-design and re-tooling costs). Some consumers may opt for flashing rear lights if pedal reflectors were not provided (at higher overall cost). Some bicycles are already sold (legally) without pedal reflectors (by not having pedals).

The proposal to allow non-wide-angle rear reflectors, e.g. as integrated components within dynamo lights, would be de-regulatory but not involve any cost savings, except if dynamo lights were fitted as well as a wide-angle reflector (in which case the cost of the wide-angle reflector could be saved). The numbers of bikes with dynamo lighting are likely to be too small for this to be significant.

With around 4 million cycles sold annually in the UK (LSE, 2011), the maximum possible saving to consumers could be about £30m, if removing requirements for front, side and pedal reflectors saved about £7.50 per cycle and all those savings were passed on to consumers, and none of them made alternative extra purchases to compensate for any perceived reductions in their visibility. Given, however, the various mechanisms described above that might reduce the overall savings achievable, it seems unlikely that the additional benefits of Option D would exceed more than £10m per annum, or £2.50 per cycle on average. A range of £0 - £10m is used in the formal impact assessment, equating to a (rounded) Net Present Value over the period 2015-2024 of £0 - £83m at a 3.5% discount rate, with 2014 as the base year and at current (2013) prices.

Bells are reported to add about £3-5 to the average purchase cost of a bicycle. As for reflectors, however, and perhaps even more so, many consumers would likely choose to have one fitted anyway (at higher cost), and any cost savings may not be passed on to

UK consumers. It thus also seems likely that removing the requirement for a bell to be provided at point of sale (Option Z) would have negligible overall financial benefits. It is also conceivable that bikes without bells (or alternative warning device) would be slightly more likely to become involved in injury-causing accidents, particularly with pedestrians on cycle paths, further negating any possible benefits.

The option (Y) to add some flexibility to the Regulations by allowing an "audible warning device" as an alternative to a bell may improve consumer choice but would be unlikely to radically affect the existing market. Assuming a bell is cheaper (to fit) than any alternative device, suppliers will continue to fit a bell as the default option.

For the formal impact assessment, therefore, the overall potential benefits of Options Y and Z (bells) are assumed negligible.

For Option C (lighting simplifications), the proposals would in effect represent no significant change from existing practice. Lights approved to the BS standard are, the evidence suggests, very few and far between, so removing that requirement simply reflects existing market conditions. The minimum requirements would also reflect existing usage and enforcement practices. There may be some risks that removing the 4 cd minimum brightness requirements would encourage poor quality, cheap, low intensity lights to be marketed as suitable for cycle use and reliance would be placed on market forces to eliminate them. Enforcement officers might also have a role here, i.e. poor performing lights might well be deemed inadequate by the police.

Overall, therefore, the potential benefits of Option C (lighting) are also assumed to be negligible.

Changes (simplification) to the braking requirements (part of Option B) would also have negligible impacts on the mainstream bicycle industry. Consumers can already choose to have brake levers swapped over after purchase, so allowing this as part of the purchase process should have no major additional costs or benefits. There is potential for some benefits from bikes being manufactured with right-rear and left-front brake configurations not having to have their brakes swapped twice for consumers who want this original (but non UK) specification, but the numbers concerned are likely to be very small indeed.

EAPC bicycles and e-bikes

Some benefits will be available for the EAPC bicycle market through harmonisation with the EU's 250 W and 25 km/h speed limits (Option B). This, stakeholders confirm, would likely lead to lower prices, improved marketability and increased sales. Some of these sales, and the journeys made by such cycles, have the further potential to displace journeys by car (or bus) and thus provide fuel, emissions, health and noise benefits, too.

EAPC stakeholders postulate that if harmonising with the EU allowed the UK market to grow similarly to the Dutch and German markets over recent years, sales would increase from about 20,000 per annum now to perhaps 400,000 per annum within 5 years and 1 million after 10 years, equivalent to an annual average growth rate of almost 50% over the ten year period. In the absence of such harmonisation (Option A), the same stakeholders suggest that growth may only be 20-30% per annum, equivalent to annual sales in 5 years' time of no more than 75,000 and around 300,000 in 10 years' time.

Figures derived from various internet sources indicate that in Holland, pedelec sales increased from 22,000 in 2004, to 178,000 in 2011, equivalent to an average annual

growth rate over that 7 year period of 35%. In Germany, pedelec sales increased from about 70,000 in 2007 to 400,000 in 2012, equivalent to a 34% average annual growth over that five year period. While speculation of 50% compound growth rates for the UK over 10 years may thus be overly ambitious, a rate of 30% over that period does seem potentially realistic.

According to Colibi-Coliped (2012), in Holland, by 2011 pedelec sales accounted for some 15% of all bicycle sales, but other sources indicate that sales there may have levelled off in 2012. In Germany by 2012 the proportion was up to 10%, and still growing rapidly. If, based on these data, 15% of all bicycle sales is taken as a reasonable indicator of the overall market potential for pedelecs, this would indicate the potential for annual UK sales of up to around 600,000.

The UK market for bicycles, EAPC or otherwise, however is not identical to the Netherlands or Germany. Many other factors are at play, most notably consumers perceptions of cycling safety and motorists (too often hostile) attitudes to cyclists. Without wider changes in UK society to develop a safer cycling culture and infrastructure, therefore, EAPC growth along the lines experienced elsewhere may not be achievable. That said, it does seem reasonable to assume that harmonisation would generate EAPC sales and usage over and above those that would happen anyway. For the purposes of the formal impact assessment, it is assumed that under option A (do nothing), EAPC sales would grow by 20% per annum, while under Option B (harmonisation) they would increase by 25-30% per annum[12], over the next ten years. These extra sales are assumed to be of pedelecs only – stakeholders report already declining demand for e-bikes in the UK and this is likely to be further exacerbated by the future requirement for type approval for such cycles (the impacts of which are outside the scope of this study as they stem from changes in EU type approval regulations). At the highest assumed rate of 30% compound growth, UK pedelec sales would be around 345,000 per annum by 2024, which is still well short of the 600,000 potential and would still be less than 10% of all bicycle sales (assuming these are still at least 4 million per year), further indicating that these growth assumptions are reasonable for the UK.

To assess the net economic benefit to consumers derived from increased pedelec sales, the impact assessment needs to estimate the usage of these bikes, what proportion of that usage would replace car or bus journeys, and thus how much money consumers would therefore save and what health benefits might arise. The only available evidence for this comes from PRESTO (2010b), which cites research that every pedelec displaces 900 km of car use per year. Stakeholders have also provided evidence to suggest that some pedelec purchases displace car purchases, so it is reasonable to base the cost savings on the average overall costs of car usage, rather than just the marginal costs of fuel and maintenance. The AA (2012) suggest that motoring costs for cars vary enormously according mainly to the initial purchase price (and thus depreciation costs) and annual mileage. If a typical car is taken to be one costing £14,000 - £22,000 (petrol or diesel) and travelling 10,000 miles per year, the costs are stated to be around 60p per mile. Those costs were calculated, however, with a fuel price of about £1.35 per litre. Expectations are that fuel prices will continue to rise quite steeply (they are £1.50 per litre at the time of writing this report), so for the purposes of the impact assessment it is assumed that fuel prices will average £2 per litre, and overall car motoring costs of 70p

[12] LSE (2011) reports overall cycle sales rose by 28% in 2010 by comparison with 2009.

per mile (rounded to 44p per km) are a reasonable assumption for the 2015-2024 period, although this is, of course, subject to considerable uncertainty.

Conventional cycling costs are estimated to be about 10p per mile (GoSmarter, 2013), based on a £300 bike lasting 5 years and cycling 2,000 miles per year. EAPCs are, however, considerably more expensive than conventional bikes (by a factor of perhaps 5) but EAPC users are likely to cover more miles per year and might also expect their bikes to last a little longer than 5 years. A reasonable estimate of the overall costs of EAPC ownership would therefore seem to be about 25p per mile (rounded to 15p per km). This means that an EAPC is assumed to save on average 29p per km for every km it replaces a car (44 – 15), and therefore £261 per year if that displacement is 900 km.

New car fleet average fuel consumption (as measured during official NEDC testing) is targeted to reach 95 g CO_2/km by 2020, though real-world consumption is likely to be somewhat higher. For the purposes of the formal impact assessment, it is assumed that over the evaluation period of 2015-2024, average car fuel consumption generates 100 g per km, so each 900 km saved would save 90 kg of CO_2. The costs and environmental impacts of the electricity used to charge them are assumed negligible given the overall levels of uncertainty in the analysis[13]. The social cost (benefit) of the 90 kg of CO_2 saved is assumed valued at £6, based on webTAG guidance for non-traded emissions (£62 per tonne in 2020, at 2010 prices).

Emissions of regulated emissions such as particulates and nitrous oxides would also be prevented through displaced car journeys. Transport Statistics Great Britain reports that in 2010, cars and taxis produced 163,000 tonnes of Nitrogen Oxides and 5,400 tonnes of Particulates (PM_{10}). The same publication reports overall car and taxi travel of 385.9 billion vehicle km in 2010. This equates to equivalent, per km emissions of about 0.42 g of NO_x and about 0.014 g of PM_{10}. The car and taxi emissions are falling steadily, however, by about 10% per annum for NO_x and 5% per annum for particulates, as modern engines gradually replace older, more polluting types. For the purposes of the impact assessment, it is assumed that average emissions over the period 2015-2024 will be 0.2 g per km of NO_x and 0.01 g per km PM_{10}. WebTAG places central per tonne valuations on these pollutants of about £100 per tonne for PM_{10} (0.01p per gramme) and £1,100 per tonne for NO_x (0.11p per gramme) for the 2015-2024 timeframe. Displacing 900 km of car use would thus, on average, likely save about 180 g of NO_x and 9 g of PM_{10}, with values of 19.8p and 0.09p respectively. This is less than 20p in total and is thus ignored for the overall impact assessment, as it is trivial in comparison to the other cost savings considered.

There would also be health benefits from transferring some car journeys to pedelec, and congestion reduction benefits. LSE (2011) cites evidence that frequent cyclists may well have, on average one less sick day per year than non-cyclists, valued at £78, for example. The Health Economic Assessment Tool (HEAT), as described earlier in this report and adopted for use within WebTAG, can be used to quantify the health benefits of cycling. It does not cater specifically for pedelecs, as opposed to conventional pedal cycles, but Presto (2010b) indicates that a pedelec cyclist uses at a given speed about 80% of the energy he would use on a conventional bike; 900 km of pedelec use can thus be assumed equivalent, in health terms, to 720 km on a conventional bike. Running the HEAT for cycling tool suggests that every 1,000 pedelec users undertaking this level of

[13] PRESTO 2010b suggests that recharging a 200 Wh pedelec battery would cost about 3p.

activity would save 0.37 deaths per annum, valued at €578,000, equivalent to €578 (£500) per pedelec user per year.

No evidence has been identified to suggest what proportion of the 900 km avoided car use is likely to be done on congested roads. However, WebTAG does provide average marginal congestion costs for Great Britain; roughly 13p per km in 2015, 16p in 2020 and 21p in 2025 (at 2010 prices). For the purposes of the impact assessment, an average of 17p per km is assumed for the period 2015-2024, at current prices. 900 km of avoided car use could thus save £153 per annum in congestion costs on average.

In total, therefore, each new pedelec sale would, if its rider displaces 900 km per year of car travel (about 4 km per working day on average), generate net annual savings of £261 in travel costs, CO_2 savings worth a further £6, £500 in health benefits and £153 in congestion savings; £920 per annum in all. Each pedelec is further assumed to have a life expectancy of 6 years, so the annual benefits accrue for each sale for this period of time only. Table 10 shows the calculation of extra sales and the Net Present Value (NPV) of the annual savings they are estimated to generate; between £507 million and £1.15 billion over the 10 year evaluation period, depending on the achieved sales growth rate.

Table 10. Cumulative extra pedelec sales and NPV of Option B

Yr.	Baseline sales (Option A) 20% p.a.	Estimated sales (Option B) 25-30% p.a.	Additional sales generated	Cumulative additional sales	Net savings (£920 per bike) £m	NPV (3.5% rate) £m
2014	25,000	25,000	0	0	0	0
2015	30,000	31,250–32,500	1,250–2,500	1,250-2,500	1–2	1-2
2016	36,000	39,100–42,250	3,100–6,250	4,300-8,750	4–8	4-7
2017	43,200	48,800–54,900	5,600–11,700	9,900-20,500	9–19	8-17
2018	51,800	61,000–71,400	9,200–19,600	19,100-40,000	18–37	15-32
2019	62,200	76,300–92,800	14,100–30,600	33,200-70,700	31-65	26-54
2020	74,700	95,400–120,700	20,700-46,000	53,900-116,700	50–107	40-87
2021	89,600	119,200–156,900	29,600-67,300	83,600-184,000	76–167	59-130
2022	107,500	149,000–203,900	41,500-96,400	125,100-280,400	111-250	84-188
2023	129,000	186,300–265,100	57,300-136,100	182,400-416,500	159-364	115-264
2024	154,800	232,800–344,600	78,000-189,800	260,400-606,400	222-521	155-365
Total					**£m**	**507 - 1,147**

Commercial EAPC tricycles

By removing the 60 kg weight limit for EAPC tricycles, stakeholders are clear in their view that Option B would also be likely to stimulate growth in the goods-delivery cycle

market. It may also stimulate growth in the pedicab market but other external legislative and political factors may continue to act as barriers to pedicab services. For the purposes of the formal impact assessment, therefore, it is assumed that growth in goods-delivery services is incentivised quite strongly, as stakeholders have suggested, but that any effects on pedicab services would be negligible.

Cyclelogistics (2012) suggests that goods-delivery bikes (conventional and electrically-assisted) could potentially substitute for about 40% of all urban journeys performed by van or truck (as well as a similar proportion of such journeys by private car or bus). They based estimates of fuel and CO_2 benefits on what they surmised to be very conservative assumptions that such cycles would actually displace only 1 thousandth of that potential by 2020, based on expectations of "only a small change in behaviour over the next few years". They also pointed out the likely variability across Europe, with Copenhagen stated as already having 35,000 cargo bikes in use as an example.

GB statistics (Department for Transport, 2012b) indicate that light vans and goods vehicles travelled about 28 billion kilometres in urban areas in 2010 (light vans accounting for 24 billion). If the maximum potential is for EAPC tricycles to replace 40% of that figure, that equates to 11.2 billion km. If just one in every 1,000 of these were replaced by a cargo cycle, this would be equivalent to 11.2 million vehicle km. The evidence suggests that cargo bikes are gaining in application in the UK, though still very rare, but their growth is likely to be seriously constrained, particularly in hilly areas. Under Option A (do nothing), therefore, it seems reasonable to assume that there would be no significant growth in goods-delivery cycle services. Allowing electrical assistance, however (Option B), would be likely to open up new markets and new towns and cities. By 2020 it seems reasonable to assume that 11 million van kilometres could be substituted per annum, rising to 20 million km by 2024. Linear growth is assumed for the intervening years. It is acknowledged that these estimates are subject to considerable uncertainty, but at just 1-2 thousandths of the overall potential, they seem likely to err on the conservative side.

Assuming a one-for-one replacement, 11 million vehicle km by cargo bike would take about 1,000 vans off the road, i.e. about 0.03% of the 3 million or so vans in use in Great Britain. Although vans can carry more load, bikes can specialise in short trips and get through traffic more easily to be able to re-load at the depot/base more frequently, so overall productivity is likely to be quite similar and, therefore, a one-for-one substitution is feasible.

Publicly available industry estimates of van running costs typically vary between about 40p and 80p per mile. While webTAG, for example, indicates average marginal running costs for light goods vehicles to be around 50% higher than cars, the sorts of vans that cargo cycles are most likely to replace would naturally tend to be the smaller, car-derived and similarly sized vehicles, which are likely to have fuel consumption and other costs similar to cars. It is therefore appropriate to use the same costs for vans as were used for cars in the assessment of EAPC impacts, i.e. 70p per mile (rounded to 44p per km). An electrically assisted cargo cycle would cost somewhat less than a van, both to purchase and to run. Figures published by the Cyclelogistics project indicate costs of less than 8p per mile, based on a £2,000 purchase cost, 4 year life and 10,000 miles per year (about 40 miles per working day). EAPC variants may well cost about £1,000 more (about the same differential as with conventional bicycles and EAPCs), but even assuming they don't have any longer life expectancy, costs would still only be about 10p

per mile. This figure (rounded to 6p per km) is used in the impact assessment and thus the net saving for each kilometre substituted is 38p (44 – 6).

WebTAG guidelines suggest that for the period 2015-2024, each litre of diesel fuel should be assumed to produce about 2.4 kg CO_2. In 2010, Transport Statistics Great Britain show that light vans consumed about 5 billion litres of fuel in travelling about 67 billion vehicle km, equivalent to roughly 7.5l/100km and thus about 180 g CO_2/km. Smaller vans, however, have better fuel consumption than larger variants (the TSGB classification of 'light vans' includes anything up to 3.5 tonnes gross vehicle weight), and technological progress is producing more and more efficient engines. For the purposes of the impact assessment, therefore, CO_2 savings are assumed to be 130g per substituted km on average, valued according to webTAG guidelines at 1p/km.

The health benefits cannot be properly calculated using the HEAT methodology, as described for the EAPC assessment, because the average distances cycled per day would exceed the model's limitations (it is designed for more occasional, leisure or commuter journeys). If each cargo cyclist replaces one van, and cycles about 10,000 miles per annum (16,000 km), this would indicate an average daily ride of about 65-70 km, whereas the model is only valid for average daily trips of about 12 km or less. While cycle delivery operations would naturally tend to enhance the fitness and basic health of the rider, they may also expose them to stresses associated with meeting delivery deadlines and getting through traffic, as well as operate in dense urban centres where air quality is poor. Overall, therefore, and given the lack of good evidence/tools to quantify these potentially conflicting impacts, the impact assessment assumes zero health benefits for cargo cycle operations.

While cargo bikes will tend to be slightly wider than conventional bicycles, stakeholders and published evidence suggest that they are well suited to avoiding congestion, rather than further contributing to it. They will also tend to be used most often in dense urban centres, where the potential for congestion savings through avoided van journeys is greatest. The impact assessment assumes that the same average per km congestion costs as were derived for cars (from WebTAG) applies, i.e. 17p per km.

As with the EAPC bicycle analysis, avoided pollutant emissions are excluded, because they are likely to be negligible in comparison to the other impacts assessed.

In total, therefore, electrically-assisted cargo cycles are reckoned to generate net savings of 56p per substituted km (from vans); 38p from savings in vehicle and running costs, 17p from avoided congestion and a further 1p from avoided greenhouse gas emissions. Table 11 shows the calculations of van-kilometres substituted by electrically assisted goods-delivery cycles and their Net Present Value (NPV) over the evaluation period of 2015-2024; £44 million.

Table 11. Van-km substituted and NPV for goods delivery cycles, Option B

Year	Van-km substituted	Net savings (56p per km) £m	NPV (3.5% discount rate) £m
2014	0	0	0
2015	1,000.000	0.6	0.5
2016	3,000,000	1.7	1.6
2017	5,000,000	2.8	2.5
2018	7,000,000	3.9	3.4
2019	9,000.000	5.0	4.2
2020	11,000,000	6.2	5.0
2021	13,000,000	7.3	5.7
2022	15,000,000	8.4	6.3
2023	17,000,000	9.5	6.9
2024	20,000,000	11.2	7.8
Total			**£44.0 million**

5.3.3 Overall summary

The preceding sections describe the assumptions and calculations made to estimate the net present value of the benefits of the various regulatory options, most of which stem from Option B through encouraging the EAPC and goods-delivery markets, with a small additional potential benefit from simplification of the reflector requirements. Table 12 summarises the results.

Table 12. Summary of NPVs of benefits for all technical options

Option	Marginal extra benefits over and above previous option	Combined benefits
A & X - do nothing	£0m	£0m
B - EAPC harmonisation & brakes simplifications	£551m - £1,191m	£551m - £1,191m
C - as B + lighting simplifications	£0m	£551m - £1,191m
D - as C + reflector simplifications	£0m - £83m	£551m - £1,274m
Total NPV of benefits (EAPC harmonisation and all brakes, lighting and reflector simplifications)		**£0.55b - £1.27b**
Y - audible warning device as alternative to bell	£0m	
Z - remove requirement for bell	£0m	

The overall savings over the course of the 10 year evaluation period (2015-2024) are estimated to be somewhere in the range £0.55-£1.19 billion for Option B (all from EAPC harmonisation), with a possible extra £0.08bn from Option D (reflector simplifications).

For the combined implementation of Options B and D (or B, C and D), the split in benefits between businesses (from congestion cost savings, point of sale savings and goods-delivery/van operational savings), consumers (car operating savings and health benefits), and the environment (greenhouse gas savings) is shown in Table 13.

Table 13. Split of estimated savings by beneficiary group

(At current prices)	Minimum estimated total benefits, 2015-2024	Maximum estimated total benefits, 2015-2024.
Businesses	£128 million	£317 million
Consumers	£419 million	£949 million
Environment	£4 million	£8 million
Total	£551 million	£1,274 million

5.3.4 Key assumptions and sensitivities

The above analyses inevitably rely on a wide range of assumptions and projections about the potential consequences of the various legislative options. Uncertainties in those estimates will, of course, result in corresponding uncertainties in the overall estimate of benefits. While the central estimate, using all the assumptions described above, is that implementing all the options would produce net overall savings of £0.91bn ± £0.36bn, Table 14 shows how that estimate would vary if some key alternative assumptions were made:

- EAPC sales projections - the central estimate assumes a baseline (do nothing) growth in EAPCs in the UK of 20% per annum, and a 25-30% annual growth if Option B were implemented. Two alternative scenarios are considered; the first with baseline growth considerably lower (10%), but the "with Option B" sales growth in the same 25-30% range as originally assumed and, second, with baseline sales at 10% and the "with Option B" sales also lower, at a just 15%;
- EAPC usage – the central estimate uses the only published evidence identified on the subject in assuming that each EAPC sale would displace 900 km of car use per annum. Two further scenarios are explored; the first with this figure reduced to just 600 km, the second with the figure at 1,200 km;
- Motoring costs savings – the central estimate assumes that many EAPC purchasers (including cargo cycles) would do so as a direct alternative to purchasing a car or van, and thus uses the full average, per km costs of motoring to calculate the savings. An alternative scenario is to assume that these purchasers still buy a car or van but use the EAPC cycle to replace a proportion of the journeys they would otherwise have made in their car/van, in which case the marginal costs of motoring would be the more appropriate calculation basis. These are taken to be 15p per km for both cars and vans;

- Congestion savings – an average per km congestion cost saving is assumed for every km travelled by an EAPC that would replace a car or van journey. Even by the end of the evaluation period (2024), however, the calculations suggest there might at most be about 600,000 EAPCs in use on UK roads, traveling a combined distance of around 0.5 billion vehicle kilometres. Official traffic forecasts (in Transport Statistics Great Britain) indicate that by then, overall traffic could be at least 600 billion vehicle kilometres. An alternative scenario, therefore, is to assume that removing just 0.5 billion of this overall 600 billion would have no discernible effect on overall congestion levels or costs.

Table 14. Sensitivities of central benefits estimate to some key assumptions

Alternative scenario parameter	Alternative values	New central benefit estimate
Original assumptions	None	£0.91 billion
EAPC sales (1)	Baseline growth 10%, Option B sales growth 25-30%	£1.63 billion
EAPC sales (2)	Baseline growth 10%, Option B sales growth 15%	£0.40 billion
EAPC usage (1)	Each EAPC displaces 600 km of car travel per annum	£0.72 billion
EAPC usage (2)	Each EAPC displaces 1,200 km of car travel per annum	£1.31 billion
Motoring cost savings	Use marginal costs, at 15p per km	£0.65 billion
Congestion cost savings	Assume negligible congestion impacts	£0.76 billion

Allowing for these uncertainties suggests that the overall benefits range could be somewhere in the range £0.40 - £1.63 billion. The most significant influence on the overall savings estimate is the assumptions regarding EAPC sales growth, and particularly the difference in that sales growth that might result from the Option B implementation (harmonisation). Allowance for the other key uncertainties would not, in themselves, be sufficient to take the central estimate outside of this range.

6 Conclusions

1. The fundamental objective of this work was to gather, generate and expert-review evidence from a wide variety of sources on the forces and pressures influencing pedal cycle construction, sale and use in Great Britain, and provide DfT with costed, practical and appropriate options for legislative change.
2. The methodology chosen to achieve this objective included reviews of published research literature, Red Tape Challenge responses, previous consultation responses, existing legislation, and of cycle accident data held within the STATS19 database, combined with thorough and comprehensive consultation with stakeholders from the cycle industry, cycling groups, local authorities, operators, professional bodies, road safety organisations and enforcement agencies.
3. The reviews and stakeholder discussions led to the development of the following major options for legislative change:

   Option A – Do Nothing (retain all UK regulations in their current form)

   Option B – EAPC harmonisation & Brakes simplifications

   - Remove weight limits for EAPCs;
   - Harmonise EAPC maximum power and assisted speed with EU at 250 W & 25 km/h respectively;
   - Continue to classify as pedal cycles, subject to type approval, those EAPCs, with twist and go, that meet 250 W max output and 25 km/h power cut-off;
   - Remove voltage marking requirement from the EAPC data plate;
   - Allow 2,3 or 4 wheeled EAPCs;
   - Keep handed brake levers but allow suppliers to swap left and right hand brakes if customer requests it;

   Option C – as B + Lighting simplifications

   - Remove all references to British (lighting) Standards, rely on manufacturer and consumer choice to ensure lights and reflectors give adequate performance
   - Minimum requirements would be fitment of front and rear light and rear reflector if the cycle is used at night, aimed to avoid dazzle or discomfort, properly maintained, etc.

   Option D – as C + Reflector simplifications

   - Remove requirement for pedal reflectors to be fitted at point of sale and in-use.
   - Remove requirement for rear reflectors to be wide-angle type
   - Remove requirement for side and front reflectors at point of sale

   Bells – treated as separate options, which are:

   - **X** - keep the existing requirements (for a bell at point of sale)
   - **Y** – simplify by allowing audible warning device as alternative at point of sale (subject to performance requirements)
   - **Z**- de-regulate by removing requirements for a bell

4. A formal impact assessment has provided estimates of the net present value of the benefits of the various regulatory options over the period 2015-2024, most of

which stem from encouraging the EAPC and goods-delivery markets, with a small additional potential benefit from simplification of the reflector requirements.

5. **The overall NPV of benefits for EAPC harmonisation and simplification of the braking requirements is estimated to be in the range £551 million to £1,191 million** (central estimate £871m) at current prices over the ten year evaluation period (all of which comes from the EAPC changes alone), **while simplifying the reflector requirements might take the overall maximum NPV up to £1,274 million (central estimate £912m)**.
6. Simplifying the lighting and braking requirements, and options for changes to the requirement affecting bells were found, on their own, unlikely to have any net overall cost or benefit.
7. Over the ten year period to 2024, with 2014 as the base year and using a discount rate of 3.5%, these savings would be shared amongst:
    - **consumers** (through car operating cost savings and health benefits), **£0.42-£0.95 billion**;
    - **businesses** (through congestion cost savings, point of sale savings and goods-delivery/van operational savings), **£0.13 - £0.32 billion** and;
    - the **environment** (through greenhouse gas reductions), **£4 - £8 million**.
8. Allowing for the various uncertainties in the assumptions made to generate these savings estimates, the overall benefits range could be somewhere in the range £0.40 - £1.63 billion. The most significant influence on the overall savings estimate is the assumptions regarding EAPC sales growth, and particularly the difference in that sales growth that might result from the Option B implementation (harmonisation).

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Annex 1 – completed Impact Assessment template (main options)

Evidence Base (for summary sheets)

A full description of the evidence used to generate the following numbers is provided in sections 5.2 and 5.3 of the main report.

Title: Cycle Regulations Review (main options) **IA No:** **Lead department or agency:** Department for Transport **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 30/04/13 **Stage:** Options **Source of Intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:**

Summary: Intervention and Options

RPC: RPC Opinion Status

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
£m 912	£m 222	£m 0	No	Zero Net Cost

What is the problem under consideration? Why is government intervention necessary?

There is currently in place a wide range of pedal cycle legislation in Great Britain, covering construction standards, point-of-sale requirements and in-use issues. Some of this legislation is specific to pedal cycles (or just bicycles) or electrically assisted pedal cycles (EAPCs), while others are more general but contain pedal cycles within their scope. Much of the existing legislation, however, was originally developed 20-30 years ago and may not adequately reflect more recent developments in cycle use/consumer markets or in technology.

What are the policy objectives and the intended effects?

Particularly significant and relevant are the pressures to simplify and reduce legislative burdens while maintaining or improving safety levels. As well as a formal consultation regarding the EAPC Regulations in 2010, in May 2011, the Department for Transport put all the existing cycling regulations online as part of the Government's Red Tape Challenge. This IA arises from a study commissioned by DfT to gather, generate and expert-review evidence from a wide variety of sources (including Red Tape Challenge and EAPC consultation responses) on the forces and pressures influencing pedal cycle construction, sale and use in Great Britain, and provide DfT with costed, practical and appropriate options for legislative change.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option A (hereafter Option 1) – Do Nothing (retain all UK regulations in their current form)
Option B (Option 2) – EAPC harmonisation & Brakes simplifications
Option C (Option 3) – as B + Lighting simplifications
Option D (Option 4) – as C + Reflector simplifications
Bells - treated separately (see Annex 2)
Note: Only Options involving EAPC harmonisation and reflector simplifications were found to have net costs or benefits. "Preferred (or more likely) Option" figures relate to any combination of options involving these two.

Will the policy be reviewed? It will/will not be reviewed**. If applicable, set review date:** Month/Year					
Does implementation go beyond minimum EU requirements?			Yes / No / N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** Yes/No	**<20** Yes/No	**Small** Yes/No	**Medium** Yes/No	**Large** Yes/No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent) (cumulative over ten year period)			**Traded:**	**Non-traded:** 0.1 – 0.2 Mt	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Chair/Chief Executive/Minister:_____ Date:_____

Summary: Analysis & Evidence — Policy Option 1

Description: TRL Study Option A – Do Nothing

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:** £0m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Other key non-monetised costs by 'main affected groups'

This is the Do Nothing option, i.e retain existing legislation, and thus has no direct costs. Much of the existing legislation, however, was originally developed 20-30 years ago and may not adequately reflect more recent developments in cycle use/consumer markets or in technology. There are also some potentially confusing or burdensome anomalies and/or inconsistencies between individual pieces of legislation, e.g. with some differences between requirements for cycles at the point of sale and when in-use on public roads.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks — Discount rate (%): 3.5

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 0	**Net:** £m 0	No	Zero net cost

Summary: Analysis & Evidence — Policy Option 2

Description: TRL Study Option B – EAPC harmonisation & Brakes simplification

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £551m	**High:** £1,191m	**Best Estimate: £871m**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Deregulatory, so no costs. Costs to consumers and businesses incurred by adopting EAPC cycles are considered in the benefits assessment to arrive at net operational savings.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**£ 551m**
High	Optional		Optional	**£ 1,191m**
Best Estimate	£ 0		£	**£ 871m**

Description and scale of key monetised benefits by 'main affected groups'

Consumers (car operating cost savings and health benefits), £419m - £949m (all from EAPC harmonisation);
- Businesses (congestion cost savings, point of sale savings and goods-delivery/van operational savings), £128m - £234m (all from EAPC harmonisation);
- Environment (through greenhouse gas reductions), £4 - £8 million (all from EAPC harmonisation).

Note: Study suggests negligible costs or benefits from brake simplification proposals on their own

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks — Discount rate (%): 3.5

Allowing for the various uncertainties in the assumptions made to generate these savings estimates, the overall benefits could be somewhere in the range £0.40 - £1.55 billion, for EAPC harmonisation only. The most significant influence on the estimates is the assumptions regarding EAPC sales growth, and particularly the difference in that sales growth that might result from the Option B implementation (harmonisation).

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 18	**Net:** £m 18	No	Zero net cost

Summary: Analysis & Evidence — Policy Option 3

Description: TRL Study Option C – as B (Option 2 above) + Lighting simplifications

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:** £871m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	**Optional**
High	Optional	Optional	**Optional**
Best Estimate	£ 0	£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Deregulatory, so no costs. Costs to consumers and businesses incurred by adopting EAPC cycles are considered in the benefits assessment to arrive at net operational savings.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	**Optional**
High	Optional	Optional	**Optional**
Best Estimate	£ 0	£ 0	**£ 871m**

Description and scale of key monetised benefits by 'main affected groups'

As Option 2 – no additional benefits (or costs) from lighting simplifications

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks — Discount rate (%): 3.5

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 18	**Net:** £m 18	No	Zero net cost

Summary: Analysis & Evidence — Policy Option 4

Description: TRL Study Option D – as C + Reflector simplifications

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £551m	**High:** £1,274m	**Best Estimate:** £913m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Deregulatory, so no costs. Costs to consumers and businesses incurred by adopting EAPC cycles are considered in the benefits assessment to arrive at net operational savings.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**£ 551m**
High	Optional		Optional	**£ 1,274m**
Best Estimate	£ 0		£ 0	**£ 913m**

Description and scale of key monetised benefits by 'main affected groups'

Consumers (car operating cost savings and health benefits), £419m - £949m (EAPC harmonisation);
- Businesses (congestion cost savings, point of sale savings and goods-delivery/van operational savings), £128m - £317m (£128m - £234 million from EAPC harmonisation, **£0-£83m from reflector simplifications**);
- Environment (through greenhouse gas reductions), £4 - £8 million (all from EAPC harmonisation).

Note: Study suggests negligible costs or benefits from brake and lighting simplification proposals on their own.

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks — Discount rate (%): 3.5

Allowing for the various uncertainties in the assumptions made to generate these savings estimates, the overall benefits could be somewhere in the range £0.40 - £1.63bn with reflector simplifications added to EAPC harmonisation. The most significant influence on the estimates is the assumptions regarding EAPC sales growth, and particularly the difference in that sales growth that might result from the Option B implementation (harmonisation).

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 22	**Net:** £m 22	No	Zero net cost

Annex 2 – completed Impact Assessment template (bell options)

Evidence Base (for summary sheets)

A full description of the evidence used to generate the following numbers is provided in sections 5.2 and 5.3 of the main report.

Title: Cycle Regulations Review (bell options) **IA No:** **Lead department or agency:** Department for Transport **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 30/04/13 **Stage:** Options **Source of Intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:**

Summary: Intervention and Options

RPC: RPC Opinion Status

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
£m 0	£m 0	£m 0	No	Zero Net Cost

What is the problem under consideration? Why is government intervention necessary?

There is currently in place a wide range of pedal cycle legislation in Great Britain, covering construction standards, point-of-sale requirements and in-use issues. Some of this legislation is specific to pedal cycles (or just bicycles) or electrically assisted pedal cycles (EAPCs), while others are more general but contain pedal cycles within their scope. Much of the existing legislation, however, was originally developed 20-30 years ago and may not adequately reflect more recent developments in cycle use/consumer markets or in technology.

What are the policy objectives and the intended effects?

The bell issues considered in depth were whether or not there was a case for requiring them at point of sale (but not in-use) and whether alternative provisions ("audible warning devices") should be allowed.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option X (hereafter Option 1) - keep the existing requirements (for a bell at point of sale)
Option Y (Option 2) – simplify by allowing audible warning device as alternative at point of sale (subject to performance requirements)
Option Z (Option 3) - de-regulate by removing requirements for a bell
EAPC, lighting, brakes and reflector issues are treated separately (see Annex 1)
Note: none of the Options were found likely to have net costs or benefits over and above the "Do Nothing" case.

Will the policy be reviewed? It will/will not be reviewed**. If applicable, set review date:** Month/Year					
Does implementation go beyond minimum EU requirements?			Yes / No / N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** Yes/No	**<20** Yes/No	**Small** Yes/No	**Medium** Yes/No	**Large** Yes/No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent) (cumulative over ten year period)			**Traded:**	**Non-traded:** 0	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Chair/Chief Executive/Minister:_____ Date:_____

Summary: Analysis & Evidence — Policy Option 1

Description: TRL Study Option X – Do Nothing

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:** £0m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Other key non-monetised costs by 'main affected groups'

This is the Do Nothing option, i.e retain existing legislation, and thus has no direct costs. Stakeholders involved in the TRL study agreed that the present regulation is sub-optimal, frequently resulting in the token provision, separate from the bicycle, of a "cheap and ineffective" bell purely for compliance. They further acknowledged that the question of bells may have a strong political aspect, and ultimately, therefore, must be a matter of political judgement.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

A counter-argument, to keep the existing provisions, was also made during the TRL study, citing concern that the number of complaints from pedestrians, regarding cyclists giving no warning, would increase. It was felt that the automatic provision of a bell was a useful mechanism to deflect such complaints.

Key assumptions/sensitivities/risks — Discount rate (%) 3.5

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 0	**Net:** £m 0	No	Zero net cost

Summary: Analysis & Evidence — Policy Option 2

Description: TRL Study Option Y – simplify by allowing audible warning device as alternative at point of sale

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £0m	**High:** £0m	**Best Estimate: £0m**

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	**Optional**
High	Optional	Optional	**Optional**
Best Estimate	£ 0	£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Deregulatory, so no costs.

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	**£ 0m**
High	Optional	Optional	**£ 0m**
Best Estimate	£ 0	£	**£ 0m**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

The option (Y) to add some flexibility to the Regulations by allowing an "audible warning device" as an alternative to a bell may improve consumer choice but would be unlikely to radically affect the existing market. Assuming a bell is cheaper (to fit) than any alternative device, suppliers will continue to fit a bell as the default option.

Key assumptions/sensitivities/risks — Discount rate (%) 3.5

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 0	**Net:** £m 0	No	Zero net cost

Summary: Analysis & Evidence — Policy Option 3

Description: TRL Study Option Z – de-regulate by removing requirements for a bell

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2014	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:** £0m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0**

Description and scale of key monetised costs by 'main affected groups'

Bells are reported to add about £3-5 to the average purchase cost of a bicycle. However, many consumers would likely choose to have one fitted anyway (at higher cost), and any cost savings may not be passed on to UK consumers (instead being retained by the mainly non-UK manufacturers). It thus seems likely that removing the requirement for a bell to be provided at point of sale (Option Z) would have negligible overall financial benefits.

Other key non-monetised costs by 'main affected groups'

It is also conceivable that bikes without bells (or alternative warning device) would be slightly more likely to become involved in injury-causing accidents, particularly with pedestrians on cycle paths, further negating any possible benefits.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition)(Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate	£ 0		£ 0	**£ 0m**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks — Discount rate (%) 3.5

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: £m 0	**Benefits:** £m 0	**Net:** £m 0	No	Zero net cost