Title: Increasing the agricultural tractor and trailer speed and combination weight limits IA No: DfT00299 Lead department or agency: Department for Transport Other departments or agencies: Department for the Environment, Food and Rural Affairs	Impact Assessment (IA) Date: 02/02/15 Stage: Final (validation) Source of intervention: Domestic Type of measure: Secondary legislation Contact for enquiries: nicola.collins@dft.gsi.gov.uk 02079442799

Summary: Intervention and Options

RPC Opinion: Awaiting scrutiny

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, Two-Out?**	**Measure qualifies as**
£591.96	£656.34	-£57.13	Yes	Out

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

The maximum gross weight of agricultural trailers is 18.29 tonnes. The maximum gross weight of agricultural combinations (tractor, trailer and load) is 24.39 tonnes. The maximum speed limit for conventional tractors on public roads is 20 mph. It has been suggested by the Farming Regulation Taskforce that these weight limits are too low, incentivise farmers to use small tractors to pull heavy trailers or cause unnecessary costs to farmers. It was also suggested that the speed limit is too low and causes unnecessary costs to farmers. Weight and speed limits are set by Government to balance the private benefit of larger payloads and faster travel with the social costs. Government intervention is required as weight and speed limits are regulated activity.

What are the policy objectives and the intended effects?

The policy objective is to maximise the productivity and economic performance of the agricultural sector and increase road safety by changing the current combination and trailer weight limits and the maximum speed limit for conventional tractors. The intention is to reduce time spent on roads for tractor drivers, increase productivity for farmers in GB and remove farmers' incentives to use inappropriately small tractors to pull heavy trailers. The industry perceives the current weight and speed limits to be outdated. The intention is also to level the playing field for business, as vehicles which weigh above or drive at speeds above existing limits or use inappropriately small tractors to pull heavy trailers currently have a competitive advantage over those adhering to the maximum limits.

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

The Government have plans to consider a second stage to these regulatory changes. The policy options considered for Stage 1 are:

Option 0: Do nothing
Option 1: Increase combination weight limit for all tractors and trailers to 31t and the speed limit for conventional tractors and trailers to 25mph.
Option 1 is the preferred option because it will provide benefits for famers and possible road safety benefits.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** March/2020

Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** Yes	**< 20** Yes	**Small** Yes	**Medium** Yes	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** NQ	**Non-traded:** NQ	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: _____ Date: 4th February 2015

Summary: Analysis & Evidence

Policy Option 1

Description: Increasing maximum weight limit for tractor/trailer combinations from 24.39t to 31t and increasing maximum speed limit for conventional tractors and trailers from 20 mph to 25 mph.

FULL ECONOMIC ASSESSMENT

Price Base Year 2015	PV Base Year 2015	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 380.09	**High:** 803.84	**Best Estimate:** 591.96

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.0		7.5	**64.4**
High	0.0		7.5	**64.4**
Best Estimate	0.0		7.5	**64.4**

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

Small increase in road damage caused by heavier loading of trailers.

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

Implementation costs to Government, local authorities and information providers. Publicity costs to Government and private sector. Other impacts are uncertain because the policy will result in less time spent on the road, but higher speeds. Impacts for which we are uncertain of the direction of impact are: noise, fuel costs and fuel duty revenues, Greenhouse Gas emissions and road safety.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0		51.9	**444.5**
High	0.0		101.4	**868.2**
Best Estimate	0.0		76.7	**656.3**

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

Time savings for tractor drivers. This occurs due to (a) faster speeds and (b) being able to carry the same payload in fewer trips. Average annual benefits are as follows: £3m during off-peak months, £28m for the most active days of a peak month, and £46m for other days during peak months.

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

Farmers will experience a reduction in non-fuel operating costs – larger payloads and faster travel will lead to savings as journeys take less time and vehicles become more productive. More level playing field for businesses and increased respect for weight limits and tractor speed limits. Possible road safety benefit – new weight limits will remove farmers' current incentive to use smaller tractors to maximise payload, allowing them to match tractor size to trailers without reducing payload. Other vehicles can go faster (where they cannot overtake the tractor).

Key assumptions/sensitivities/risks — **Discount rate** 3.5%

Evidence collected at consultation suggests non-compliance with the current speed limit is widespread but almost no information was provided to suggest what speeds tractors currently travel at. We therefore use a assume a range of different initial speeds, from compliance with the current speed limit up to maximum design speed. We assume a 0.94mph increase in average speed at the lower-bound and no increase in speed at the upper-bound. The best estimate is the mid-point between these two scenarios. We assume that less than half of all farms in Great Britain would benefit from these changes – other farms are assumed to be too small to register significant benefits. We have used estimates for average distances travelled, number of trips per day and average payload based on information provided by stakeholders. We have assumed that in each peak month, there are 2 days of 'high intensity' work and 28 days of 'lower intensity' work. During non-peak months, we use lower estimates.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:						In scope of OITO?	Measure qualifies as
Costs: 0.0	**Benefits:**	57.1	**Net:**	57.1		Yes	OUT

Evidence Base

Background

Task Force:

1. The Farming Regulation Task Force (which was made up of members whose experience covers farming and growing, retail, food processing, conservation, private and public sector management, and regulatory implementation and enforcement), reported to Government on ways of reducing regulatory burdens on farmers and food processors on 17 May 2011.[1] The Report recommended 200 ways of reducing unnecessary "red tape" and challenges the Department for Environment, Food and Rural Affairs (DEFRA), its agencies and delivery partners to change the way they approach regulation for the industry. The Task Force recommended a new approach to regulation based on trust, responsibility and partnership between Government and industry.
2. The Task Force made a large number of recommendations about how individual regulations and processes could be improved without reducing standards. The issue of tractor and trailer weight and speed limits are the responsibility of the Department for Transport and the subject of this impact assessment.

Weight:

3. The maximum weight of agricultural trailers is 18.29 tonnes. The maximum weight of agricultural combinations (tractor and trailer) is 24.39 tonnes. These are contained in the Road Vehicles (Construction and Use) Regulations 1986 (C&U Regs) regulation 75 and 76 respectively, and apply to Great Britain.[2]
4. Advances in technology have introduced more sophisticated and more multi-tasking machinery for tractors to tow, and so tractors have become heavier – and many argue, safer - over the years since the current weight limits were set. Indeed, the industry perceives the current weight limits (set pre-1986) to be outdated and feels they do not reflect technological developments over the last quarter-century. However, while larger and more capable equipment is being used, the gross train weight[3] limits have not changed. This has resulted in reduced payload[4] making farming less efficient, as the tractor eats into the available weight. Increasing the maximum tractor and trailer weights will mean that farming equipment is utilised better and increase potential payload for those farmers using modern tractors.

Speed:

5. The maximum speed limit for all tractors with or without a trailer is currently 40mph, as set out in the Road Traffic Regulation Act (1984), schedule 6. However, the "C&U Regs" set out certain technical requirements for tractors and requires those that are driven above 20mph to meet certain requirements, including the fitment of brakes meeting truck standards, including Anti-lock Braking System (ABS). Most tractors do not comply with these requirements so legally can only be used at speeds up to and including 20mph (i.e. conventional tractors). Similar requirements apply to agricultural trailers and many are also restricted to being towed at 20mph. The power to change vehicle speed limits under schedule 6 of the Road Traffic Regulation Act 1984 is devolved in Scotland. However the "C&U Regs" are not so we consulted about the possibility of change across the whole of

[1] https://www.gov.uk/government/publications/independent-farming-regulation-task-force-report

[2] http://www.legislation.gov.uk/uksi/1986/1078/made

[3] The combined weight of the tractor, trailer and cargo.

[4] Payload is the weight of the cargo i.e. the amount of produce being carried.

Great Britain, as these are the regulations which affect maximum speeds that are being considered for change. There was no objection in the consultation to change across the whole of Great Britain and the intention is that any increase in speed limit would apply to all of Great Britain.

Problem Under Consideration

Weights and speeds:

6. Weight and speed limits are set by Government to balance the private benefits of carrying loads and of speed of travel with the social cost of the presence of heavy vehicles travelling at speed. Government regulates weight and speed limits because road users do not take the full social costs of operating heavy vehicles and deciding which speed to travel at into account when loading and driving them. They may overload vehicles or drive too fast, leading to negative effects on road safety and road damage. Therefore a weight and speed limit is set and penalties laid down for exceeding them. Conventional tractors have lower speed limits than most other vehicles to reflect the lower technical standards they are required to meet and the increased severity of crashes involving heavier vehicles.

7. However, there have been significant technical improvements to agricultural tractors since the current weight and speed limits were set pre-1986, in particular around braking and other safety related items. Advances in technology have introduced more sophisticated and more multi-tasking machinery for tractors to tow, and so tractors have become heavier. Tractors have also become faster and are capable of travelling at speeds over 20mph and have more sophisticated braking systems - in some cases their braking performance could be similar to a heavy lorry of comparable weight. Trailers have also increased in size and are capable of carrying more cargo. However, speed and weight limits have remained the same. Consultation responses commonly expressed the view that current speed and weight limits are outdated and inconsistent with technological developments over the last quarter-century, including better braking on tractors and better traction. Indeed, 65% of respondents were against maintaining the current speed limit for tractors and 73% of respondents were against maintaining the current weight limits.

8. The current regulations also pose issues in relation to road safety. The new weight limits will remove disincentives for farmers to use safer combinations to transport their goods. The increase in gross train weight limit will enable farmers to use larger tractors without compromising on payload, so will remove their current incentive to use smaller tractors to pull large trailers. Using more balanced tractor / trailer combinations should result in better control of the trailer and improved handling of the combination, and therefore, for example, could reduce the likelihood of overturning. The new combination weight limit will also mean farmers can better utilise the capacity of larger trailers (unlike in the status quo), therefore encouraging their use. The use of larger trailers should reduce the number of 'overloaded or poorly loaded' agricultural vehicles – a contributory factor in a number of accidents involving tractors[5]. Farmers will also gain a modest increase in payload, enabling them to make fewer trips.

[5] 2.95% of serious or fatal accidents involving agricultural vehicles has 'overloaded or poorly loaded vehicle or trailer' as a contributory factor compared with 1.38% of serious or fatal accidents involving HGVs and 0.12% of serious or fatal accidents involving all vehicle types. Contributory factors for agricultural vehicles are not published however to see the equivalent contributory factors for cars see: table RAS50005, Vehicles in Reported Accidents by Contributory Factor and Vehicle Type, Great Britain 2012: https://www.gov.uk/government/publications/reported-road-casualties-great-britain-annual-report-2012

9. The consultation responses indicate a high level of non-compliance with current regulations and therefore non-compliant farmers and tractor drivers gain an advantage over their compliant colleagues. In some other EU countries, all tractors can operate at 25 mph (40 km/h) and this presents concerns regarding international competitiveness[6].

10. Increasing weight and speed limits will yield improved productivity and competitiveness, and facilitate economic growth in the agricultural sector. A higher speed limit will also reduce congestion on narrow roads where tractors cannot pull over to allow other traffic to pass.

11. Government intervention is required to change weight and speed restrictions as vehicle weight and speed restrictions are regulated.

Policy objective

Weights and speeds:

12. The primary policy objectives of the changes are:

- To modernise current regulations so they reflect the capabilities of current agricultural tractors and trailers,
- To facilitate the use of higher standard and safer machinery and;
- To contribute to increased efficiency in the agricultural industry.

13. The intended effects also include reducing costs to business, enabling there to be greater compliance with regulations and therefore level the playing field between compliant and non-compliant farmers and drivers, reducing regulatory incentives to use mismatched tractor/trailer combinations in order to maximise payloads, addressing concerns over international competitiveness.

Description of options consulted on

14. On the issue of weight limits, we consulted on four potential options:
    - Do nothing.
    - Increase maximum trailer and combination weights to 21 tonnes and 31 tonnes respectively where the trailer is put forward for an annual roadworthiness test.
    - Increase maximum combination weight to 31 tonnes and maintain current trailer weight limit where the trailer is put forward for an annual roadworthiness test.
    - Increase trailer weight for tandem-axle and tri-axle trailers to 33 tonnes and 37 tonnes respectively where the trailer is put forward for an annual roadworthiness test. (Industry proposal).

15. On the issue of speed limits, we consulted on two potential options:

    - Do nothing.
    - Increase maximum speed limit to 25mph[7].

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[6] In some countries conventional tractors can go faster than 25mph; in Germany they can go up to 60km/h or about 44mph

[7] The maximum permitted speed is being set as 40km/h rather than 25mph, to match other pan-European requirements related to vehicle use.

16. We received 611 responses to the consultations from a wide range of stakeholders including a number of organisations[8]. Respondents generally supported increasing the weight and speed limits. 86% of respondents to the weight limits consultation supported increasing the limits – 50% supported the industry proposal (option d above), 33% support option b above, and 3% supported option c above. 85% of respondents to the speed limits consultation supported increasing the speed limit - the majority supported an increase to more than 25mph. 92% felt that a roadworthiness test requirement was a necessary part of increasing weight limits although it is unclear if respondents would support inclusion of a roadworthiness test for *any* weight increase or only if the weight limit was increased to a certain level. Some also felt a test requirement should accompany a speed limit increase.

Chosen approach

17. Based on the Farming Taskforce Report and consultation responses we consider there is a good case to increase permissible weights and speeds, alongside an annual roadworthiness test for heavier laden vehicles. There are some key details about the nature of the testing which need more work including input from stakeholders. However we consider there are some weight and speed changes which should be progressed ahead of this and do not require the roadworthiness test to be in place. We have therefore decided to adopt a two stage approach, with stage one entering into force in March 2015. Stage two will follow later and will look at raising weight limits further in conjunction with the introduction of a roadworthiness test.

18. Stage one changes are assessed in isolation in this document. They are:

    a. The change from 20 mph to 25 mph in the effective speed limit for agricultural tractors and trailers. The consultation proposals and taskforce recommendation was that this should be implemented for all agricultural tractors and trailers regardless of whether they had a roadworthiness test.
    b. An increase of the maximum permissible tractor-trailer combination weight from 24.39t (about 24 imperial tons) to 31t, whilst retaining the general maximum permissible laden trailer weight at 18.29t (about 18 imperial tons). This generates two effects. The first is to allow heavier, generally more modern, tractors to haul the same payload as is legally permissible with smaller tractors. The second is to allow a modest increase in payload for farmers who have heavier tractors which currently reduce their payload. Our assessment is that the business benefits, the reduction in mileage of laden trailers (for people keeping within the regulations), the positive environmental and safety effects of the reduced mileage and the removal of a perverse disincentive not to use modern machinery make this a worthwhile change to make now.

Effects evaluated

Monetised costs and benefits:

- Time savings for farmers due to speed and weight changes
- Increased road maintenance costs due to higher weights (a preliminary estimate has been made)

Non-monetised costs and benefits:

[8] Around 70 organisations responded to the consultation including trade organisations (representing farming, agricultural engineers and manufacturers, and logistics sectors); local authorities and parish councils; road safety groups and; police forces. A high number of individual farmers responded as well as members of the public who live in rural areas.

- Safety impacts of speed and weight changes
- Changes in fuel use and emissions

Monetised Costs and Benefits: Time Savings for Farmers

19. Time-savings have been calculated using the assumptions listed in Annexes A and B, and the calculations set out in Annex C. In these calculations, we have used survey data provided by the National Farmers Union to estimate the number and distance of typical daily trips made by tractors and trailers, with their typical payload. We have then estimated the reduction in time spent travelling that would occur thanks to faster average speeds and a reduction in the number of trips made (due to higher payloads).

20. One of the most complex and uncertain elements of the analysis is the set of assumptions around speed of travel. These are therefore described in the following section.

Speed Scenarios used in the analysis: Current (status quo) tractor speed

21. Unlike for other vehicle types (such as cars, vans and heavy goods vehicles), the Department does not collect statistics showing the speed of agricultural vehicles. However, the following evidence was collected at consultation:

    - 92% of respondents believe that non-compliance with the speed limit is widespread and the remaining 8% believe that some tractors are non-compliant with speed limits.
    - Police Scotland undertook checks in two districts in Scotland. One took place over a three month period and showed there were no tractors travelling below 20mph. The other was conducted in one day and 100% non-compliance was noted. Neither of these studies recorded actual speeds.
    - Somerset police documented 22 offences of excess speed from one speed camera fitted on an A-road over a ten day period (although again, actual speed was not recorded). A representative from Somerset police estimated, based on experience, that around 80% of tractors travel at 30mph or more. Note, however, that this comment is at odds with data collected on the maximum design speed of tractors (see below).
    - 13% of consultation respondents suggested that tractors drive at their maximum capable speed.

22. Consultation responses suggest widespread non-compliance with the current speed limit, but almost no evidence was provided to show what speed tractors normally travel at. We also note that qualitative research suggests people's perception of other drivers' speeds tends to be higher than the reality. For example, studies published by the Scottish Executive and the Department for Transport state:

    "almost all the [focus] group participants were agreed that, these days, most people drive at around 10 mph above the speed limit"[9]

    "almost all drivers believe that other drivers speed and 92% think other drivers break the speed limit" [10]

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[9] Stradling, S. G., Campbell, M., Allan, I. A., Gorell, R. S. J., Hill, J. P., Winter, M. G., & Hope, S. (2003). *The speeding driver: who, how and why?*. Page 36.

[10] Musselwhite, Charles, et al. "Understanding public attitudes to road user safety: final report. DfT Road safety research report no. 111." (2010). Page 33.

23. The table below show actual speed behaviour for cars in 2003 (the year that the Scottish Executive research was published). It shows that the statement "most people drive at around 10 mph above the speed limit" is not borne out by the statistics. On single carriageways in particular, only 2% of drivers were found to exceed the speed limit by more than 10 mph, and only 9% were exceeding the speed limit at all. Note also that while the perception discussed in the focus groups was that most people are speeding, the average recorded speed for all cars was generally below the speed limit.

Table 1: Average free-flow speed and proportion exceeding the speed limit for cars, by road type, in 2003[11]

Road type (Speed Limit)	Average Speed	% Exceeding Speed Limit	% Exceeding Speed Limit by more than 10 mph
Motorway (70 mph)	71 mph	57%	20%
Dual Carriageway (70 mph)	69 mph	50%	15%
Single Carriageway (60 mph)	48 mph	9%	2%

24. In light of the responses received and discussion above, we have chosen to use a wide range for the current (status quo) speed of tractors which recognises the fact that non-compliance is prevalent, but that actual speed of tractors is unknown. The range we have chosen is from the current speed limit (**20mph**) up to the maximum design speed of tractors. The lower bound figure of 20 mph is a conservative estimate since it is possible that tractors may be travelling at average speeds below the current speed limit, which would generate higher estimated benefits[12].

25. The estimate used for the maximum design speed of a tractor is **26.5 mph**. This is based on type-approval data for tractors registered on the Driver and Vehicle Licensing Agency (DVLA) database. Tractors can have a maximum design speed, under type-approval, of up to 40 km/h or more than 40 km/h. We understand that most modern conventional tractors will either have a maximum design speed of 40 km/h (25 mph) or 50 km/h (31 mph) and we have therefore made a simplifying assumption that these are the maximum design speeds indicated by the two different type approval categories[13]. 73% of registered vehicles are in the 40km/h category and the remaining 27% the 50 km/h category. We have assumed that these proportions extend to the whole fleet and have therefore taken the weighted average of 26.5mph (i.e. 73% x 40km/h + 27% x 50km/h) as the maximum design speed for all tractors.

26. Time-saving benefits should be calculated on the basis of average speed per trip, rather than maximum speed achieved during the course of the trip. The discussion above concerns maximum speeds typically achieved by tractors during the course of the trip. Factors such as junctions, hills, bends, pulling over to let other vehicles pass, and time spent accelerating, all mean that the average trip speed will be somewhat lower than

[11] Source: Table SPE0103; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316457/spe0103.xls

[12] Note that a lower speed assumption would generate higher benefits estimates since travel time is inversely proportional to speed: The time-saving from increasing speed by 1mph is smaller, the higher is initial speed.

[13] It is likely that some of the type approved 'up to 40km/h' tractors will only be capable of going at a lower speed than 40km/h, but that some of the tractors type approved to 'over 40km/h' are capable of travelling at above 50km/h. In addition, we have assumed that those which are registered in the over 40km/h category have a maximum design speed of 50km/h as we cannot identify which of these might have technical requirements to allow them to travel at speeds of up to 40mph rather than the current 20mph (although we understand that very few models of tractors have the requirements to travel at up to 40mph)..

'free-flow' traffic speed[14]. DfT traffic data suggests that average trip speed is around 75% of free-flow traffic speed[15].

27. We therefore assume that average tractor speed for each trip in the current (status quo) scenario is in the interval **15.0 mph** to **19.9 mph**. The lower-bound estimate assumes full compliance with the current speed limit (i.e. 75% x 20 mph) and the upper-bound estimate assumes zero compliance and is based on maximum design speed (i.e. 75% x 26.5 mph). Both estimates have been adjusted by a factor of 75% to better reflect average trip speed.

Speed Scenarios used in the analysis: Tractor speed following the policy change

28. There is compelling evidence to suggest an increase in the speed limit will result in an increase in average traffic speeds. Elvik et al.[16] performed a meta-analysis, drawing on 248 effect estimates from 51 different studies. On the relationship between speed limits and traffic speed, the study states that:

"Speed limits do influence the mean speed of traffic, which almost always changes in the same direction as the speed limit. There is, however, great variation in the effects of changes in speed limits. Such changes rarely lead to fully proportional changes in mean speed, i.e. mean speed rarely changes by as much as 10 km/h if the speed limit changes by 10 km/h. On the average, the change in the mean speed of traffic induced by a change in speed limit appears to be around 25% of the change in speed limit. This means that if the speed limit is reduced by 10 km/h, one may expect the mean speed of traffic to go down by about 2.5 km/h."

29. None of the studies examined in this meta-analysis were specifically related to agricultural vehicles and, as far as we are aware, no such study exists. The meta-analysis considered studies from a range of different countries and traffic situations, and considered speed limits ranging all the way from 25 km/h (16 mph) to 120km/h (75 mph). Such a wide range of different speed limits is likely to include consideration of very different compliance rates (Table 1 shows that these vary significantly with road type), vehicle mixes and road types. We therefore consider that the broadness of this study makes it a suitable source for estimating the impact of an increase in the tractor speed limit.

30. The study suggests a 5 mph increase in the speed limit would result in a 1.25 mph increase in traffic speed. We have adjusted this by a factor of 75%, as for the current (status quo) speeds, to reflect the likely change in average trip speed. This gives an estimated increase in average trip speed of 0.94 mph.

31. Table 2 shows the average annual time-saving benefits for the lower and upper bound speed scenarios and for the central estimate (calculated as the mid-point between the two). In the upper-bound speed scenario we assume no change in speed following the policy change since it is not possible for tractors to travel faster than their maximum design speed. Note that the maximum design speed of a tractor is not comparable to the top speed of a car, in that it is normally imposed by the manufacturer through the fitting of

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[14] Speed statistics conventionally present 'free-flow' traffic speed, which is measured at designated points on the network designed to capture vehicle speed at points where traffic is not constrained by congestion, hills, bends, junctions or other factors which might inhibit speed.

[15] This is based on analysis by the department to compare free-flow speeds with data on average trips speed collected from GPS data. The analysis is not yet published and figures are provisional. The 75% figure relates to all vehicles, not tractors, but in the absence of any evidence as to how the average speed relates to the free-flow speed for tractors in particular, we have taken 75% as a best estimate. The true figure may in fact be lower - due to the nature of the roads they use and the short trips they undertake, tractors are likely to spend more time starting, stopping and turning than other traffic. They also frequently pull over to let other vehicles pass. On the other hand, hills and bends are less likely to require a significant reduction in speed for slow-moving vehicles, so it is also possible that the true figure is higher.

[16] Elvik, R., P. Christensen, A. H. Amundsen (2004). Speed and Road Accidents. An evaluation of the Power Model. Report 740/2004. Institute of Transport Economics, Oslo. Page 93.

a speed limiter. Therefore it seems reasonable to assume that tractors can routinely achieve speeds right up to (and including) their maximum design speed.

Table 2: Estimated time-saving benefits using different speed input assumptions

	Initial Speed (mph)	**Speed after policy change (mph)**	**Average Annual Benefit (£m)**
Lower-bound speed scenario	15.00	15.94	£101.4m
Upper-bound speed scenario	19.90	19.90	£51.9m
Central Estimate			***£76.7m***

32. All of the modelled benefits are time savings to farmers. Assumptions and data inputs used for the analysis are detailed in appendices A and B. Time savings arise from both:

    (i) faster journeys, due to the higher speed limit (except in the lower-bound speed estimate where we assume no change in actual speeds)
    (ii) fewer trips, due to the ability to carry more payload per trip.

33. The effects of parts (i) and (ii) are considered simultaneously. We consider time-savings for three different periods: off-peak months, intensive days during peak months; and less-intensive days during peak months. Average annual benefits for each of these is summarised in Table 3 below. The methodology for calculating benefits in each time period is described in appendix C.

Table 3: Estimated time-saving benefits broken down by type of benefit

	Average Annual (£m)		
	LOW	**BEST**	**HIGH**
Time-savings during off-peak months	£0.0m	£2.5m	£5.0m
Time-savings during intensive days in a peak month	£19.0m	£27.9m	£36.9m
Time-savings during less intensive days in a peak month	£33.0m	£46.2m	£59.5m
Total	**£51.9m**	**£76.7m**	**£101.4m**

Monetised Costs and Benefits: Increased Road Maintenance Costs

Monetised costs

34. There are no monetised costs to business. This is a deregulatory proposal. Farmers have the choice of whether or not to increase speed and payload as a result of these changes. No additional costs or burdens will be imposed on farmers who choose to adopt faster speeds or carry larger payloads, or who choose not to.

35. However, costs from increased road damage will be incurred by wider society, as discussed below.

Road Maintenance:

36. The department's work on mode-shift benefits attempts to estimate the social benefit of shifting road freight onto water or rail. This includes the avoidance of road maintenance and other infrastructure related costs. As we are not aware of any work which documents the specific infrastructure damage caused by agricultural vehicles, we have chosen to use the work relating HGV miles to infrastructure damage to create a best estimate. The mode-shift benefit values are currently being updated by the department, and so the figures given here should be considered indicative estimates only.

37. The methodology used to calculate the infrastructure cost of each additional HGV mile is documented in the *Mode Shift Benefits technical report*[17]. This is based on a methodology developed in *Surface Transport Costs & Charges*[18] and NERA (1999)[19]. The infrastructure cost imposed by HGVs is found by assessing the various contributory factors to different types of road-wear. This includes, for example, the relationship between vehicle weight and bridge maintenance, axle loading and surface maintenance; and vehicle flow and drainage, signs and crossings. Total maintenance expenditure is divided across these different contributory factors in order to estimate maintenance or infrastructure costs per mile driven.

38. *Table 4* shows the cost per thousand units of each 'contributory factor' on the four road types studied. In this table, the following definitions are used:

Standard axle kilometres is obtained by multiplying the PCU kilometres (see below) for each vehicle type by its average standard axle equivalence factor. The standard axle equivalence factor is a measure of the level of road damage caused relative to a 'standard' 80kN axle load. This measure is used to allocate costs for categories of expenditure related to repairing the road surface.

Passenger car unit (PCU) kilometres is obtained by multiplying the distance travelled (in vehicle kilometres) by each vehicle type by its PCU factor (a parameter used to measure the amount of road space used by a vehicle). This driver is used to allocate costs that are not related to vehicle weight.

Average gross vehicle weight kilometres is obtained by multiplying the distance travelled (in vehicle kilometres) by total vehicle weight. It is used to allocate costs which are dependent on the total weight of vehicles, such as bridge maintenance.

Table 4: Maintenance costs (£) per 1000 units, 2006 prices

	Standard Axle kilometres	PCU kilometres	Average Weight kilometres
Motorway	3.3	0.1	0.1
Trunk	6.3	0.5	0.5
Principal	11.6	0.3	0.6
Other	59.1	0.5	0.7

39. The benefits assessment assumed no change in payload for 12t trailers – only for 16t trailers. Furthermore, we assume that this change only occurs during peak months. To calculate the infrastructure damage caused by tractor and 16t trailer combinations during

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/51151/msb-technical-report.pdf

[18] http://www.its.leeds.ac.uk/projects/stcc/surface_transport.html

[19] NERA, AEA. "Technology Environment, TRL (1999) Report on Phase 2 of the Study into Lorry Track and Environmental Costs." *NERA, London.*

peak months, we calculate the number of standard axle, PCU and average weight kilometres as follows:

Total kilometres travelled is calculated using the assumptions about average trip distance and number of trips per day detailed in the monetised benefits section. We estimate that during peak months 16t trailers would travel 118 million kilometres in the status quo and 96 million kilometres after the policy change.

PCU kilometres: There is no PCU factor available for a tractor plus trailer. As a proxy, we use the same factor as an articulated lorry, which is 2.9 PCU[20].

Average gross vehicle weight kilometres uses the total weight of the tractor, trailer and payload: 24.39t in the status quo; 26.59t after the policy change.

Standard Axle kilometres: To calculate the standard axle equivalence factor, we must first establish the loading of each axle. We assume that the weight of the tractor (8.3t) is divided equally between the two tractor axles. In addition, we assume that the back tractor axle takes 3t of trailer weight from the coupling. The remaining trailer weight (6.1t) and payload (9.99t in the status quo; 12.19t after the policy change) is split equally between the two trailer axles. This gives the following axle loading:

Table 5

	Axle	Axle load (tonne)	
		Status Quo	Policy Option
Tractor	1	4.15	4.15
	2	7.15	7.15
Trailer	3	6.545	7.645
	4	6.545	7.645
TOTAL		**24.39**	**26.59**

[20] See WebTAG 3.9.5 table 8

40. To calculate standard axle equivalence for each axle, we convert into kilonewtons, divide by 80 (since a 'standard' axle is 80kN) and raise to the power 4. This is because the wearing effect of an axle is approximately proportionate to the fourth power of the axle load[21].

Standard axle equivalence = $\left(\frac{axle\ load\ (kN)}{80}\right)^4$

Computing the standard axle equivalence for each axle gives the following:

Table 6

	Standard Axle Equivalence	
Axle	Status Quo	Policy Option
1	0.07	0.07
2	0.59	0.59
3	0.41	0.77
4	0.41	0.77
TOTAL	**1.49**	**2.20**

41. Note, for comparison[22], that standard axle equivalence for an articulated lorry ranges from 1.1 (3/4 axles) through 1.9 (5 axles) to 3.9 (6 axles).

The total standard axle equivalence for a tractor and trailer is multiplied by PCU kilometres to calculate standard axle kilometres.

Total Standard Axle, Passenger Car Unit and tonne kilometres

Table 7

	Status Quo	Policy Option
thousand SA kilometres	506,899	615,030
thousand PCU kilometres	341,164	279,592
thousand tonne kilometres	2,869,308	2,563,572

These figures are multiplied by the unit costs for 'other roads' given in *Table 4*

42. *Table 4*. This gives a total road maintenance cost caused by 16t trailers during peak months of £32.2m (status quo) and £38.4m (after the policy change). This means the additional road maintenance cost of the increased weight limit is **£6.1m** (2006 prices) or **£7.5m** uprated to 2015 prices.

Non-monetised benefits

Non-Fuel Operating Cost Benefits:

Weights:

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[21] Source: Pavement Wear Factors, TRL PPR066, pp. 4-5

[22] http://www.fightbackwithfacts.com/wp-content/uploads/2011/07/C.21-Speeds-etc-2006.pdf

43. Farmers will experience a reduction in non-fuel operating costs as tractors and trailers are able to carry more per trip and so make fewer trips. The elements making up non-fuel vehicle operating costs include oil, tyres, maintenance, depreciation and vehicle capital savings. Allowing a larger payload means that vehicles become more efficient, in terms of operating costs, per hour of operation. However, as the Department does not have a standard set of parameters regarding the non-fuel operating costs of agricultural tractors and trailers; it has not been possible to quantify these savings.

Speeds:

44. Farmers will experience a reduction in non-fuel operating costs as tractors and trailers travel faster, thus becoming more efficient per hour of operation. Again, these benefits could not be quantified.

Competition benefits:

Weights:

45. There is a potential benefit associated with changes whereby increasing the weight limits would level the playing field for businesses. 88% of consultation respondents believed that a significant number of operators are currently non-compliant with these limits[23]. These farmers and operators currently have a competitive advantage over those who adhere to the maximum weight limits: a change in these limits could reduce the chance of the latter group being unfairly disadvantaged.

46. Furthermore, the changes proposed could help move the GB industry closer to the limits for weight in other EU member states and thus improve GB competitiveness. For example, France has a gross train weight (GTW) limit of 38t for twin axle trailers with an effective maximum trailer weight of 31t, and Germany has a GTW limit of 40t. It is possible that these other countries have other restrictions in place, but it's certainly true to say that because GB rules have not changed since 1986, we have not kept pace.

Speeds:

47. There is a benefit associated with changes whereby raising the speed limit for tractors and trailers would level the playing field for businesses. Evidence, both quantitative and anecdotal, gathered during the consultation suggested that non-compliance with the current speed limits is widespread. Therefore there may be some farmers who currently have a competitive disadvantage because they adhere to the speed limit. A change in these limits could reduce the chance of the latter group being unfairly disadvantaged.

48. Furthermore, in some other EU countries tractors can already operate at 25mph (40km/h). This proposal will address concerns regarding international competitiveness.

Time savings for other road users:

Weight:

[23] The majority of consultation responses provided only anecdotal evidence to support this however two police responses offered qualitative evidence. Police Scotland referred to a recent 3 month test whereby over 60% of tractors tested failed to comply with weight limits, although their survey size was small.

49. It is reasonable to assume that other road users will also experience time savings. On rural roads, where overtaking is not possible and the tractor is unable to pull over to allow other vehicles to pass, it is likely that the reduced number of tractors on the road (as a result of fewer journeys) will decrease the number of queues developing as a result of slow moving tractors. However, as the Department does not have a detailed breakdown of traffic flows following agricultural vehicles it has not been possible to quantify these savings.

Speed:

50. As the current speed limit for tractors on public roads is significantly lower than it is for most other vehicles, it is reasonable to assume that vehicles driving behind tractors will experience time savings as a result of the speed limit increase, where they cannot overtake. We expect these savings would be most significant on small rural roads, which is where most tractors drive and also where the likelihood of queues developing is greater, (as the roads are small and do not generally permit overtaking). Again, it has not been possible to quantify these savings.

Non-monetised costs

Transition costs:

Weights and speeds:

51. There would be a direct cost of implementation, which we have not quantified, accruing to both government and the private sector as a result of the weight and speed limit change. For example, government (central and local) would incur some publicity costs where literature and publications will need to be updated to reflect the new vehicle speed limit. Equally, some manufacturers or trade associations may have literature or publications that need to be updated. This cost is likely to be very small.

52. Consultation respondents mostly believed there would not be any transition costs. Those that did believe there would be transition costs agreed with those set out in the pre-consultation impact assessments (publicity costs to government). Some believed there would be costs associated with training if a testing regime was introduced and costs of upgrading the specification of trailers however these costs are not relevant to this stage of the policy proposal.

Non-monetised: Direction of Impact Uncertain

Fuel Consumption:

Weights

53. We are unable to quantify the impact of this proposal on fuel consumption. This is because – whilst increasing the weight limits would result in fewer trips for tractor drivers – it could be argued that these vehicles will use more fuel per mile as they are more

heavily laden. Since we have limited information about the fuel efficiency of agricultural vehicles, the net impact of these two effects is unknown.

54. Respondents to the consultation on weight limits mostly believed an increase in weight limits would lead to fuel savings since fewer journeys will be required to shift the same tonnage.

Speeds

55. We are unable to establish how fuel consumption will change in response to the speed limit change proposed, in part because there is no fuel consumption equation which explains how fuel consumption varies with respect to changes in the average speed of an agricultural tractor. Intuitively, it could be assumed that as vehicles travel faster they consume more fuel per unit of distance travelled. Interestingly however, this might not be the case. It is true that above a certain speed the faster a vehicle travels the more fuel it will consume. However at relatively slow speeds it is possible that this relationship is inverted.

56. For instance using the fuel consumption equation and parameters from WebTag – the speed at which fuel consumption per kilometre travelled is minimised for "OGV1" vehicles (which includes 2 and 3-axle rigid HGVs) is 64 km/h (or 39.8 mph). For illustrative purposes, the table below shows the litres consumed per km travelled for the same representative vehicle at 20 mph and 25 mph:

Litres of Fuel Consumed per km	20mph	25mph
	0.208271	0.188199

57. There was little quantitative evidence offered in the consultation on this issue however the majority of respondents believed that fuel consumption would decrease should the speed limit for tractors increase.

Fuel duty:

Weight and speeds

58. As we are unable to establish the impact on fuel consumption of this proposal, it is not possible to assert what the impact on fuel duty paid by tractor drivers will be. In any case, the net impact of the change can be treated as a transfer between tractor drivers and tax payers: a cost to one and a benefit to the other depending on whether fuel consumption increases or decreases.

Greenhouse Gas (GHG) and Air Quality impacts:

Weights and speeds

59. As GHG emissions and impacts on air quality are a function of fuel consumption – and we don't know the impact on fuel consumption – we are unable to determine how these items will be affected in response to the weight and speed limit change. Moreover, any increase in GHG emissions or negative air quality impacts require to be balanced against the reduced number of trips tractors will make as a result of the proposed weight and speed increases.

60. Some respondents to the speed limit consultation expressed concern about potential negative environmental impacts in rural areas should the speed limit be increased, however, no quantitative evidence was offered to support this concern.

Noise impacts:

Weights

61. It is possible that – as tractors become heavier – the amount of noise they make will increase (as more energy is required to accelerate and they make harder landings when travelling over a bump in the road). The impact of this additional noise will depend upon the number of people living in areas closest to the roads which tractors travel on. However – whilst they may make more noise per trip – the main impact of this proposal is that tractors will make fewer trips. The net impact of these two effects is unknown.

62. The majority of respondents to the weights consultation thought there would be no significant increase in noise levels as a consequence of increasing weight limits. Although no qualitative evidence was provided to support this, respondents reasoned that loading does not materially affect sound emissions and that fewer journeys will mean there is a shorter duration for noise generation.

Speeds

63. It could be assumed that as tractors travel faster the noise they produce will increase. The impact of this additional noise will depend upon the number of people living in areas closest to the roads which tractors travel on. Unfortunately, we have been unable to quantify these impacts. However, we believe these impacts will be small: as mentioned above – we have anecdotal evidence suggesting a high proportion of tractors are non-compliant with the current speed limit, so the increase in the speed limit will not affect the behaviour of these drivers. The impact of this additional noise will depend upon the number of people living in areas closest to the roads which tractors travel on.

64. No evidence on noise impacts was offered in the speed limit consultation.

Road Safety:

65. Over the past five years there were around 85 deaths in accidents involving tractors (about 1% of the total number of road deaths in that period). This is around 30% lower than total of 5 years preceding 2000.

Weight

66. The relationship between vehicle weight and accident incidence and severity is not linear, and there are many factors that will influence road safety. The relationship between vehicle weight and accidents has not been extensively investigated.

67. The new weight limits will remove disincentives for farmers to use safer, more balanced, combinations to transport their goods. The increase in gross train weight limit will enable farmers to use larger tractors without compromising on payload, so will remove their current incentive to use smaller tractors to pull large trailers. Using more balanced tractor / trailer combinations should result in better control of the trailer and improved handling of

the combination, and thus less likelihood of overturning. The new combination weight limit will also mean farmers can more fully utilise the capacity of larger trailers (unlike in the status quo), encouraging their use. The use of larger trailers should reduce the number of 'overloaded or poorly loaded' agricultural vehicles – a contributory factor in a number of accidents involving tractors[24].

68. An increase in weight would, all other things being equal, increase the stopping distance of a vehicle. However, the tractor brakes are likely to become more effective when used with a heavier unbalanced trailer, because more weight will be transferred to the rear axle of the tractor during braking, improving adhesion utilisation and so reducing the likelihood of the wheels locking.

69. Increased weight tends to increase the severity of some crashes, once they occur, but the majority of crashes considered in TRL's report[25] would be likely to be unaffected by the weight of the tractor[26].

70. The weight limit increase will enable farmers using 16t trailers to make 11% fewer trips over the course of the year, and 18% fewer trips during peak months. This reduction in mileage would in itself work to reduce the number of crashes.

71. Consultation respondents provided no quantitative evidence related to road safety however 34% of respondents thought increasing weight limits would not increase the risk of collisions on roads (although some of these opinions were expressed with reference to a roadworthiness test in conjunction with weight limit increases). 13% of consultation respondents thought an increase in weight limits would increase the risk of collisions on roads.

Speed

72. No study has been carried out which specifically examines the road safety implications of increasing the maximum speed at which conventional tractors can be driven in Great Britain. As most studies of speed-casualty relationships are based on changes in speed across all vehicles types, very little evidence is available on the effects of a speed limit change only for tractors.

73. Elvik et al.[27] propose a rule of thumb for the relationship between speed limits and traffic speed. They suggest that a 5 mph increase in the speed limit would result in a 1.25 mph increase in average speed. The department has collected data on Travel Time Efficiency Rating which shows that average travel speed on rural A roads is around 75% of 'free-flow' speed. Therefore, the estimated increase in speed as a result of this proposal is a modest 0.94 mph.

74. Consultation responses also suggest strongly that actual speeds are unlikely to change much and this impact assessment reflects this, for example in relation to time savings

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[24] 2.95% of serious or fatal accidents involving agricultural vehicles has 'overloaded or poorly loaded vehicle or trailer' as a contributory factor compared with 0.12% of serious or fatal accidents involving all vehicle types. Contributory factors for agricultural vehicles are not published however to see the equivalent contributory factors for cars see: table RAS50005, Vehicles in Reported Accidents by Contributory Factor and Vehicle Type, Great Britain 2012: https://www.gov.uk/government/publications/reported-road-casualties-great-britain-annual-report-2012

[25] A review of accidents involving agricultural and other types of working vehicle, 1996 to 2001 PR/SE/443/02, TL Smith and R Gard. This report is over 10 years old, but is the most recent relevant report the Department is aware of.

[26] Of the 39 fatal accidents involving agricultural tractors in TRL's sample, it is likely that, in only 11 would the weight of the tractor and trailer have been a factor.

[27] Elvik, Rune, et al., eds. *The handbook of road safety measures*. Emerald Group Publishing, 2009; pp. 448

connected with the speed limit change. Consequently, the impacts of the speed limit change on road safety are likely to be minimal.

75. There are two plausible effects of increased tractor speed. Firstly an increase in the number and severity of collisions because it takes tractors longer to brake and the impact speed would be higher in the event of a collision. However incidents related to excessive or inappropriately high tractor speed appear to be relatively infrequent. Secondly a higher proportion than the average for all vehicles of tractor accidents are as a result of the tractor 'travelling too slow for conditions'[28]. Some of these might be avoided with slightly higher speeds and with other motorists delayed less and tempted less to undertake hazardous overtaking movements.

76. Only a small minority of consultation respondents expressed concern that road safety would be negatively affected with an increased speed limit for tractors and considered that a cause or contributory factor to collisions is that tractors travel too fast. However, none were able to provide quantitative evidence to support this.

Business benefits

77. As the monetised time savings arising from this proposal accrue entirely to business and the proposal is clearly deregulatory, this measure is an 'Out' with an Equivalent Annual Net Cost to business of £-57.13m (i.e. an annual net benefit to UK business of £57.13 million in 2009 prices).

Specific Impact Tests

Small and Micro Business Assessment (SMBA):

78. This proposal will affect small firms, but as it is beneficial to business it would be counter-productive to not apply these changes to them. The majority of respondents to the speed consultation believed that there would be a positive impact on small firms although no respondents were able to provide quantitative evidence.

Competition Impact Test:

79. The Office of Fair Trading (OFT) indicates that four questions should be considered to examine whether there would be significant impacts on competition. Would the proposal:

- Directly limit the number or range of suppliers?
- Indirectly limit the number or range of suppliers?
- Limit the ability of suppliers to compete?
- Reduce suppliers' incentives to compete vigorously?

80. We have considered all four questions in turn. The proposal would not, directly or indirectly, limit the number or range of suppliers. It also wouldn't limit the ability of suppliers to compete: it would create a more level playing field between those who currently obey the law and those who travel faster than legally permitted, as well as

[28] 2.7%, compared to 0.1% for other vehicles. 2005-2012 Contributory Factors data from STATS19. NB the contributory factors are largely subjective and depend on the skill and experience of the investigating officer to reconstruct the events which directly led to the accident. They reflect the attending officer's opinion at the time of reporting and are not necessarily the result of extensive investigation. Furthermore it is recognised that subsequent enquiries could lead to the reporting officer to change his/her opinion. Therefore the reliability of the contributory factor statistic cited is limited to some extent.

between farmers in Great Britain and those in other EU member states. We also consider that there would be no reduction in suppliers' incentives to compete vigorously.

Equalities Impact Test:

81. Any possible negative impacts on equalities have been considered. These include possible negative impacts on race, sexual orientation, religious belief, transgender/transsexual persons, disability, pregnancy and maternity, gender, age, etc. The new weight and speed limit would apply to all tractor drivers regardless of these factors, and we therefore believe that there are no equalities impacts arising from these proposals.

Carbon Impact Test:

82. As mentioned earlier, we are unable to establish at this stage what the impact of this proposal will be on fuel consumption and hence on carbon emissions.

Appendix A - Assumptions Used in the Analysis

For the analysis in this impact assessment, we have used the following assumptions[29]:

- Farmers do not change the type of trailer they use over the appraisal period; only the payload carried and number of trips
- A 'take-up'[30] rate of 38% for arable and mixed farms, and 23% for other farms. While all farms can benefit from the changes, we have only quantified benefits for larger farms because the data gathered is most relevant to large farms. The figures listed in the rest of the assumptions are designed to be representative for these larger farmers. Consequently the benefits are likely to be an underestimate.
- A 'small' trailer holds a capacity of 12t, and a 'large' trailer 16t.
- Each farm owns on average 2.9 small trailers and 2.7 large trailers
- Each month is considered a 'peak month' by some proportion of farmers. The fewest (9%) consider February to be a peak month while the largest proportion (87%) consider August to be a peak month. 9% of farmers do not experience any month as a peak. See Appendix B for further details.
- On the two most intensive days during a peak month, each trailer moves a payload of 350t per day. The distance travelled depends on the type of farm and size of trailer, ranging from 6.6 miles to 12.3 miles per trip. See Appendix B for further details.
- During the remaining days in a peak month, the same average distance per trip is observed but fewer trips are made due to lower payloads being carried.
- During off-peak months, each trailer makes an average of 0.4 trips per day. The distance travelled depends on the type of farm and size of trailer, ranging from 5.5 miles to 9.1 miles per trip. See Appendix B for further details. Due to the lower payloads carried on non-peak months, we assume that the higher weight limit only brings a benefit during peak months.
- A larger tractor (weighing on average 8.3t) is used to pull large trailers. A smaller tractor (weighing on average 6.9t) is used to pull small trailers. The average train weight of a small tractor plus unladen 12t trailer is 11.5t. The average train weight of a large tractor plus unladen 16t trailer is 14.4t.
- We assume that all time saved is used for alternative productive activities. Therefore the value of time savings is based on a farmer's hourly wage rate. In 2013 prices, the average cost of employing a farmer for an 8-hour day was £103.82[31]. This gives an hourly rate of £12.98 (2013) or £13.44 (2015). Consistent with WebTAG[32], this is uprated each year in line with forecast GDP per capita rises.
- There are 75,000 farms in Great Britain, of which 26,000 are arable and mixed farms and 49,000 are other farms.
- We have used a ten-year appraisal period and 3.5% discount rate. With the exception of growth in per capita income, we have assumed that benefits are constant throughout the appraisal period – i.e. no change through time in the number of farms affected, trip length, average payload, or number of trips.

[29] These figures are primarily based on survey results provided by the National Farmers' Union (NFU)

[30] 'take up' is meant as those that will benefit from the proposed changes

[31] Source: DEFRA farm labour costs

[32] WebTAG is the Department for Transport published Transport Appraisal Guidance. See https://www.gov.uk/transport-analysis-guidance-webtag for further information.

Appendix B – Input data used in the analysis, as provided by stakeholders

Proportion of farmers for whom each month is considered a peak month

Jan	9.2%
Feb	8.8%
Mar	9.2%
Apr	11.2%
May	14.0%
Jun	20.0%
Jul	68.8%
Aug	87.2%
Sep	79.6%
Oct	41.2%
Nov	19.6%
Dec	14.0%
No Peaks	8.8%

Average distance travelled per trip

Arable & Mixed Farms

	12t trailer	16t trailer
Peak Month	6.6	7.6
Non-Peak Month	5.5	6.6

Other Farms

	12t trailer	16t trailer
Peak Month	7.3	12.3
Non-Peak Month	6.2	9.1

Appendix C: Calculation of Time Savings for Farmers

Time Saved During Off-Peak Months

1. In off-peak months, we assume that payloads are not large enough to be affected by the change in the weight limit. The only benefit during off-peak months is from faster speeds.

2. The estimated benefit from time saved during off-peak months is £0 - £5.0m per year. This is calculated as follows[33]:

For 12t trailers:

		Calculation
A	2.3 miles travelled per trailer per day	= 0.4 trips per day x 5.9 miles per trip
B	6.8 miles travelled per farm per day	= (A) x 2.9 trailers per farm
C	0.45 hours spent travelling per farm per day (status quo)	= (B) ÷ 15 mph [time = distance/speed]
D	0.43 hours spent travelling per farm per day (after speed change)	= (B) ÷ 15.9 mph [time = distance/speed]
E	0.03 hours saved per farm per day	= (C) – (D)
F	0.80 hours saved per farm per month	= E x 30

For 16t trailers:

		Calculation
G	3.1 miles travelled per trailer per day	= 0.4 trips per day x 7.9 miles per trip
H	8.5 miles travelled per farm per day	= (G) x 2.7 trailers per farm
I	0.57 hours spent travelling per farm per day (status quo)	= (H) ÷ 15 mph [time = distance/speed]
J	0.53 hours spent travelling per farm per day (after speed change)	= (H) ÷ 15.9 mph [time = distance/speed]
K	0.03 hours saved per farm per day	= (I) – (J)
L	1.00 hours saved per farm per month	= K x 30

[33] In the analysis, we have used different figures for different sized trailers and different types of farms. However, for simplicity we present here figures for the upper-bound calculations. Due to rounding, the calculations cannot be replicated exactly using the printed figures.

Total saving per farm per month:

		Calculation
M	1.80 hours saved per farm per month	= (F) + (L)
N	21,262 farms affected	= 26,036 arable farms x 38% take-up + 49,426 mixed farms x 23% take-up
O	1,871 farms for which every month is considered off-peak	= (N) x 8.8% [see Appendix A]
P	40,641 hours saved per year for farms which don't experience peaks	= (M) x (O)
Q	302,358 hours saved per year for farms which do experience peaks	= (M) x (N) x (1-8.8%) x proportion of farmers for whom each month is a peak month [Appendix A]. This calculation is summed over all months of the year.
R	342,998 hours saved per year during off-peak months	= (P) + (Q)
S	£5.0m of farmer's time saved per year during off-peak months.	= (R) x £14.71 [hourly wage for a farmer, average over the period 2015-2025[34]]

Time Saved During Intensive Days in a Peak Month

3. Farmers tend to carry much higher payloads during peak months, in particular during the most intensive days in a peak month. For 12t trailers, the increased combination weight limit is not expected to make a significant difference since the 12t capacity of the trailer is more likely to be the limiting factor. However, for 16t trailers, the higher combination limit will allow a larger trailer pulling a 16t tractor to carry around 2t more per trip[35].

4. The estimated benefit from time saved during intensive days in a peak month is £19.0m - £36.9m per year.
   This is calculated as follows:

For 12t trailers:

		Calculation
A	29.2 trips per trailer per day	= 350t/12t [350t is the average daily payload, 12t is the trailer capacity]
B	202.7 miles travelled per trailer per day	= (A) x 7.0 miles per trip
C	587.8 miles travelled per farm per day	= (B) x 2.9 trailers per farm
D	39.19 hours spent travelling per farm per day (status quo)	= (C) ÷ 15 mph [time = distance/speed]
E	36.88 hours spent travelling per farm per day (after speed change)	= (C) ÷ 15.9 mph [time = distance/speed]
F	2.31 hours saved per farm per day	= (D) – (E)
G	4.61 hours saved per farm per month	= (F) x 2 [Assume 2 intensive days per peak month]

[34] This figure takes into account forecast growth in per capita income over the appraisal period.

[35] This is calculated as follows: We assume a large unladen trailer plus tractor weighs 14.4t. With a combination weight constraint of 24.4t, this allows the farmer to carry 10t per trip in the status quo. With a higher combination weight limit of 31t, this is no longer the limiting constraint. Instead, the limiting constraint is the trailer weight limit, at 18.29t. We assume a large unladen trailer weighs 6.1t. Therefore the farmer can now carry a payload of 12.2t per trip – 2.2t greater than in the status quo.

For 16t trailers:

		Calculation
H	35.0 trips per trailer per day (status quo)	= 350t/10t [350t is the average daily payload, 10t is the combination weight constraint – see footnote 13 for further details]
I	28.71 trips per trailer per day (after weight limit change)	= 350t/12.2t [12.2t is the new constraint after increasing the combination weight limit. See footnote 13 for further details]
J	348.6 miles travelled per trailer per day (status quo)	= (H) x 10.0 miles per trip
K	285.7 miles travelled per trailer per day (after weight limit change)	= (I) x 10.0 miles per trip
L	941.2 miles travelled per farm per day (status quo)	= (J) x 2.7 trailers per farm
M	771.4 miles travelled per farm per day (after speed and weight limit change)	= (K) x 2.7 trailers per farm
N	62.75 hours spent travelling per farm per day (status quo)	= (L) ÷ 15 mph [time = distance/speed]
O	48.40 hours spent travelling per farm per day (after speed and weight limit change)	= (M) ÷ 15.9 mph [time = distance/speed]
P	14.35 hours saved per farm per day	= (N) – (O)
Q	28.70 hours saved per farm per month	= (P) x 2 [Assume 2 intensive days per peak month]

Total saving per farm per month:

		Calculation
R	33.31 hours saved per farm per month	= (G) + (Q)
S	2,508,543 hours saved per year for farms which experience peaks	= (R) x 21,262 farms affected x (1-8.8%) x proportion of farmers for whom each month is a peak month [Appendix A]. This calculation is summed over all months of the year.
T	£36.9m of farmer's time saved per year during off-peak months.	= (S) x £14.71 [hourly wage for a farmer, average over the appraisal period]

Time Saved During Less Intensive Days in a Peak Month

5. This element brings the highest benefit of £33.0m - £59.5m per year. As for intensive days in a peak month, we assume that the higher combination weight limit allows farmers to make fewer trips with a 16t trailer.

   Benefits are calculated as follows:

For 12t trailers:

		Calculation
A	11.6 miles travelled per trailer per day	= 1.7 trips per day x 7.0 miles per trip
B	33.59 miles travelled per farm per day	= (A) x 2.9 trailers per farm
C	2.24 hours spent travelling per farm per day (status quo)	= (B) ÷ 15 mph [time = distance/speed]
D	2.11 hours spent travelling per farm per day (after speed limit change)	= (B) ÷ 15.9 mph [time = distance/speed]
E	0.13 hours saved per farm per day	= (C) – (D)
F	3.69 hours saved per farm per month	= (E) x 28 [Assume 28 less intensive days per peak month]

For 16t trailers:

		Calculation
G	43.33 miles travelled per trailer per day (status quo)	= 4.35 trips per day x 10.0 miles per trip
H	35.51 miles travelled per trailer per day (after weight limit change)	= 3.57 trips per day x 10.0 miles per trip. The number of trips is calculated by dividing the payload moved in (A) by the new capacity constraint of 12.2t per trip.
I	116.99 miles travelled per farm per day (status quo)	= (G) x 2.7 trailers per farm
J	95.88 miles travelled per farm per day (after weight limit change)	= (H) x 2.7 trailers per farm
K	7.80 hours spent travelling per farm per day (status quo)	= (I) ÷ 15 mph [time = distance/speed]
L	6.02 hours spent travelling per farm per day (after speed limit change)	= (J) ÷ 15.9 mph [time = distance/speed]
M	1.78 hours saved per farm per day	= (K) – (L)
N	49.94 hours saved per farm per month	= (M) x 28 [Assume 28 less intensive days per peak month]

Total saving per farm per month:

		Calculation
O	53.63 hours saved per farm per month	= (F) + (N)
P	4,042,290 hours saved per year for farms which experience peaks	= (O) x 21,262 farms affected x (1-8.8%) x proportion of farmers for whom each month is a peak month [Appendix A]. This calculation is summed over all months of the year.
Q	£59.5m of farmer's time saved per year during off-peak months.	= (P) x £14.71 [hourly wage for a farmer, average over the appraisal period]