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Dear Ms Williams,

Dangerous Road Humps

As darker nights approach, I am taking issue with you about the speed humps installed by the Council in Botwnnog which are illegally blinding drivers and putting lives at risk.



Oncoming vehicle with LED headlights on low beam traversing humps in Botwnnog

As Gwynedd Council's Road Safety Manager, I am sure that you will have approved the installation of the speed humps in Botwnnog which I believe were originally instigated by Councillor Gareth Williams.

The 1999 hump regulations were drafted when vehicles had incandescent tungsten-halogen lights which are kinder to the eye than near UV blue LED light.

The Council have failed to keep abreast of developments in the eye damaging intensity of 6,500k LED headlights which can cause disability blindness.

It is disappointing that new technology puts us all in this horrific situation.

[The Law - Road Vehicle Lighting Regulation RVLr reg 27](#) Manner of use prohibited
1 Headlamp (a) Used so as to cause undue dazzle or discomfort to other persons using the road

[The Highway Code - Lighting requirements 114](#) You **MUST NOT**

- ***use any lights in a way which would dazzle or cause discomfort to other road users, including pedestrians, cyclists and horse riders***

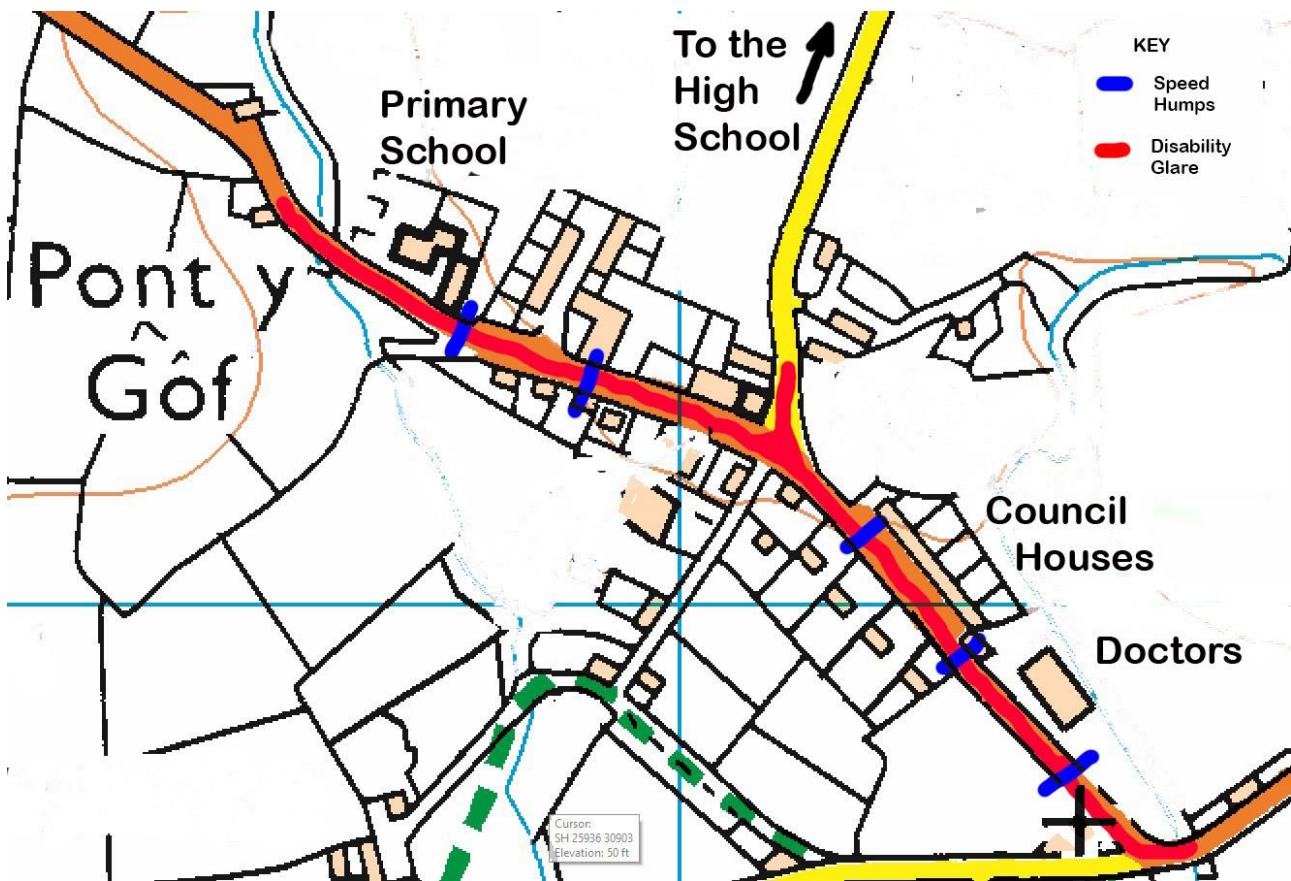


A driver's view from vehicle with LED headlights (correctly set at 1.2% dip) on low beam traversing humps.

Note how the beam illuminates the Doctors Surgery on the left-hand side, the bus stop sign and the right-hand wall above eye height and also penetrates 170metres down the road illuminating the chevrons at the exit bend from Botwnnog thus blinding oncoming drivers.

The same blinding effect occurs at Pont y Gof Primary School and the Council houses at Trewerin.

Extract from the Ordnance Survey map of Botwnnog village



Key - **Speed Humps 1 - 5** **Length of 9 second Disability Glare**

The Royal Society for the Prevention of Accidents (RoSPA) state: "Between the ages of 15 and 65, the time it takes to recover from glare increases from one to nine seconds – Becky Guy Road Safety Manager, England. Also stated in "The problem of 'blinding' car headlights – and how to stay safe on the road" The Telegraph by James Foxall 13 April 2022)

The Medical University of Vienna being one of the foremost institutions in the world in the understanding of eye, vision and cognition, undesired light effects including Distraction Blindness etc. - Prof emer. Peter Heilig MD agrees with the RoSPA's statement.

He quotes: "Every single supra-threshold, even weak light stimulus (including light stimulation of peripheral visual field areas) has to be processed by the brain. 'Overflow' (of visual short-term memory, working memories), i.e., too many, too bright, too distracting (blinking, moving, changing intensity or colour etc.) threatens to elicit Distraction Blindness including possible fatal sequelae and consequences.

Mark Baker BSc President of the [Softlights Foundation](#) states:

"As per the Cree Lighting white paper "Is Lighting Damaging Our Health" there are currently no valid formulas for glare from LED flat surface sources. Thus, the 9 second value cannot be confirmed.

However, the situation is likely worse than 9 seconds, because these speed humps will likely cause debilitating pain and total loss of vision due to LED headlights."

A typical hump traverse speed is 20 mph, 1 second of disability glare = 9 metres travelled blind – enough to miss a child. Nine seconds of disability glare = 80.5metres travelled blinded.

The Llŷn has an ageing population which means drivers could have impaired vision due to disability glare whilst driving from one end of Botwnnog village to the other. LED lights are already very disabling and an equalities issue for a growing number of people.

This is putting at risk local primary children attending Pont Y Gof Primary School, all West Llŷn secondary pupils from attending Botwnnog High School and patients from across the West Llŷn area attending the Doctors Surgery (Meddgyfa Rhydbach) in Botwnnog village.

Twilight is particularly hazardous when children are leaving school as the eye has to continually switch from daytime cone to night time rod vision.

Being blinded by phototoxic LED's creates after images which may have an impact way outside the boundaries of Botwnnog and also creates flashes in the peripheral vision of the eye which can last several days.

This is the safety warning notice on a Gearlight LED torch:

WARNING: To avoid eye injury, do not stare directly into the light beam or shine the beam directly into anyone's eyes. This product is not designed, intended, or recommended for children or hazardous environments.

In this series of short videos Peter Veto from the University of Ulm explains why LED headlights blind and shows how headlights have increased in power since the 1999 road hump regulations were published:-

[Demo: LED vs. halogen apparent luminance distribution - YouTube](#)

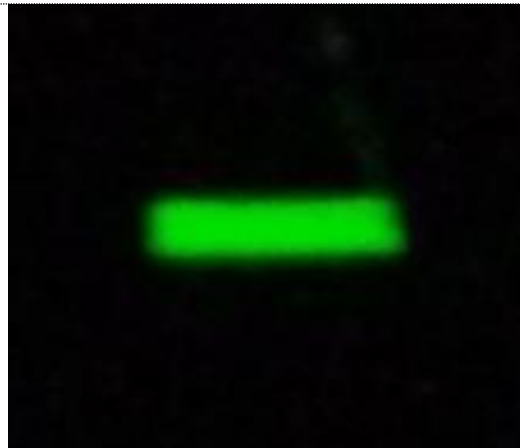
[Why are LED headlights so glaring? | Part 1: Luminance - YouTube](#)

[Why are LED headlights so glaring? | Part 2: Color \(spectral power distribution\) - YouTube](#)

In the first video, Professor Veto shows how a LED headlight penetrates two layers of DIN shade 10 arc welding mask filters. Welders know that a flash of a few milliseconds can cause eye-damage.



A LED headlight viewed through single DIN grade 10 welding mask filter; Welders use single DIN filters graded 8 - 14



The LED headlight penetrates TWO DIN grade 10 welding mask filters

Traversing a speed hump at 20mph creates a 375-millisecond flash in an unprotected driver's eye.

The blinding is exacerbated by suspension compression and rebound and is worse from four-wheel drive and Sports Utility Vehicles due to higher mounted headlamps and softer front suspension.

Blinding also occurs in daytime, most vehicles now have 6500k 1200cd daytime running lights which are designed to beam LED light directly into a driver's eyes so a car can be seen in bright sunlight.

When it is dull daytime running lights can dazzle drivers.



Extract from a Hella Daytime Running Light advert.

The EU mandated DRL in 2011 which were supposed to save 6% of accidents – in reality accidents in the UK and Europe increased.

Light sensors automatically switch headlights in when it is dull or raining and some drivers think is great to drive with headlights and fog lights on all the time.

Recently we have travelled over 2,600 miles in Europe to the Alps via France Germany, Austria and Switzerland. We did not encounter one speed hump. Drivers carefully obeyed the speed limits in villages, some as low as 30kph (18mph).

Antagonising drivers is a negative approach to road safety, I commend to you a book by ex-Police Grade 1 driver Adrian Shurmer "[Mind How You Go](#)" The Thinkers guide to a safer drive. This book shows how a positive frame of mind creates a safer driver. Also recommended is [Understanding LED Illumination Dr. M. Nisa Khan](#).

To summarise Gwynedd Council are putting citizens and visitors at risk by: -

- Breaking the law by causing drivers to be blinded (RVLR reg 27)
- Using outdated 1999 hump regulations
- Failing to keep abreast of LED technology - ignoring the damaging effect of blinding 6500k LED lights upon the human eye. Dangers from HID and LED lighting have been published since 2003 (see the reference list). We would be happy to work with the Council to offer solutions to LED.

In view of Gwynedd's policy of increasing the number of road humps thus blinding drivers, you are formally advised that should there be an accident as a result of humps in Gwynedd, you Rhian Wyn Williams as Road Safety Manager, your line manager, your Director and the Council's Chief executive could be held legally liable.

Under the Freedom of Information Act, please advise the total costs (including design and management of the five speed humps in Botwnnog.

I look forward to Gwynedd Council taking immediate action to make our roads safer by stopping blinding drivers with phototoxic light and complying with the law.

Yours sincerely,



Roy Milnes

cc

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Prof emer. Peter Heilig MD
Professor Mark Baker BSc
Peter Veto University of Ulm
BBC Panorama
The Telegraph James Foxhall
The Cambrian News
Caernarfon and Denbigh News
Wales On line

References

[The Law - Road Vehicle Lighting Regulation RVLr reg 27](#)

[Highway Code Lighting requirements 114](#)

Professor Peter Veto University of Ulm videos:

[Why are LED headlights so glaring? | Part 1: Luminance - YouTube](#)

[Why are LED headlights so glaring? | Part 2: Color \(spectral power distribution\) - YouTube](#)

[Demo: LED vs. halogen apparent luminance distribution - YouTube](#)

[Understanding LED Illumination Dr. M. Nisa Khan](#), President IEM Lighting Technologies and Author

[Generalised letter for LED light sensitive individuals](#) Dr. Nisa M. Khan Ph D President IEM LED Lighting Technologies

[Light-emitting-diode induced retinal damage and its wavelength dependency](#)

[Light Induced Retinal Ganglion Cell Damage](#)

[Human and Environmental Effects of Light Emitting Diode \(LED\) Community Lighting](#)

American Medical Association - Louis J Kraus MD June 2016

[Human Responses to Lighting based on LED](#) Public Health England, Chartered Institute of Building Services and Society of Light and Lighting May 2016 5.2 Blue Light hazards and hotspots, page 18

[Blinding Headlights and LED Lights: Dangerous on Roadways and Off](#) by Suzanne Coleman MD

[Eyecare research LED cause 5x more phototoxicity](#) Dr. Celia Sanchez-Ramos RCC Harvard

[Inattentive Blindness and Conspicuity](#) Professor Marc Green Phd Yale University updated 2011

[Tailored to the Eye P. Heilig March 2015](#) Professor Peter Heilig University of Vienna explains how bright light affect the eye down to photon and molecular level

[Daytime Running Lights - What good? P. Heilig Jan 2014](#) "Traffic Safety: No Benefit, Contravention of Human Rights, Children at risk particularly on pedestrian crossings

[Bright white headlights: are they safe? Flyingshingle.com Jan 2012](#)

Michael D. Mehta, Ph.D. Dean and Professor, Faculty of Arts Thompson Rivers University BC

[Why HID Xenon headlights bother older drivers](#) [British Journal of Ophthalmology 2003](#)

M A Mainster, G T Timberlake, Department of Ophthalmology, University of Kansas Medical Center,

"Governmental regulations determine which headlights we encounter. Acceptance or rejection of the current generation of HID xenon headlights ultimately depends on their record in traffic and litigation.

[Retinal Light Damage 2009 Dr. P. Heilig, Dr. Elena Rozanova, Dr. Jasminka Godnic-Cvar](#)

[Disability and Discomfort Glare of Headlamps - english](#) Locher, J.& Kley, F. (2009). ISAL 8th International Symposium on Automotive Lighting (38 - 42) This paper seeks to justify Xenon headlights - it concludes in static laboratory conditions that there is minimal difference between Xenon-HID, LED and normal Tungsten-Halogen headlights if correctly aligned. However if mis-aligned discomfort glare is present. A major failing of this static laboratory experiment is not carrying out real-world tests on moving vehicles with Xenon-HID headlamps - when they traverse legal speed humps or potholes they temporarily blind drivers. This is a real concern as the laboratory was Hella's who make headlights for many vehicles.

<https://medicalxpress.com/news/2019-05-eyes-health-authority.html> states:

The "blue light" in LED lighting can damage the eye's retina and disturb natural sleep rhythms.

"Exposure to an intense and powerful [LED] light is 'photo-toxic' and can lead to irreversible loss of retinal cells and diminished sharpness of vision" Chronic exposure can "accelerate the ageing of retinal tissue, contributing to a decline in visual acuity and certain [degenerative diseases](#) such as [age-related macular degeneration](#),"

[Mind How You Go by Adrian Shurmer and Stephen John O'Donnell](#) The Thinkers guide to a safer drive (Amazon).

[The problem of 'blinding' car headlights – and how to stay safe on the road](#) The Telegraph James Foxall 13 April 2022

[Cree White Paper Is Lighting Damaging Our Health?](#)

[The Highways \(Road Humps\) Regulations 1999 \(legislation.gov.uk\)](#)

[Lightmare.org](#)

[Soft Lights Foundation](#)