Alternative Temporary Park and Ride and Heavy Goods Vehicle Marshalling Area
Lighting Strategy

United Utilities Water Limited

Haweswater Aqueduct Resilience Programme

Planning Application Document RVBC–P&R-APP-RP-004
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Alternative Temporary Park and Ride and Heavy Goods Vehicle Marshalling Area Lighting Strategy

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Executive Summary

This Lighting Strategy considers the Alternative Temporary Park and Ride and Heavy Goods Vehicle Marshalling Area (Alternative Facility), which forms part of the wider Haweswater Aqueduct Resilience Programme (HARP).

The Alternative Facility is located approximately 1.75 km north-east of Clitheroe town centre. It is located within a predominantly rural setting, albeit with urban, industrial and transport land uses nearby, and no significant artificial lighting sources in the immediate vicinity of the site. The adjacent Bowland Forest National Landscape area is a Dark Sky Discovery site, and the surrounding area has been assessed as a lighting Environmental Zone of E2.

This strategy includes reasonable worst-case assumptions about the design and construction methods that may be used to construct the Alternative Facility. It considers the need for artificial lighting, how artificial lighting could be used, any likely significant effects, and potential mitigation in relation to any required artificial lighting.

The conclusion is that the Alternative Facility forms a work location, and therefore lighting is required under the requirements of the Health and Safety at Work etc. Act 1974[1], and that British Standard (BS) EN 12464-2[2] provides best guidance on the lighting levels to be achieved. Access to the Alternative Facility from the public highway would require lighting due to the volume of traffic using the new junction, and BS 5489-1:2020[3] in addition the Institution of Lighting Professionals' PLG02[4] guidance document provides good practice for the lighting classes to use.

[1] Health and Safety at Work etc. Act 1974. [Online] Available at: https://www.legislation.gov.uk/ukpga/1974/37/contents

[2] British Standards Institution (2024). BS EN 12464-2:2024 Light and lighting. Lighting of work places – Outdoor work places. [Online] Available at: https://knowledge.bsigroup.com/products/light-and-lighting-lighting-of-work-places-outdoor-work-places-1?version=tracked

[3] British Standards Institution (2020). BS 5489-1:2020 – TC Design of road lighting – Lighting of roads and public amenity areas. Code of practice. [Online] Available at: https://knowledge.bsigroup.com/products/design-of-road-lighting-lighting-of-roads-and-public-amenity-areas-code-of-practice?version=tracked

[4] Institution of Lighting Professionals (2013). PLG02 The Application of Conflict Areas on the Highway. [Online] Available at: https://theilp.org.uk/publication/plg02-the-application-of-conflict-areas-on-the-highway/

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Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
BS	British Standard
CCT	Correlated Colour Temperature
DNO	Distribution Network Operator
EN	European standard
ENA	Energy Networks Association
ha	Hectares
HGV	Heavy Goods Vehicle
ILP	Institution of Lighting Professionals
K	Kelvin
KPH	Kilometres per hour
LED	Light-emitting diode
MPH	Miles per hour
PLG	Professional Lighting Guide (published by the ILP)
SQM	Sky Quality Measurements
V	Volts

1 Introduction

1) This Lighting Strategy considers the Alternative Temporary Park and Ride and Heavy Goods Vehicle Marshalling Area (the Alternative Facility), which forms part of the wider Haweswater Aqueduct Resilience Programme (HARP). The strategy includes reasonable worst-case assumptions about the design and construction methods that may be used to construct and operate the Alternative Facility.

2) This strategy considers the need for artificial lighting, how artificial lighting could be used, any likely significant effects, and potential mitigation in relation to any required artificial lighting. The strategy includes consideration of the following matters:

- Key legislation, policy, and guidance
- Key lighting receptors
- The required lighting metrics for safe operation of the facility
- Methods of lighting
- Lighting mitigations
- Other lighting design constraints.

1.1 Location

3) The Alternative Facility is located approximately 1.75 km north-east of Clitheroe town centre. The site is located within a predominantly rural setting, albeit with urban, industrial and transport land uses nearby. To the north-west of the Alternative Facility (beyond Worston Brook) is Salthill Industrial Estate on Lincoln Way. To the east of the Alternative Facility is Pimlico Link Road, beyond which is open agricultural land interspersed with small pockets of woodland. To the south-east there is approximately 400 m of open farmland before reaching the A59, which is the main east-west highway in the Ribble Valley area. The nearest residential property to the Alternative Facility is some 380 m west-south-west at its nearest point.

1.2 Description of the Alternative Facility

4) The key aims of the Alternative Facility are to:

- Reduce the number of private vehicles and light duty vans using the local road network to access the three HARP construction compounds associated with the consented schemes
- Marshal HGVs in one safe location before they are released in groups onto the local road network for their onward journey to the HARP construction compounds.

5) The Alternative Facility is intended solely to operate as a temporary park and ride and HGV marshalling area, providing a security office at the entrance to the Alternative Facility and staff welfare facilities.

2 The Need for Lighting

2.1 Key Legislation, Policy, and Guidance

6) Table 2.1 sets out key legislation, policy, and guidance of relevance for exterior artificial lighting both within the planning application boundary, at the Alternative Facility access, and on the revised layout public highway.

Table 2.1: Key Legislation and Guidance for Exterior Artificial Lighting

Applicable Legislation and Guidance	Description
Legislation	
Health and Safety at Work etc. Act 1974[1]	This Act includes a duty to provide lighting to ensure that work can be undertaken safely. This includes the need for lighting in interior and exterior areas, and emergency lighting.
BS 5489-1:2020[3] Design of road lighting – Lighting of roads and public amenity areas. Code of practice	This national standard establishes specific lighting requirements for public roads, cycle and pedestrian areas, and includes sections covering open air car parks.
BS EN 12464-2:2024[2] Light and lighting. Lighting of workplaces. Outdoor workplaces	This national standard establishes specific lighting requirements for humans in outdoor workplaces including recommendations for marshalling areas, and areas with moving vehicles.
EN13201 Road Lighting[5] [All sections]	This international standard establishes target lighting levels, measurement methods, and qualitative metrics for exterior lighting and is a companion standard to BS 5489-1[3].
BS 7671:2018 + A3:2024 Requirements for Electrical Installations. IET Wiring Regulations Amendment.[6]	This national standard provides regulations regarding all aspects of low voltage (<500 volts AC or <50 volts DC) electrical installations to ensure that they are safe and comply with UK law.
National Policy	
National Planning Policy Framework[7] (NPPF)	The NPPF includes limited guidance on reducing light pollution, and its associated impacts on the environment, people, and wildlife.
Clean Neighbourhoods and Environment Act 2005[8]	This Act gives the Environment Agency additional powers to deal with a wide range of issues by classifying artificial light emitted from defined premises as a statutory nuisance.
Guidance	
Institution of Lighting Professionals (ILP) Guidance Note GN1 The Reduction of Obtrusive Light[9]	This guidance note provides good practice recommendations on reducing obtrusive light spill, maintaining optical restrictions in areas of low ambient lighting, and lighting key receptors.

[5] British Standards Institution (2015). BS EN 13201-1-5 – Road lighting. [Online] Available at: https://www.en-standard.eu/csn-en-13201-1-4-road-lighting/?srsltid=AfmBOorMWbocb1w69-MmzbbpmAr69exzLbKlfPcmCVe7r9MHUgQKofLV

[6] British Standards Institution (2024). Requirements for Electrical Installations. IET Wiring Regulations Amendment. [Online] Available at: https://www.bsigroup.com/en-GB/insights-and-media/insights/brochures/bs-76712018a32024-iet-wiring-regulations-amendment/

[7] Ministry of Housing, Communities and Local Government (2024). National Planning Policy Framework. [Online] Available at: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf

[8] Clean Neighbourhoods and Environment Act 2005. [Online] Available at: https://www.legislation.gov.uk/ukpga/2005/16/contents

[9] Institution of Lighting Professionals (2021). Guidance Note 01/21 The Reduction of Obtrusive Light. [Online] Available at: https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/

Applicable Legislation and Guidance	Description
ILP PLG02 Application of Conflict Areas on the Highway[4]	This national guidance document provides good practice recommendations relating to conflict areas on public highways e.g. at junctions, crossings, roundabouts etc.
ILP PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments[10]	This national guidance document provides advice on how to undertake environmental lighting impact assessments and what factors should be considered.
ILP and Bat Conservation Trust GN08 Guidance Note Bats and Artificial Lighting at Night[11]	This national guidance note provides good practice recommendations on careful lighting design to reduce the potential adverse effects of artificial lighting on bats, all species of which are protected.
ILP TR12: Lighting of Pedestrian Crossings[12]	This national guidance note provides good practice recommendations on the lighting requirements for walking/cycling/horse-riding crossings on the public highway.
The Society of Light and Lighting Code for Lighting[13]	This national guidance provides good practice recommendations on all aspects of lighting in the built environment including both natural and artificial lighting.
LG06 The exterior environment[14]	This guidance gives design guidance to exterior lighting designers on good practice, lighting methods, and lighting metrics.
Engineering Reports G39 Electrical safety in the planning, installation, commissioning and maintenance of public lighting and other street furniture[15]	The national code of practice gives guidance on safety when working near Distribution Network Operator (DNO) connections, and in particular establishes zones around overhead power lines relative to lighting column heights depending upon the line voltage, which impact on column locations, types, and markings.

2.2 Background

7) The Alternative Facility is currently agricultural land with mature hedging and trees around its boundaries. The construction phase would remove and store the topsoil on site, then provide a sealed aggregate hardstanding surface for vehicle use. After the completion of the consented schemes, the Alternative Facility would be decommissioned and reinstated to its current condition.

8) The Alternative Facility would occupy an area of approximately 3.78 ha. Refer to Environmental Statement Volume 3 Figure 3.1 for a general layout drawing.

9) The Alternative Facility would have its own generator power supply, although there is existing 11 kV overhead power cables owned by Electricity North West within the planning application boundary. The overhead line comprises three exposed cables running side-by-side horizontally, mounted on wooden poles approximately 8 m tall, with an overhead termination at the site's eastern boundary near Pimlico Link Road.

[10] Institution of Lighting Professionals (2013). PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments. [Online] Available at: https://theilp.org.uk/publication/plg04-guidance-on-undertaking-environmental-lighting-impact-assessments/

[11] Institution of Lighting Professionals and Bat Conservation Trust (2023). GN08 Guidance Note 8 Bats and Artificial Lighting at Night. [Online] Available at: https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/

[12] Institution of Lighting Professionals (1997). TR12 Lighting of Pedestrian Crossings. [Online] Available at: https://theilp.org.uk/publication/tr12-lighting-of-pedestrian-crossings/

[13] Chartered Institution of Building Services Engineers (2022). Society of Light and Lighting Code for Lighting. [Online] Available at: https://www.cibse.org/knowledge-research/knowledge-portal/sll-code-for-lighting-2022/#:~:text=The%20SLL%20Code%20for%20Lighting,in%20lighting%20technologies%20and%20research.

[14] Chartered Institution of Building Services Engineers (2016). Lighting Guide 6 The exterior environment. [Online] Available at: https://www.cibse.org/knowledge-research/knowledge-portal/lighting-guide-06-the-exterior-environment-2016

[15] Energy Networks Association (2020). Engineering Reports G39 Electrical safety in the planning, installation, commissioning and maintenance of public lighting and other street furniture.

2.3 Existing Lighting Baseline

10) The nearest residential property to the Alternative Facility is circa 380 m west-south-west with several established trees between the property and the Alternative Facility.

11) There is no existing lighting on Pimlico Link Road adjacent to the Alternative Facility access, or within the planning application boundary.

12) The A59 is 350 m to the south-east of the Alternative Facility, and it is lit for approximately 650 m to the south and more than 1 km to the north of the Pimlico Link Road junction. Pimlico Link Road is lit for approximately 80 m westwards from the junction give-way line.

13) Circa 350 m to the north of the Alternative Facility access, Pimlico Link Road is lit at its junction with Lincoln Way.

14) To the north-west of the Alternative Facility, Lincoln Way is lit, and also has private lighting for the industrial/commercial premises accessed from Lincoln Way. The closest location to the Alternative Facility with potential private lighting is circa 125 m to the north of the Alternative Facility, with multiple mature hedging/trees between the Alternative Facility and the industrial/commercial areas.

15) To the south-west and north-east of the Alternative Facility are open agricultural type areas with no lighting.

16) The existing highways lighting (A59, Pimlico Link Road, and Lincoln Way) use 10-12 m high lighting columns with light-emitting diode (LED) luminaires.

17) The Alternative Facility is near the boundaries of the Forest of Bowland National Landscape, sitting in a gap between two designated areas. The areas have been designated as a Dark Sky Discovery Site. The Alternative Facility is circa 2.4 km to the closest point of the southern boundary of the designated area to the north, and approximately1.3 km to the closest point of the northern boundary to the south.

18) It is considered that given the rural surroundings, low local ambient artificial lighting levels at night, and the nearby Dark Sky Discovery Site of the Forest of Bowland (assumed to be lighting Environmental Zone E1), the Alternative Facility is within a lighting Environmental Zone of E2 using the ILP's GN1[9] shown in Table 2.2 below.

Table 2.2: Lighting Environmental Zones (From Table 2 in the ILP's GN1:2020[9])

Zone	Surroundings	Lighting Environment	Example
E0	Protected	Dark (Sky Quality Measurements (SQM) 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

2.4 Ecology

19) Volume 2 Chapter 7 Ecology identifies several species protected under the Wildlife and Countryside Act 1981 (as amended) from disturbance through light spillage adjacent to the planning application boundary (Table 2.3).

Table 2.3: Light-Sensitive Protected Species

Receptor	Description	Risk
Bats	Present within the woodland, scattered trees and barn near planning application boundary	Species protected under wildlife legislation
	Commuting and foraging areas	Species protected under wildlife legislation. Some species may not leave roosts under 'bright' light conditions.
Barn owl	Confirmed roosting and potential for nesting close to planning application boundary	Species protected under wildlife legislation
Otter	Evidence of current use of Worston Brook for commuting	Under wildlife legislation, species protected against disturbance through light spillage.
Badger	Historical evidence of badger setts, recent evidence of badgers commuting within the Alternative Facility	Legislatively protected. Any disturbance to badger 'setts' is prohibited. Badgers are known to avoid lit areas and could therefore be impacted by light spillage.

3 Assessment of Likely Significant Effects

20) The following section examines the requirements for, and likely significant effects of artificial lighting at the Alternative Facility.

3.1 Construction

21) No likely significant effects are anticipated for artificial lighting during construction, based on the assumption that the majority of works would take place during daylight hours. Any night time works during shorter autumn/winter days would be minimised, and any resultant spill from vehicle head/work lights would be short-lived and transient e.g. vehicle head lights 'sweeping' along a hedgerow whilst a construction vehicle manoeuvres.

3.2 Operation

22) Artificial lighting for safe operation of the Alternative Facility can be subdivided into the following main functional areas each with its own specific lighting requirements:

- Alternative Facility access on Pimlico Link Road
- Alternative Facility roads and pedestrian routes
- Security office at the access point
- HGV marshalling area
- Car park
- Welfare and office buildings.

23) Each of these areas has differing tasks and therefore the lighting requirements, guidance, and/or regulations are applicable, and as such they will now be considered in more detail.

24) Highways lighting classifications fall into three main categories, defined in BS 5489-1[3] and EN 13201-2[5]

- M Classes are for traffic routes, such as motorways, dual-carriageways, and trunk roads
- P Classes are for subsidiary and residential roads where vehicle speeds are generally lower
- C Classes are for conflict zones, where there is an increased risk in areas where multiple traffic streams intersect such as junctions, roundabout, and pedestrian areas with motorised vehicle access.

25) The relevant 'letter' part of the classification is followed by a numerical part where the lower values correspond to a brighter lighting level, e.g. for a traffic route, the brightest class would be M1, and the darkest M6. The combined classification corresponds to both quantitative and qualitative criteria for the resulting lighting system, e.g. Lighting Class C4 would require a minimum average illuminance of 7.5 Lux, and a minimum uniformity value of 0.4.

26) Uniformity is a comparison of the brightest and darkest points within an area. The human eye adapts to cope with the brightest light level in view, and that can mean that points with lower light level appear darker. This can be demonstrated when walking into a building from a bright summer's day; the building appears dark, but after being in the building the eye adapts, and the space appears well lit, but step outside for a few minutes and the interior again appears dark. For road users, uniformity metrics reduce driver eye strain and ensure drivers are not 'blinded' by bright spots, and that other users do not disappear into perceptually dark spots. For conflict areas, uniformity is calculated as an overall figure for the entire area, but for

roadways it is spilt into overall, and longitudinal along the centreline for a traffic lane over a distance related to the speed limit.

3.2.1 Alternative Facility Access Point on Pimlico Link Road

27) The proposed highways design for the Alternative Facility access onto Pimlico Link Road, shows a side-road style, bi-directional two-lane bell-mouth, with no central splitter islands, of a suitable size for HGV use. Additionally, enhancement of the pedestrian provisions near the new access point is proposed, with an informal crossing over Pimlico Link Road.

28) Pimlico Link Road has a 40mph speed limit and is relatively flat and straight at the access location. The Alternative Facility would have approximately 240 car parking spaces, and operatives are expected to be working on a continuous shift system, meaning that as a worst case at shift change, there could be circa 150day shift vehicles moving in one direction and 100-night shift vehicles in the other direction through the access point in a relatively brief period at night. Allowing some additional HGV movements, and consolidated transport to/from the construction sites etc. would suggest a peak traffic flow of circa 300 vehicles in an hour. As a rough guide the peak flow for a road can be taken as 10% of the AADT giving an indicative AADT of over 3,000.

29) Using BS 5489-1:2020[3] Table A.3.1 and the risk assessment method in A.1.3 with the criteria listed below, suggests a Lighting Class for the Alternative Facility access of M6:

- 'Very low' traffic flows (<7,000 AADT)
- Single carriageway
- 40 mph speed limit
- Standard traffic composition (i.e. no increased pedestrian or cyclist use)
- No parked cars, bus stops, or pedestrian crossings on Pimlico Link Road (the re-aligned Public Right of Way would be included in the access point design, and therefore is not included here)
- Low ambient lighting levels (E2 Rural Environmental Zone – refer to Section 2.3) – Lighting Class could be reduced by one step to account for lower ambient brightness
- Simple driving task, in terms of the junction layout, visual guidance, visibility etc.

30) Using the same method to assess Pimlico Link Road, and using the Department for Transport's traffic flow data (refer to Appendix A Pimlico Link Road Traffic Flow Data of this document for full details) plus the Alternative Facility indicative traffic flow, and the criteria listed below, suggests a target Lighting Class for Pimlico Link Road of M5:

- AADT = 7,149 (from Table A.1 included in Appendix A) + 3,000 = 10,149 – Low to Moderate traffic (AADT between 7,000 and 40,000)
- Single carriageway
- 40 mph speed limit
- Standard traffic composition (i.e. no increased pedestrian or cyclist use)
- No parked cars, bus stops, or pedestrian crossings on Pimlico Link Road
- Low ambient lighting levels (E2 Rural Environmental Zone – refer to Section 2.3) – Lighting Class could be reduced by one step to account for lower ambient brightness
- Simple driving task, in terms of the junction layout, visual guidance, visibility etc.

31) Taking the highest Lighting Class of M5 for Pimlico Link Road and stepping up by one class as recommended in ILP's PLG02[4], the conflict area at the junction would have a target lighting class of C4.

32) The pedestrian crossing provision will be included within the scope of the conflict area in accordance with the recommendations of the ILP's TR12[12] 'Lighting of Pedestrian Crossings' guidance.

33) Table 3.1 shows the lighting metrics for each of the mentioned lighting classes, for reference.

Table 3.1: Lighting Class Comparison

Lighting Class	Minimum Average Illuminance*	Minimum Uniformity Ratio*
C4	10 Lux	0.4
M5	7.5 Lux	0.4
M6	5 Lux	0.25

* Using BS 5489-1:2020 Table A.1 'Lighting Classes of a Comparable Level', to allow M class luminance values to be compared to C class illuminance values for reference only.

34) Using the guidance from the ILP's PLG02[4] for the extents of the lighting on Pimlico Link Road, the lighting should extend for a minimum of the distance travelled in five seconds at the travelling speed ('the five-second distance') which for a 40 mph speed limit equates to 89 m. This would leave circa 250 m of unlit highway to the south between the end of the new lighting and the existing at the A59 junction, and 300 m of unlit highway to the north between the new lighting and the existing lighting at the Lincoln Way junction. Design Manual for Roads and Bridges TD 501[16] design guidance suggests a minimum unlit length between lit sections of highway as 4x Sight Stopping Distance[17] which for 40 mph equates to 360 m.

35) The existing lighting at both the A59 and Lincoln Way junctions with Pimlico Link Road, does not comply with the five-second requirement from the ILP's PLG02, suggesting that local policy may supersede PLG02 and call for reduced extents on the Pimlico Link Road approaches to the Alternative Facility access.

36) The final lit extents would require discussion with the local planning authority, and confirmation via a designer's risk assessment.

3.2.2 Alternative Facility Roads and Pedestrian Areas

37) The 'roads' allowing vehicle movements within the Alternative Facility have been assumed to have a relatively low-friction surface such as compacted MOT Type 1, rather than a public highway type asphalt surface, necessitating a low vehicle speed and a blanket speed limit of 5 mph (circa 8 kph). It has also been assumed that marked segregated pedestrian routes would be provided alongside the vehicle routes.

38) Table 7 of BS EN 12464-2:2024[2], row 7.1, recommends for '*Walkways exclusively for pedestrians*' a target of 5 Lux minimum average illuminance and 0.2 minimum uniformity. Row 7.2 recommends for '*Traffic Areas for slowly moving vehicles (Max 10 kph) e.g. bicycles, trucks, and excavators*' a target of 10 Lux minimum average illuminance and 0.4 minimum uniformity.

[16] Highways England (2020). Design Manual for Roads and Bridges TD 501 Road lighting design. [Online] Available at: https://www.standardsforhighways.co.uk/tses/attachments/07c88b7e-bd8f-43c8-bdd9-49bfb86d6878?inline=true

[17] The total distance required to bring a vehicle to halt, comprising the reaction time of the driver before the brakes are applied, and the braking distance.

39) The table also provides requirements for the limitation of glare and minimum colour rendering which should be adhered to during the detail design and product specification phase.

3.2.3 Security Office at the Access Point

40) The Alternative Facility layout indicates that there would be a security office at the main access. This would be for checking operative passes and HGV paperwork, rather than for conducting detailed vehicle exterior inspections or similar tasks requiring enhanced vision.

41) There is no specific requirement within BS EN 12464-2:2024[2] covering security points, gatehouses, etc., (e.g. security points at airports are covered, but gatehouses are not). Taking a holistic approach, the access to the public highway and the Alternative Facility roads adjoining the security office, are proposed to be lit to 10 Lux, and this would not be suitable for detailed work such as reading paperwork etc. Using the maximum 2-lighting-class step from highways lighting as a guide, the security area could be lit to class C2 (20 Lux) which would allow basic recognition of text etc. but additional portable light sources might be needed to read small print.

3.2.4 HGV Marshalling Area

42) BS EN 12464-2:2024[2] does not specifically list marshalling areas, however in Table 7 '*General requirements for traffic zones outside buildings and for cleaning at outdoor workspaces'*, row 7.2 lists the requirements for '*Traffic areas for slowly moving vehicles (max 10 kph) …*' as 10 Lux minimum average. By comparison, Table 8 '*Parking Areas*' row 8.2 lists '*Medium Traffic e.g. parking areas of department stores, office buildings, plants, sports, and multipurpose building complexes*' also as 10 Lux minimum average.

43) Given that the HGV marshalling area would have a relatively simple navigational task, with minimal manoeuvring requirements (e.g. single direction flow through the space, limited need for reversing, a small number of vehicles/vehicle movements, a clear area limited to HGV use only) and a comparatively low traffic rate, but with pedestrians present (drivers moving between vehicles and facilities), based on parameters provided in guidance and professional judgement, the most relevant equivalent use is a car park for an office building and subsequently 10 Lux minimum average illuminance would be sufficient for the tasks.

3.2.5 Car Park

44) BS EN 12464-2:2024[2] Table 8 '*Parking Areas*' row 8.2 lists '*Medium Traffic e.g. parking areas of department stores, office building, plants, sports, and multipurpose building complexes*' as 10 Lux minimum average.

45) Given the transient traffic flows with quiet periods of low/no movements, interspersed with busy times around shift changes, the car park would be an ideal location to use automatic variable lighting levels. This would mean during quiet periods the lighting could be at a lower level, e.g. 5 Lux (as per row 8.1 '*Light Traffic*') suitable for security, and then presence detectors trigger higher light levels if/when zones are in use e.g. 10 Lux.

46) Deploying variable lighting levels would offer an increased energy saving, whilst also directly reducing any potential obtrusive light spill significantly, and indirectly reducing the fuel use and noise produced, e.g. from the Alternative Facility's power generator.

3.2.6 Interior Facilities

47) The design of the interior facilities lighting is not directly within the scope of this report, however, light from welfare building windows etc., has the potential to spill beyond the

planning application boundary and have a small impact on key receptors. It is proposed that the Alternative Facility would use single-storey facilities, which would reduce the extent of any light spill from unshuttered windows.

48) The above assessment on the need for lighting in each area of the Alternative Facility shows that without mitigation actions, there is significant potential for obtrusive light spill from the operational lighting, having negative effects on the surrounding ecology. However, with mitigation these effects could be reduced to a low potential risk instead.

3.3 Decommissioning

49) No likely significant effects are anticipated for artificial lighting during decommissioning, based on the assumption that the majority of the works would take place during daylight hours. Any night-time works during shorter autumn/winter days would be minimised, and any resultant spill from vehicle head/work lights would be short lived and transient, e.g., vehicle head lights 'sweeping' along a hedgerow whilst a construction vehicle manoeuvres.

4 Proposed Mitigations and Residual Effects

50) There are various factors which have a direct impact on obtrusive light spill, but the key items with the largest impacts are as follows.

51) Matching the luminaire optics to the area to be lit: Wide distribution optics provide good uniformity but can contribute to light spill (Plate 4.1 and Plate 4.2). Asymmetric output optics focus the light in front of the column, but this can lead to an increase in glare. Back light shields can be used on luminaires located near the planning application boundary or key receptor areas, to reduce light spill behind the columns.

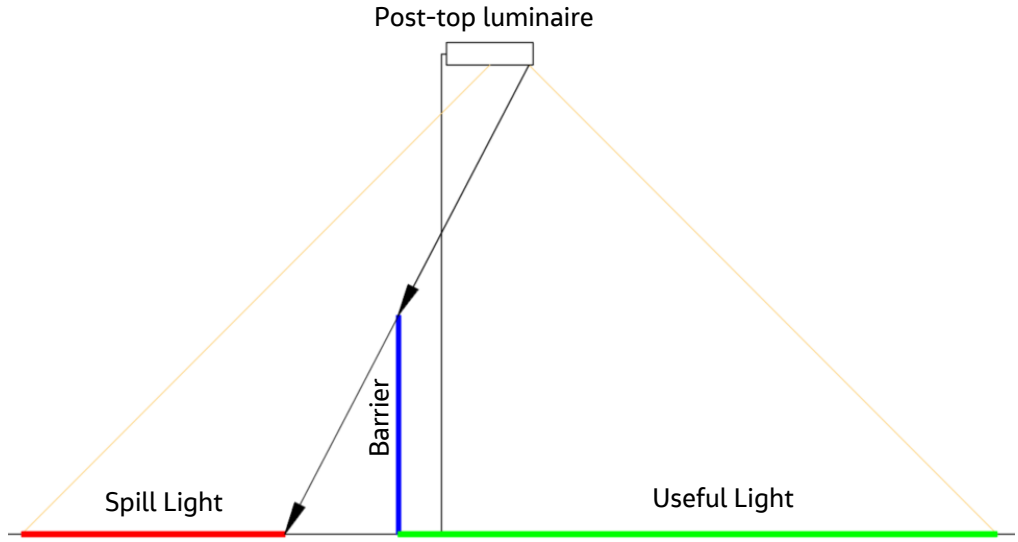


Plate 4.1: Indication of Light Spill from a Luminaire with Symmetric Optics

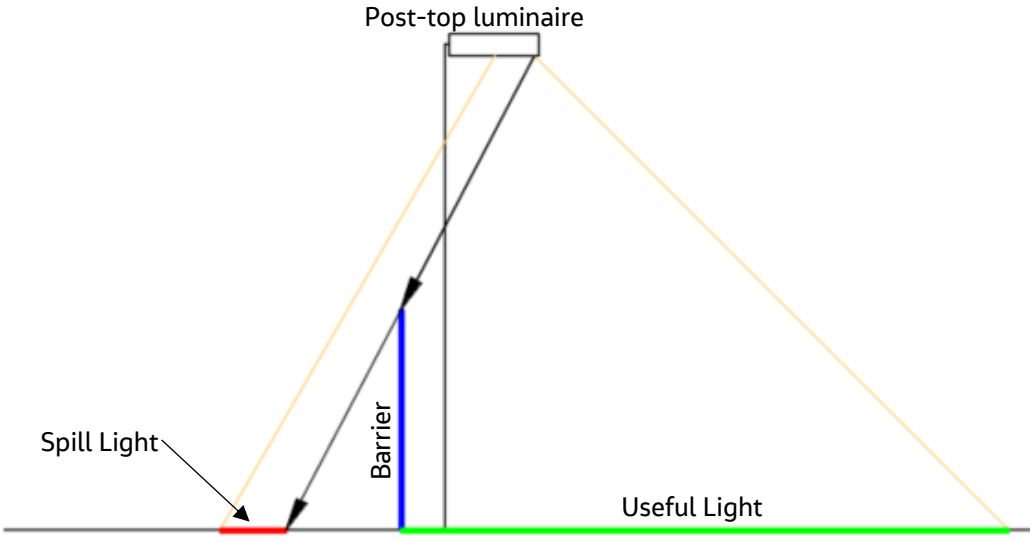


Plate 4.2: Indication of Light Spill from a Luminaire with Asymmetric Optics

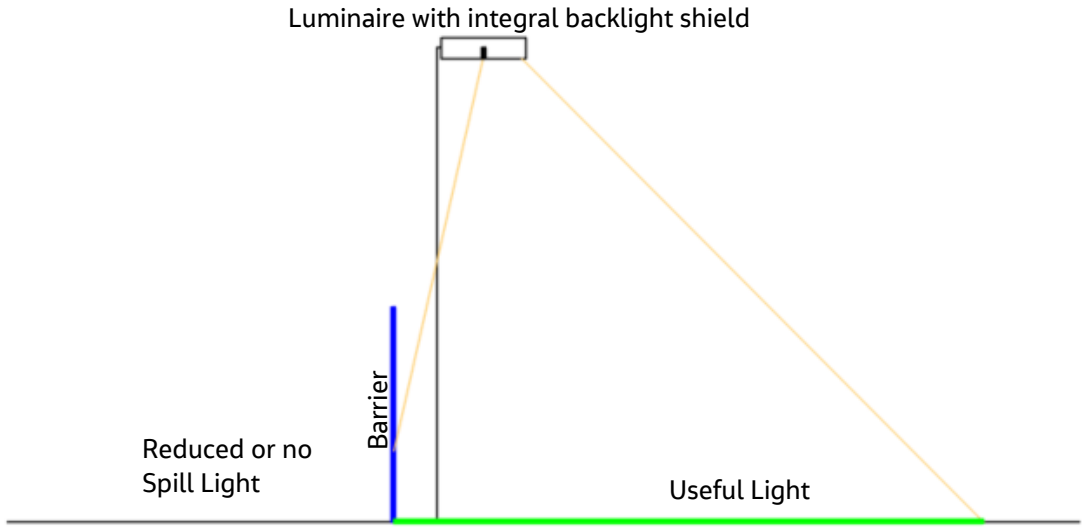


Plate 4.3: Impact on Light Spill of Luminaire with Integral Backlight Shield

52) Column height: Increasing column height would reduce the number of columns needed to provide a compliant lighting solution, but taller columns often result in light spilling further from the Alternative Facility, and also mean that the columns have a greater impact on the surrounding views, both in day time and at night (Plate 4.4). There would need to be a balance between the number of columns needed, and the extent of any light spill, e.g. keeping the columns as low as possible to reduce light spill, whilst still achieving a compliant and cost-effective lighting solution for the Alternative Facility.

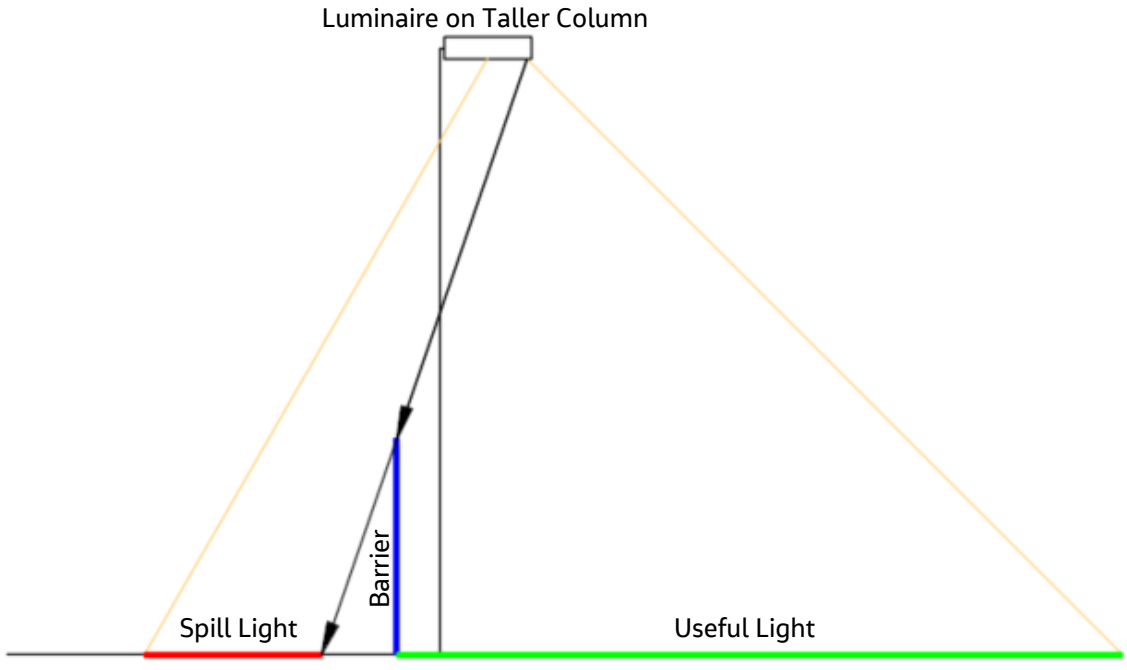


Plate 4.4: Impact of Column Height on Light Spill

53) Column/Luminaire location: Luminaires located close to the boundary are more likely to cause obtrusive light spill beyond the boundary, but it may not be practical to move the columns inward from the boundaries. In this instance, out-reach brackets/arms could be used to allow columns to be mounted close to the boundary whilst the luminaire is offset inside the

boundary by the arm. This can be seen by comparing Plate 4.1, which shows a post-top luminaire located close to a vertical barrier, with Plate 4.5 where the column has been moved away from the barrier slightly and the luminaire mounted on a short outreach arm, moving the luminaire further from the barrier.

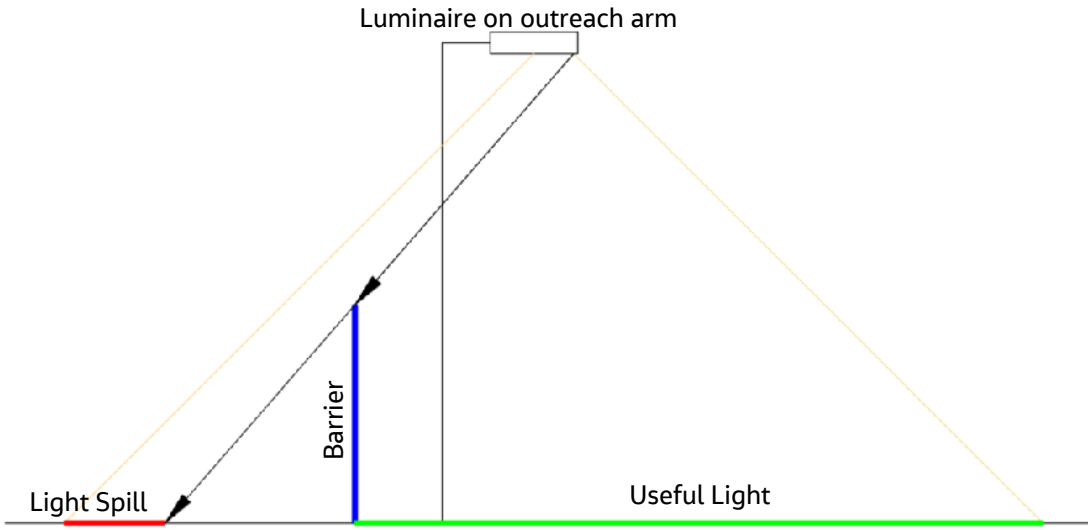


Plate 4.5: Impact on Light Spill of Column Being Moved Away and Luminaire on an Outreach Arm

54) Luminaire aiming: To avoid luminaires projecting light directly into key receptor areas, whilst also directly reducing any spill light, luminaires should be aimed/directed to project their light towards the centre of the Alternative Facility, and away from the boundaries. Equally, luminaires should not be tilted upwards, as this could project light directly upward breaching national Dark Sky policies and guidance (e.g. the ILP's GN1[9]) and impacting on dark corridors for photosensitive species to fly over the Alternative Facility.

55) The solid plywood panel hoarding proposed at the northern boundary of the Alternative Facility would provide some light spill blocking, but its effectiveness would be dependent upon the barrier's height (2.4 m), lighting column height, luminaire optics, and proximity of the luminaires to the barrier.

56) There are studies in progress looking at 'pure-red' highway lighting, which has been used in locations where known bat commuting routes cross highways, and its potential impacts on bats. Initial feedback/results suggest that whilst some species have not been negatively impacted after the installation of the red lighting, other species seem to have reduced activity, but it is unclear if this could be related to other factors. Depending on the species of bats identified around the Alternative Facility, and the development of the CEMP, red lighting may be a suitable mitigation.

57) Whilst there are examples of pure red lighting in highways applications and consequently an understanding of its impacts on drivers, etc., its use in working areas is less common, and therefore would require a risk assessment, and co-ordination with the Alternative Facility's Health and Safety team.

58) The Bat Conservation Trust lighting guidance note[11] proposes the use of warmer Correlated Colour Temperature (CCT) white light, with reduced blue light content. Given the Alternative Facility's proposed use and minimal requirement for detailed operations in the car park, which could be impacted by warmer CCT light, the Alternative Facility should be lit using LEDs with CCTs of less than 2700 Kelvin (K).

59) Given the relatively low light levels required for the Alternative Facility's exterior areas, and the open land to the south of the Alternative Facility, self-contained solar-powered lighting could be considered. The units would not require below-ground cabling, or connection to the generator set. They can be supplied with integral presence detectors, and either standard planted foundations or no-dig pre-cast foundation blocks. The restricted space available inside the Alternative Facility may mean that use of foundation blocks is not viable due to their large footprint. Overall, solar-powered luminaires would offer reduced operation costs, but their initial capital cost may be prohibitive in this instance.

60) No-dig foundation blocks may not be acceptable for use on the public highway due to the increased risk of collisions but could be discussed with the local highway's authority as an option. If the use of foundation blocks was accepted, the relevant lighting design would need to take account of the increased column set-back required to maintain the minimum safety clearances to the highway.

61) To better control obtrusive light spill by blocking light in certain directions, luminaires could be provided with shields. These can be designed in, and therefore installed inside the optical compartment by the manufacturers, or alternatively used as a reactive solution in responses to any unforeseen issues and installed at the site on the luminaire exterior as an add-on accessory.

62) Given the potential for areas of the Alternative Facility to have low use at certain times, e.g. between shifts, using presence detection to switch low-use areas to a lower light level would provide an energy saving and reduce the level of any light spill, whilst still allowing the areas to be monitored for security etc., from the offices/gatehouse. By splitting the larger areas into zones, e.g. the HGV marshalling area, car park west, car park east, security, the maximum savings can be realised, as only the in-use areas would switch to a brighter level rather than the whole Alternative Facility. Presence detectors can have adjustable time-delays to keep the higher level active for a set time period to allow users to get in the vehicles, remove personal protective equipment etc., prior to driving away.

63) Table 4.1 summarises the residual effects that have been identified on the Alternative Facility following the application of mitigation.

Table 4.1: Likely Significant Effects for Exterior Artificial Lighting

Receptor	Description	Likely Effect Prior to Mitigation	Proposed Mitigation	Likely Effect Following Mitigation
Bats	Present within the woodland, scattered trees and barn at the planning application boundary.	Significant potential for obtrusive light spill to negatively affect bat activity, and breach of legislation. Present during each phase of development, but reversible once site has been decommissioned and reinstated.	Reduce light levels on Alternative Facility. Use lower column heights (5 m minimum). Luminaire to project light into rather than out of, the site. Use zero-upward light luminaires, and do not tilt them. Match luminaire optic to the area to be lit and include back-light shields on luminaires near boundaries. Use LED light sources with warm white light colours <2700 K and reduced blue and no UV emissions. Use presence detection to dim areas not in use.	Potential for direct projection of light into known bat roosts eliminated. Limited potential for obtrusive light spill from site operation to impact bat feeding areas and commuting routes but reducing light spill would reduce the scale of the area affected. Not significant.
Barn owls	Roosting site in New House building	Obtrusive light spill near the building may reduce the site's 'attractiveness' as a potential nesting location.	Reduce light levels on Alternative Facility. Use lower column heights. Ensure luminaires project light into rather than out of, the Alternative	New House building not impacted by obtrusive light spill or glare/reflections.

Receptor	Description	Likely Effect Prior to Mitigation	Proposed Mitigation	Likely Effect Following Mitigation
		Potential glare/reflection of light sources across the surface of the Site Drainage Attenuation Area. Present during each phase of development, but reversible once site has been decommissioned and reinstated.	Facility. Do not tilt luminaires. Match luminaire optics to the 'shape' of the area to be lit and include back-light shields on luminaires near boundaries. Use presence detection to dim areas not in use. Reduce/eliminate the number of light sources near the Site Drainage Attenuation Area.	Not significant.
Otter	Potential for otter activity to the north of the planning application boundary within the watercourse and riparian habitat.	Significant potential for obtrusive light spill near the watercourse to reduce its 'attractiveness' use by otters. Present during each phase of development, but reversible once site has been decommissioned and reinstated.	Reduce light levels on Alternative Facility. Use lower column heights. Ensure luminaires project light into rather than out of, the Alternative Facility. Match luminaire optics to the 'shape' of the areas to be lit and include back-light shields on luminaires near boundaries. Use presence detection to dim areas not in use.	Worston Brook and riparian habitat not impacted by obtrusive light spill.
Badgers	Potential for badger activity to the north of the planning application boundary.	Significant potential for obtrusive light spill near the watercourse, riparian habitat, hedgerows, woodland etc., adjacent to the site reducing its 'attractiveness' for future use by badgers. Present during each phase of development, but reversible once site has been decommissioned and reinstated.	Reduce light levels on Alternative Facility. Use lower column heights. Ensure luminaires project light into rather than out of, the Alternative Facility. Match luminaire optics to the 'shape' of the areas to be lit and include back-light shields on luminaires near boundaries. Use presence detection to dim areas not in use.	Worston Brook and riparian habitat, etc., not impacted by obtrusive light spill.

5 Additional Lighting Design Constraints

64) From the clearance requirements in the ENA's G39[15] (based on ENAs TS 43-8) the 11 kV overhead power line running through the Alternative Facility would have a 2.5 m vicinity zone from the extent of the sag/sway limits for the line, and a proximity zone equal to twice the lighting column height (including the root if using planted columns). Lighting columns cannot be located within the 'live zone' near the lines but can be within the vicinity zone with prior agreement from the line owner and special consideration given to maintenance (e.g. folding columns, additional safety notices in the base compartment etc.). Columns may be located within the proximity zone, but require consideration to be given to maintenance (e.g. folding columns, additional safety notices in the base compartment etc.) The DNO may not allow the use of columns in above-ground foundations within the zones due to the potential increased risk of the columns falling on the line, e.g. if a vehicle collision occurred.

65) The Site Drainage Attenuation Area on the west side of the Alternative Facility could form a reflective surface, increasing the extents where the exterior lighting is perceived as a glare source, particularly from the perspective of New House where nesting barn owls have previously been recorded. This may require careful consideration of additional luminaire shielding and/or locations to avoid reflections of potentially intense light sources into key receptors.

66) As the Alternative Facility lighting would be supplied from a generator set, the luminaires' energy use, power factor and in-rush surge would need to be checked against the generator's rating (in-rush surge for LED drivers can be very high compared to their operating current depending upon the driver manufacturer. Luminaire manufacturers often specify the maximum number of luminaires per circuit protective device, to avoid nuisance tripping).

67) Due to the proposed operational phase of the Alternative Facility (seven years) it is advised that portable light towers (trailer modules with telescopic masts and integral power supplies) would not prove to be a cost-effective choice to light the site, particularly given their poor light control which could lead to excessive light spill or project light directly into a protected habit. By comparison, lighting from fixed points using lighting columns with LED luminaires either powered by the central site generator set or from individual solar arrays, would provide a longer lasting and potentially more cost-effective solution.

6 Methods of Lighting

6.1 Columns

68) Due to the environmental/ecological restrictions and the scale of the Alternative Facility, a maximum column height of 10 m would be used for the public highway and site lighting.

69) Any columns located within the proximity or vicinity zones (as defined by the ENA's G39[15]) would be mid-hinge fold-down, with the luminaire folding direction being away from the relevant overhead line.

6.2 Luminaires

70) Any luminaires located near or on the boundaries would have asymmetric optics with integral back-light shields, zero light above the horizontal, and minimal light above 65° from directly downward

71) All luminaires could have integral presence detectors configured to automatically dim the luminous output by 50% when no presence has been detected and a time delay has elapsed. The time delay shall be adjustable, ideally from ground level without needing to directly access the luminaires/detectors.

72) All luminaires would be fitted with 20/20 photo-electric control units.

73) All luminaires for the public highway and area outside the security office would utilise dedicated roadway optics to control any spill light into unwanted areas such as the hedgerows.

6.3 Electrical

74) All lighting columns and illuminated signs fed from the generator supply would have a 2-pole street lighting isolator module in their base compartment with a dedicated circuit protective device for each luminaire connected.

75) Each isolator module would be fitted with a Type 2/3 surge protection device to protect the luminaires.

6.4 Light Spill

76) The lighting calculations shall include a vertical grid positioned along the northern boundary, and a second grid positioned to represent the watercourse and its banks to demonstrate the level of obtrusive spill light reaching the solid plywood panel hoarding, and watercourse, respectively.

Appendix A. Pimlico Link Road Traffic Flow Data[18]

Department for Transport **Road traffic statistics**

Home Summary About Data Contact

Traffic statistics > Manual count points > 77795

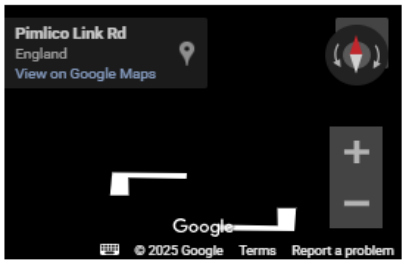
Manual count points

Site number: 77795

Site details

Region	North West
Local authority	Lancashire
Road name	A671
Road classification	'A' road
Managed by	Local authority
Road type	Major
Start junction	Green Drive, Clitheroe
End junction	A59
Link length	1.70km (1.06 miles)
Easting, northing	376000, 442720
Latitude, longitude	53.88011400, -2.36656170

Location



[18] Department for Transport (n.d.). Road traffic statistics. Site number: 77795. [Online] Available from: https://roadtraffic.dft.gov.uk/manualcountpoints/77795

Table A.1: Estimated Traffic Count Data from DfT Site 77795

Year	Pedal Cycles	Two-Wheeled Motor Vehicles	Cars and Taxis	Buses and Coaches	Light Goods Vehicles	HGVs 2 Rigid Axle	HGVs 3 Rigid Axle	HGVs 4 Or More Rigid Axle	HGVs 3 Or 4 Articulated Axle	HGVs 5 Articulated Axle	HGVs 6 Articulated Axle	All HGVs	All Motor Vehicles
2000	47	55	5,166	78	823	164	32	70	6	10	5	287	6,409
2001	47	69	5,485	148	846	172	30	37	11	15	4	269	6,817
2002	49	70	5,573	150	907	163	30	37	10	13	4	257	6,957
2003	43	100	5,367	146	985	158	31	39	10	11	4	253	6,851
2004	77	75	6,610	142	781	194	24	35	5	9	3	270	7,878
2005	65	62	6,306	133	832	211	25	40	4	7	3	290	7,623
2006	102	54	6,186	124	845	203	24	41	3	6	3	280	7,489
2007	64	51	6,087	113	890	189	22	42	3	5	3	264	7,405
2008	72	49	5,953	98	908	188	25	44	2	4	3	266	7,274
2009	72	55	6,084	97	922	171	24	42	3	4	3	247	7,405
2010	72	53	6,048	109	985	182	25	37	3	4	3	254	7,449
2011	79	45	6,030	103	1,098	185	27	43	2	5	3	265	7,541
2012	26	31	6,183	123	1,090	56	12	15	7	7	2	99	7,526
2013	26	35	6,129	129	1,133	56	13	17	5	7	2	100	7,525
2014	25	34	6,295	124	1,211	57	15	18	5	6	2	102	7,766
2015	23	30	6,420	133	1,270	54	15	17	5	6	2	100	7,953
2016	22	29	6,520	124	1,388	55	15	20	6	5	2	102	8,162
2017	21	29	6,472	115	1,461	55	15	20	6	5	2	103	8,180
2018	24	29	6,401	105	1,488	55	15	19	6	5	2	103	8,125
2019	25	27	6,481	106	1,475	55	16	20	6	5	2	103	8,192
2020	85	13	4,716	44	1,070	48	14	41	7	10	11	130	5,974
2021	70	14	5,196	46	1,166	51	15	44	7	11	12	140	6,563
2022	62	15	5,550	49	1,264	53	16	47	7	11	12	146	7,025
2023	61	15	5,654	50	1,286	53	15	47	7	11	11	144	7,149