Design Manual for Roads and Bridges

Road Lighting
Appraisal

TA 501
Road lighting appraisal

(formerly TA 49/07)

Revision 0

Summary
This document contains the requirements for the appraisal of new and replacement road lighting on motorways and all-purpose trunk roads.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	TA 501 replaces TA 49/07. This full document has been re-written to make it compliant with the new Highways England drafting rules

Foreword

Publishing information

This document is published by Highways England.

This document supersedes TA 49/07, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This document sets out the process for the appraisal of new and replacement road lighting for motorway and all-purpose trunk roads. It specifically addresses the high level approach for lighting requirements as well as the competencies of those involved in this area of the service.

The primary purpose of road lighting for motorways and all-purpose trunk roads is to reduce personal injury collisions (PICs). This is a quantifiable benefit. Consequently the most important consideration is the predicted accident cost saving, which should be greater than the lighting scheme cost in order to provide economic justification for road lighting.

Other areas where road lighting may provide benefits, such as journey ambience, will often not be quantifiable but should nevertheless be recorded and taken into account.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

This document is written for the competent lighting professional / practitioner and road safety engineer with experience in the appraisal of road lighting schemes in order that a light appraisal is undertaken that is suitable for motorway and all-purpose trunk roads.

Mutual recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement may be met by compliance with the Mutual Recognition clause in GG 101 [Ref 1.N].

Abbreviations and symbols

Abbreviations

Abbreviation	Definition
AADT	Annual average daily traffic
APTR	All purpose trunk road
BCR	Benefit cost ratio
CF	Capitalisation factor for maintenance for the appraisal period
DF	Discount factor to base year
EC	Energy cost
DGN	Driver gross negligence
GTF	General Taxation Factor
IEng	Incorporated Engineer
MILP	Member of the Institution of Lighting Professionals
OYMC	Opening year maintenance cost
PIC	Personal injury collision
PVC	Present value of costs
SAR	Scheme appraisal report
STATS19	Road accidents and safety statistics

Symbols

Symbol	Definition
A	Percentage darkness PIC saving due to road lighting
a	Appraisal period in years
e	Energy inflation rate above RPI in %
d	Discount rate in %

Terms and definitions

Terms

Term	Definition
Competent person	Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached.
Link	A stretch of road connecting two consecutive junctions (minor accesses are ignored).
Motorway incorporating variable mandatory speed limits	All forms of motorway which have variable mandatory speed limits, including those with a hard shoulder and where the hard shoulder has been converted into a running lane, either permanently or dynamically operated. NOTE: In England this is also termed as Smart Motorway.
Road safety engineer	A person with the appropriate training, skills and experience who is approved for a particular road safety audit by the project sponsor on behalf of the Overseeing Organisation. NOTE: The road safety engineer has overall responsibility for carrying out the road safety audit and managing the road safety audit team.

1. Scope

Aspects covered

1.1 Appraisals shall be carried out for all new and replacement road lighting on motorways and all-purpose trunk roads including:

1) proposed lighting of a new road;
2) proposed lighting of an existing unlit road, where lighting would be the sole improvement;
3) proposed lighting of an existing lit or unlit road, where lighting would be part of a package of improvements; and
4) proposed renewal of life-expired lighting, where replacement of lighting columns is involved.

NOTE *Where existing lighting is to be renewed or upgraded while retaining existing lighting columns in situ, this is regarded as maintenance and an appraisal is not required.*

1.2 Where it is considered that a proposed lighting scheme does not warrant the completion of a full lighting appraisal due to its small scale then agreement shall be sought from the Overseeing Organisation.

Implementation

1.3 This document shall be implemented forthwith on all schemes involving the appraisal of new and replacement road lighting on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 1.N].

Use of GG 101

1.4 The requirements contained in GG 101 [Ref 1.N] shall be followed in respect of activities covered by this document.

Competency

1.5 All organisations and personnel delivering the lighting appraisal shall be registered with an appropriate professional institution, the Engineering Council (ECUK) and hold the competencies relating to their discipline and role with a record made available to the Overseeing Organisation.

NOTE *Mutual recognition of professional qualifications under 2 Art 53 of TFEU [Ref 4.N] is applicable.*

1.6 The lead in the lighting appraisal process shall be at least MILP (or equivalent), IEng and experienced in the design and implementation of road lighting systems and associated infrastructure.

2. Lighting appraisal process

2.1 The lighting appraisal shall assess the need for lighting, and evaluate the impact of providing (or removing) lighting, along with the associated costs and safety implications.

2.2 The lighting appraisal process shall include the following seven steps:

1) information gathering;
2) concept lighting design;
3) determine works and operating costs;
4) road safety engineer report;
5) scheme appraisal report (SAR);
6) non – quantifiable impacts;
7) findings report.

NOTE *The seven steps in the appraisal process are addressed individually in subsequent sections of this document.*

3. Information gathering

3.1 The information necessary to fully inform the appraisal of the existing situation shall be obtained.

3.1.1 The information should include:

1) existing lighting and electrical asset information;
2) STATS19 collision data to cover the last 5 years (minimum 3 years);
3) annual average daily traffic (AADT) data;
4) all relevant information required for the production of a concept lighting design as defined in section 4.

4. Concept lighting design

4.1 A concept lighting design shall be produced in accordance with the requirements of TD 501 [Ref 3.N] to enable the works and operating costs to be determined.

4.2 The design shall have an intended life matching the appraisal period used in the SAR.

5. Determine works and operating costs

5.1 The costs of road lighting shall be determined and recorded separately as the works cost and operating costs for the proposed scheme.

Works costs

5.2 The works cost shall include all the costs that are incurred by preparing and installing the proposed scheme, including any overhead costs such as preparation, design and site supervision that are not accounted for automatically within the appraisal process.

NOTE *Appendix A provides a non-exhaustive list of items to be included in the works costs.*

5.3 Where other construction work is taking place at the same time, the works cost shall be the additional cost to the scheme of installing lighting rather than the cost of lighting in isolation.

NOTE *Where road lighting maintenance is included with other maintenance activities, the cost of traffic management is not solely allocated to lighting.*

Operating costs

5.4 The operating costs shall include the annual maintenance over the life of the installation, energy charges over the life of the installation and the decommissioning and disposal at end-of-life.

Maintenance cost

5.5 The opening year maintenance cost shall be the annual average for the operating life of the lighting asset.

5.6 Where identified at appraisal, an allowance shall be included for less frequent and non-routine maintenance activities.

5.7 Emergency responses shall be excluded from maintenance costs.

NOTE *Appendix A provides a non-exhaustive list of items to be included in maintenance costs.*

5.8 The figure for the opening year maintenance cost shall include the energy and decommissioning cost.

Energy cost

5.9 The opening year energy cost shall be calculated using the rates agreed with the Overseeing Organisation.

5.10 To take account of inflation, the annual energy cost shall be multiplied by the factor given in Appendix B.

5.11 The resultant annual energy cost figure calculated using Appendix B shall be included in the opening year maintenance cost.

Decommissioning cost

5.12 An allowance shall be included for the decommissioning costs of lighting at the end of the appraisal period.

NOTE *Appendix B gives a suggested list of items to be included in the decommissioning cost.*

5.13 To take account of inflation, decommissioning cost shall be multiplied by the factor given in Appendix C.

5.14 The resultant decommissioning cost figure calculated using Appendix C shall be included in the opening year maintenance cost.

6. Road safety engineer report

6.1 A full accident analysis and evaluation of the scheme shall be undertaken by a road safety engineer and a report produced detailing any findings and recommendations.

NOTE *This assessment is supplementary to road safety audits carried out for all highways improvement schemes GG 119 [Ref 1.I].*

Determination of personal injury collision (PIC) savings

6.2 The road safety engineer shall determine the percentage darkness personal injury collision (PIC) savings due to road lighting for the type of road, based on the most recent national statistics detailed within the RCGB [Ref 2.N].

6.3 The resultant percentage darkness PIC savings shall be used by the road safety engineer to determine the estimated darkness PIC savings for the opening year of the scheme to be applied within the SAR for each link.

6.4 Where road lighting forms part of a package of improvements to an existing road, the road safety engineer shall determine the applicable PIC saving due to road lighting.

6.5 PIC savings shall be assessed over the same geographical extent as the proposed lighting scheme.

Darkness PIC saving on a new link / junction

6.6 The forecast number of darkness PICs for the opening year shall be determined from the predicted opening year traffic flow multiplied by the national average PIC rate for the type of road.

6.7 The predicted PIC saving shall be calculated by multiplying the number of opening year darkness PICs by the appropriate percentage determined by the road safety engineer.

Darkness PIC saving on an existing unlit link / junction

6.8 The forecast number of darkness PICs for the opening year shall be taken to be the same as the average for the immediately preceding five years.

6.9 In the absence of five years' data, the minimum period to be assessed for the number of darkness PICs shall be three years.

6.10 The PICs shall be rationalised to exclude any where DGN was a significant contributory factor.

6.11 The predicted PIC saving shall be calculated by multiplying the number of opening year darkness PICs by the appropriate percentage determined by the road safety engineer.

Darkness PIC saving for renewing lighting on a lit link / junction

6.12 The forecast number of darkness PICs for the opening year shall be taken to be the same as the average for the immediately preceding five years, assuming road lighting remains in place.

6.13 In the absence of five years' data, the minimum period to be assessed for the number of darkness PICs shall be three years.

6.14 The PICs shall be rationalised to exclude any where DGN was a significant contributory factor.

6.15 The predicted PIC saving shall be calculated by multiplying the number of opening year darkness PICs by Equation 6.15, where A is the appropriate percentage determined by the road safety engineer.

Equation 6.15 (Predicted PIC Savings)

$$\frac{A}{100\% - A}$$

NOTE *The resultant PIC figure relates to lit conditions and, therefore, it can be assumed that the collision savings determined by the road safety engineer are already being achieved. The formula takes account of this fact.*

7. Scheme appraisal report (SAR)

7.1 As part of the lighting appraisal process, the Overseeing Organisation's SAR shall be used to determine the monetary benefit of the proposed lighting scheme through the calculation of the benefit cost ratio (BCR).

Benefits cost ratio (BCR)

Motorway incorporating variable mandatory speed limits

7.2 For road lighting schemes on motorways incorporating variable mandatory speed limits there shall be a positive BCR >=2.

All other motorways, all purpose trunk roads (APTR) and dual carriageways

7.3 For all motorways, APTRs and dual carriageways not incorporating variable mandatory speed limits there shall be a positive BCR >=1.

NOTE *Appendix D, Fig D.1 provides an example of a BCR calculation for appraisal of road lighting.*

7.4 Road lighting shall be treated as being an improvement scheme in its own right and be appraised independently where part of a multi disciplinary improvement scheme.

Appraisal period

7.5 The period of appraisal for a road lighting scheme shall be in accordance with the whole life costing assessment process detailed in TD 501 [Ref 3.N].

8. Non-quantifiable impacts

8.1 All non-quantifiable impacts (benefits and dis-benefits) as a result of the proposed road lighting scheme shall be assessed and recorded as part of the lighting appraisal.

8.1.1 The non-quantifiable impacts to be assessed and recorded as part of the lighting appraisal should include:

1) landscape adverse;
2) townscape;
3) heritage;
4) biodiversity;
5) promote active transport;
6) journey ambience;
7) accidents;
8) security;
9) severance; and
10) government policy.

NOTE *Appendix E provides guidance to the assessment of non-quantifiable impacts.*

9. Findings report

9.1 A report shall be produced to document the background information, methodology and the overall findings and recommendations of the lighting appraisal.

9.2 The report shall include:

1) description of extent of scheme;
2) description of existing road lighting installation and extents (where applicable);
3) details of design criteria, including lighting class;
4) details of all design solutions, including column height, lamp type and wattage and column arrangement;
5) works and operating cost calculations (include noteworthy assumptions where applicable);
6) summary of road safety engineer report;
7) assessment of the quantifiable benefits determined by the SAR;
8) assessment of the non-quantifiable impacts; and
9) conclusion and recommendations.

9.3 Where information related to the lighting appraisal is not available or incomplete, clear reasons shall be provided within the findings report.

9.4 All supporting documentation produced as part of the lighting appraisal shall be included within the appendices of the report, such as the works and operating cost calculation worksheets, road safety engineer's report and SAR worksheets.

9.5 Any recommendations made within the lighting appraisal report shall be reviewed by the Overseeing Organisation.

10. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Department for Transport. RCGB, 'Road Casualties Great Britain Annual Report'
Ref 3.N	Highways England. TD 501, 'Road lighting'
Ref 4.N	European Commission. TFEU, 'Treaty on the Functioning of the European Union'

11. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. GG 119, 'Road safety audit'

Appendix A. Items to include in costs

A1 Works cost

The following is a non-exhaustive list of items to be assessed when calculating the works cost for a road lighting scheme:

1) lighting columns and road lighting luminaires (including column foundation type);
2) vehicle restraint system provision or modification (where provided solely for protection of lighting equipment);
3) electricity supply, including feeder pillars and distribution network operator charges;
4) control, CMS monitoring and similar equipment, where proposed;
5) cable network, including all ducting, trenching and chambers;
6) illumination of signs made necessary by the provision of road lighting;
7) reinstatement;
8) traffic management;
9) environment impact mitigation measures;
10) any overhead costs not automatically included within the SAR;
11) any other special precautions or items of relevance.

A2 Maintenance cost

The following is a non-exhaustive list of items to be assessed when calculating the maintenance cost for a road lighting scheme:

1) equipment replacement;
2) luminaire cleaning;
3) routine column inspection (including bracket and any fixings);
4) column inspection/testing, especially after expiry of fatigue design life, based upon the whole life costing process detailed in TD 501 [Ref 3.N];
5) inspection and maintenance of vehicle restraint system (where provided solely for protection of lighting equipment);
6) electrical testing;
7) painting;
8) specialised access equipment for any of the above;
9) traffic management.

A3 Decommissioning cost

The following is a non-exhaustive list of items to be assessed when calculating the decommissioning cost for a road lighting scheme:

1) removal of lighting equipment;
2) removal of vehicle restraint system (where provided solely for protection of lighting equipment);
3) recycling and disposal in accordance with legislation;
4) reinstatement;
5) specialised access equipment for any of the above;
6) traffic management.
7) distribution network operator charges.

Appendix B. Energy cost calculation

The cost of energy should be included in the opening year maintenance cost. In order to correctly allow for inflation in energy prices, it should first be factored as described below.

The whole life maintenance cost element of the present value of costs (PVC) is calculated by SAR as follows:

$PVC_{(maintenance)} = OYMC \times CF \times DF \times GTF$

where:

OYMC is the opening year maintenance cost;

CF is the capitalisation factor for maintenance for the appraisal period;

DF is the discount factor to base year 2010; and

GTF is the general taxation factor.

The energy cost (EC) should be evaluated to the same year as the OYMC. As energy prices can be volatile, this evaluation year should be as close as possible to the opening year and an informed estimate should be made of the likely energy cost in that year. Reference to government official statistics on energy prices may provide assistance.

It is necessary to calculate another capitalisation factor, $CF_{(energy)}$, using the formula:

$CF_{(energy)} = (1 – Xa+1) / (1 – X)$

where:

$X = \{1 + (e/100)\} / \{1 + (d/100)\}$

a = appraisal period in years;

e = the energy inflation rate above RPI in %; and

d = the discount rate in %.

The EC is factored for inclusion in the total OYMC as follows:

$OYMC_{(energy\ component)} = EC\ _{(CF(energy) / CF)}$.

The appropriate values for d and CF should be confirmed with the Overseeing Organisation. The value for e should be 10% unless otherwise directed by the Overseeing Organisation.

Appendix C. Decommissioning cost calculation

The decommissioning cost should be kept separate from the construction cost in order to retain the integrity of other calculations within the lighting appraisal. For this reason, it should be added to the opening year maintenance cost, after factoring to give the correct result.

The whole life maintenance cost element of the present value of costs (PVC) is calculated as follows:

$PVC_{(maintenance)} = OYMC \times CF \times DF \times GTF$

where:

OYMC is the opening year maintenance cost;

CF is the capitalisation factor for maintenance for the appraisal period;

DF is the discount factor to base year 2010; and

GTF is the general taxation factor.

The decommissioning cost (DC) should be evaluated to the same year as the OYMC. It should then be factored for inclusion in the OYMC as follows:

$OYMC_{(decommissioning\ component)} = DC / CF.$

The appropriate value for CF should be confirmed with the Overseeing Organisation.

Appendix D. Benefits cost ratio

Below is an example of a BCR calculation. Please note that all figures are of a legacy nature and are used for indicative purposes only.

Figure D.1 Example of BCR calculation for Road Lighting

Section =	**Area 2**	**M96 J1 to J2**
Length =	0.5	km
Type	verge mounted lighting	
Class	ME2	
Residual life of scheme	3	years

Costs (per annum)

Energy	£3,845
Maintenance	£1,500
Repair	£12,432
Total	**£17,777**

Energy Calculation

Columns	20
KW per column	0.5
Hours burn per night	11.38
Days	365.26
KW per annum	**41566.588**
Cost (@9.25p/KWhr)	**£3,845**

Maintenance Calculation

Minimum maintenance	
Rule of Thumb (per km) =	£3,000
Min maintenance cost at 0.5km =	**£1,500**
Maximum maintenance	
Lamp replacement =	£3,300
Photocell replacement =	£500
Traffic management =	£3,000
Electrical inspection =	£1,800
Structural inspection =	£2,200
Total max maintenance cost =	**£10,800**
Pro-rata average =	
Max maintenance cost total / residual scheme life	
Total / 3 =	**£3,600**

Repair Cost

2008 scheme repairs	£1,200
2009 Scheme repairs	£23,664
Pro rata average =	**£12,432**

Benefits

No of PICs in last 5 yrs =	7
No of DGNs in last 5 years =	0
Annual collision rate (7/5) =	1.40
10% of PICs =	0.14

Using cost per PIC at £106k

Annual Benefits = £106000 / 0.14 = £14,840

Annual Benefits	**£14,840**
Annual Costs	**£17,777**

BCR = Benefits / Costs

BCR = £14840 / £17777 = 0.83

Appendix E. Guidance to the assessment of non-quantifiable impacts

E1 Landscape, townscape, heritage and biodiversity

A formalised impact assessment is required for each of these topics.

E2 Promote active transport

This refers to the encouragement of walking and cycling activities. Where the road to be lit has provision for walking and/or cycling an estimate should be made of the likely increase in walking and cycling journeys after dark resulting from lighting.

E3 Journey ambience

A journey in darkness may be less stressful if the road is lit and a comment to this effect should be made. However, in the daytime the presence of lighting columns can detract from views of the surrounding area if the landscape is of reasonable quality.

E4 Accidents

Refer to section 6.

E5 Security

Road lighting will generally make little difference to the security of road users and should normally be assessed as having a neutral impact.

E6 Severance

In situations where a road passes through a settlement, road lighting can be very beneficial after dark. It can restore the connection between the two sides visually and it can encourage the movement of inhabitants from one side to the other. However, this should not be considered without public consultation as alternatives to road lighting may be preferred.

E7 Government policy

All impacts on Government policy should be reported. For example, road lighting would contribute to meeting casualty reduction targets. On the other hand, road lighting would consume energy, thus working against the Government's long-term strategy to reduce greenhouse gas emissions. Other policies where road lighting would have a non-neutral impact should also be mentioned.

Road Lighting
Appraisal

TA 501
England National Application Annex to TA 501 Road lighting appraisal

(formerly IAN 167/12)

Revision 0

Summary
This National Application Annex contains the Highways England specific requirements for the appraisal of road lighting removal.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Highways England National Application Annex to TA 501.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes IAN 167/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex contains the Highways England specific requirements related to the appraisal of road lighting removal.

Road lighting is required to be regularly assessed to determine if it remains cost effective. This document outlines the actions to be undertaken by service providers to select, assess, and implement the removal of road lighting.

Motorways and all-purpose trunk roads are normally only provided with lighting when there are positive road safety benefits to the community that offset the cost to the public purse and the environmental impacts. The requirement for lighting is assessed using the requirements in TA 501 which takes account of the whole life costs of a proposed lighting scheme and its environmental impact set against the resultant saving in personal injury collisions.

Highways England is committed to reduce the energy consumption and carbon emissions (CO_2) of its roadside equipment, without a discernible shift in safety or customer service. Any decision to remove existing road lighting requires scheme appraisal that is not currently covered by any other issued requirements and advice.

TA 501 is to be used in conjunction with this document. The requirements in this document are supplementary to TA 501 and allow the assessment of benefits that an existing scheme is providing against the running costs.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Abbreviations and symbols

Abbreviations

Abbreviation	Definition
BCR	Benefit-cost ratio

Symbols

Symbol	Definition
CO_2	Carbon dioxide

Terms and definitions

Terms

Term	Definition
Asset management system	An electronic database which contains information and data covering road lighting systems, as well as other assets, and includes data on inspections, testing, maintenance, schedules and rectification of defects, as well as identifiers.
Full switch-off	A Highways England decision where night-time road lighting is switched off for a given period of time, usually 12 months, in a specific geographical area with the maintained ability to reinstate where this proves necessary.
Link	A defined section of the carriageway, commonly termed as junction to junction.

E/1. Scope

E/1.1 The requirements of this document shall be applied in conjunction with TA 501 [Ref 2.N] Road lighting.

E/1.2 Prior to undertaking any major lighting works on motorways and all-purpose trunk roads (installation, maintenance, refurbishment, replacement, renewal), evidence shall be submitted to the Overseeing Organisation that the potential for full switch-off has been assessed in accordance with the requirements in this document.

E/2. Road lighting removal

E/2.1 When appraising a road lighting scheme for removal, an assessment shall be made of:

1) the impact on other asset infrastructure and cabling;
2) the impact on customer perceptions of road lighting;
3) the current research detailing collision reduction benefits of road lighting;
4) the current research detailing road lighting contribution to casualty reduction targets.

E/2.2 References to all British and European Standards that have an impact on the removal of road lighting shall be adhered to.

E/2.3 When appraising existing road lighting schemes for the removal of road lighting the 7 stage procedure detailed in this section (E/2) shall be adhered to in addition to the requirements of TA 501 [Ref 2.N].

1. Site selection

E/2.4 Road lighting sites within a region or area which are being appraised for removal shall be identified and reported to the Overseeing Organisation.

E/2.5 Road lighting removal shall be restricted to motorways and dual carriageways.

E/2.5.1 All in situ passively safe or barrier protected lighting installations should be appraised for removal once every 5 years after the first 10 years of operation.

2. Safety benefit analysis

E/2.6 A safety benefit analysis shall be completed as part of the appraisal.

3. Running cost assessment

E/2.7 The running costs accrued over the last 5 years of operation of the existing road lighting installation shall be determined.

E/2.8 Accurate, concise and complete information and data relating to the running costs of the road lighting scheme shall be collated and provided to the Overseeing Organisation.

E/2.9 The annual average running costs shall be determined comprising the following:

1) electricity energy costs;
2) road lighting system maintenance and inspection costs, including:
    a) lamp replacement;
    b) luminaire replacement;
    c) traffic management;
    d) electrical inspection;
    e) structural inspection;
3) road lighting system remedial costs, including:
    a) damage repair;
    b) fault repair.

E/2.9.1 Fault repair should include but is not limited to:

1) cable;
2) electrical distribution equipment;
3) lamp, control gear and luminaire replacement;
4) photocell replacement;
5) primary column inspection.

E/2.10 The costs for electricity energy cost shall be derived from the previous year's data.

E/2.11 The average annual costs for remedial damage and fault repairs shall be derived by examining the total costs for the past 3 years.

E/2.12 Average annual maintenance costs shall be derived by examining planned maintenance activities between present and when the road lighting scheme is 25 years old.

E/2.12.1 For road lighting schemes that are more than 25 years old, an estimate of scheme life expectancy should be provided.

4. Benefit-cost ratio assessment

E/2.13 The current benefit-cost ratio (BCR) of the road lighting installation shall be determined.

5. Decision making

E/2.14 Removal of a road lighting scheme shall be agreed with the Overseeing Organisation.

E/2.15 Supporting evidence and information shall be provided to enable the Overseeing Organisation to reach an informed decision.

E/2.15.1 The supporting evidence and information provided should include, but is not limited to, the decision making scope of assessment as detailed in Appendix E/A.

E/2.16 The decision whether to remove a road lighting scheme shall be recorded on the health and safety file and delivered to the Overseeing Organisation.

NOTE *This is likely to be the Overseeing Organisation's asset owner.*

E/2.17 The recorded decision shall include:

1) a clear statement of the issue;
2) options that were assessed;
3) the key points of the assessment and analysis that were undertaken and had a significant bearing on the decision outcome, including:
   a) any assumptions that were made;
   b) the version numbers of documents on which the assessment was made;
4) the option that was selected, with the key reasons as to the preference;
5) how the decision is to be implemented, including details of instructions given to the service provider;
6) all parties that have been involved in reaching the decision.

6. Communications plan

E/2.18 Communications guidance and advice related to the removal of a road lighting scheme shall be obtained from the Overseeing Organisation.

7. Implementation plan

Full switch-off

E/2.19 The implementation plan for full switch-off shall be agreed with the Overseeing Organisation.

E/2.20 Full switch-off shall last for an initial period of one year.

E/2.21 Any scheduled electrical maintenance including testing shall be completed before full switch-off is implemented.

E/2.22 During the first year of full switch-off, the collision and casualty rates shall be monitored to determine if there is positive, negative or no impact on collision and casualty rates.

E/2.23 A report shall be provided that details positive, negative or no impact collision and casualty rate changes to the Overseeing Organisation.

NOTE *Details of collision and casualty rates can help to determine whether a road lighting site can be permanently removed.*

E/2.24 All associated inventories shall be updated at the start of the implementation of full switch-off.

E/2.25 The asset management system shall be updated when a decision to permanently remove the road lighting installation is made.

Decision to progress to permanent removal of road lighting

E/2.26 Permanent removal of road lighting equipment shall be agreed by the Overseeing Organisation.

E/3. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Highways England. TA 501, 'Road lighting appraisal'

Appendix E/A. Decision making scope of assessment

The scope of assessment for decision making when determining whether to approve removal of an existing road lighting scheme should include, but is not limited to, the following questions:

E/A1 Is this an appropriate site for this intervention?

Based on quantitative information provided by collision and running cost data, are there other sites in the region that could be considered significantly more appropriate?

Based on qualitative information provided by front-line staff and road safety engineers, are there any issues which could discount implementation at this site?

E/A2 Is this site providing a cost effective service?

Based on quantitative information provided by collision and running cost data, is this site providing a BCR >=1?

Based on qualitative information provided by front-line staff and road safety engineers, would the removal of road lighting discernibly increase exposure of the workforce and customers to risk?

E/A3 Does a comparison of costs and effect on safety indicate the removal of road lighting is reasonably practicable and acceptable to stakeholders?

Based on quantitative information provided by collision and running cost data, is the projected BCR of the existing road lighting scheme for the remainder of its anticipated 25 year lifespan acceptable?

Is there any evidence to suggest that removal of the road lighting scheme will result in a discernible shift in risk between road user and road worker or from one road user type to another? Consideration should be given to operating, roadwork and incident scenarios.

E/A4 Can the benefits be realised?

Are the implementation costs reasonable and affordable?

What are the 5 most likely foreseeable risks and are they currently effectively managed?

E/A5 Are there any other factors that should be taken into account and are relevant to the decision making scope of assessment?

Department for Infrastructure
An Roinn Bonneagair

Road Lighting
Appraisal

TA 501
Northern Ireland National Application Annex to TA 501 Road lighting appraisal

Revision 0

Summary
This National Application Annex contains the Department for Infrastructure Northern Ireland specific requirements for the appraisal of road lighting removal.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Department for Infrastructure Northern Ireland National Application Annex to TA 501.

Foreword

Publishing information

This document is published by Highways England on behalf of Department for Infrastructure Northern Ireland.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex contains the Department for Infrastructure Northern Ireland specific requirements related to the appraisal of road lighting removal.

Road lighting is required to be regularly assessed to determine if it remains cost effective. This document outlines the actions to be undertaken by service providers to select, assess, and implement the removal of road lighting.

Motorways and all-purpose trunk roads are normally only provided with lighting when there are positive road safety benefits to the community that offset the cost to the public purse and the environmental impacts. The requirement for lighting is assessed using the requirements in TA 501 which takes account of the whole life costs of a proposed lighting scheme and its environmental impact set against the resultant saving in personal injury collisions.

Department for Infrastructure Northern Ireland is committed to reduce the energy consumption and carbon emissions (CO_2) of its roadside equipment, without a discernible shift in safety or customer service. Any decision to remove existing road lighting requires scheme appraisal that is not currently covered by any other issued requirements and advice.

TA 501 is to be used in conjunction with this document. The requirements in this document are supplementary to TA 501 and allow the assessment of benefits that an existing scheme is providing against the running costs.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Abbreviations and symbols

Abbreviations

Abbreviation	Definition
BCR	Benefit-cost ratio

Symbols

Symbol	Definition
CO_2	Carbon dioxide

Terms and definitions

Terms

Term	Definition
Asset management system	An electronic database which contains information and data covering road lighting systems, as well as other assets, and includes data on inspections, testing, maintenance, schedules and rectification of defects, as well as identifiers.
Full switch-off	A Department for Infrastructure Northern Ireland decision where night-time road lighting is switched off for a given period of time, usually 12 months, in a specific geographical area with the maintained ability to reinstate where this proves necessary.
Link	A defined section of the carriageway, commonly termed as junction to junction.

NI/1. Scope

NI/1.1 The requirements of this document shall be applied in conjunction with TA 501 [Ref 2.N] Road lighting.

NI/1.2 Prior to undertaking any major lighting works on motorways and all-purpose trunk roads (installation, maintenance, refurbishment, replacement, renewal), evidence shall be submitted to the Overseeing Organisation that the potential for full switch-off has been assessed in accordance with the requirements in this document.

NI/2. Road lighting removal

NI/2.1 When appraising a road lighting scheme for removal, an assessment shall be made of:

1) the impact on other asset infrastructure and cabling;
2) the impact on customer perceptions of road lighting;
3) the current research detailing collision reduction benefits of road lighting;
4) the current research detailing road lighting contribution to casualty reduction targets.

NI/2.2 References to all British and European Standards that have an impact on the removal of road lighting shall be adhered to.

NI/2.3 When appraising existing road lighting schemes for the removal of road lighting the 7 stage procedure detailed in this section (NI/2) shall be adhered to in addition to the requirements of TA 501 [Ref 2.N].

1. Site selection

NI/2.4 Road lighting sites within a region or area which are being appraised for removal shall be identified and reported to the Overseeing Organisation.

NI/2.5 Road lighting removal shall be restricted to motorways and dual carriageways.

NI/2.5.1 All in situ passively safe or barrier protected lighting installations should be appraised for removal once every 5 years after the first 10 years of operation.

2. Safety benefit analysis

NI/2.6 A safety benefit analysis shall be completed as part of the appraisal.

3. Running cost assessment

NI/2.7 The running costs accrued over the last 5 years of operation of the existing road lighting installation shall be determined.

NI/2.8 Accurate, concise and complete information and data relating to the running costs of the road lighting scheme shall be collated and provided to the Overseeing Organisation.

NI/2.9 The annual average running costs shall be determined comprising the following:

1) electricity energy costs;
2) road lighting system maintenance and inspection costs, including:
    a) lamp replacement;
    b) luminaire replacement;
    c) traffic management;
    d) electrical inspection;
    e) structural inspection;
3) road lighting system remedial costs, including:
    a) damage repair;
    b) fault repair.

NI/2.9.1 Fault repair should include but is not limited to:

1) cable;
2) electrical distribution equipment;
3) lamp, control gear and luminaire replacement;
4) photocell replacement;
5) primary column inspection.

NI/2.10 The costs for electricity energy cost shall be derived from the previous year's data.

NI/2.11 The average annual costs for remedial damage and fault repairs shall be derived by examining the total costs for the past 3 years.

NI/2.12 Average annual maintenance costs shall be derived by examining planned maintenance activities between present and when the road lighting scheme is 25 years old.

NI/2.12.1 For road lighting schemes that are more than 25 years old, an estimate of scheme life expectancy should be provided.

4. Benefit-cost ratio assessment

NI/2.13 The current benefit-cost ratio (BCR) of the road lighting installation shall be determined.

5. Decision making

NI/2.14 Removal of a road lighting scheme shall be agreed with the Overseeing Organisation.

NI/2.15 Supporting evidence and information shall be provided to enable the Overseeing Organisation to reach an informed decision.

NI/2.15.1 The supporting evidence and information provided should include, but is not limited to, the decision making scope of assessment as detailed in Appendix NI/A.

NI/2.16 The decision whether to remove a road lighting scheme shall be recorded on the health and safety file and delivered to the Overseeing Organisation.

NOTE *This is likely to be the Overseeing Organisation's asset owner.*

NI/2.17 The recorded decision shall include:

1) a clear statement of the issue;
2) options that were assessed;
3) the key points of the assessment and analysis that were undertaken and had a significant bearing on the decision outcome, including:
   a) any assumptions that were made;
   b) the version numbers of documents on which the assessment was made;
4) the option that was selected, with the key reasons as to the preference;
5) how the decision is to be implemented, including details of instructions given to the service provider;
6) all parties that have been involved in reaching the decision.

6. Communications plan

NI/2.18 Communications guidance and advice related to the removal of a road lighting scheme shall be obtained from the Overseeing Organisation.

7. Implementation plan

Full switch-off

NI/2.19 The implementation plan for full switch-off shall be agreed with the Overseeing Organisation.

NI/2.20 Full switch-off shall last for an initial period of one year.

NI/2.21 Any scheduled electrical maintenance including testing shall be completed before full switch-off is implemented.

NI/2.22 During the first year of full switch-off, the collision and casualty rates shall be monitored to determine if there is positive, negative or no impact on collision and casualty rates.

NI/2.23 A report shall be provided that details positive, negative or no impact collision and casualty rate changes to the Overseeing Organisation.

NOTE *Details of collision and casualty rates can help to determine whether a road lighting site can be permanently removed.*

NI/2.24 All associated inventories shall be updated at the start of the implementation of full switch-off.

NI/2.25 The asset management system shall be updated when a decision to permanently remove the road lighting installation is made.

Decision to progress to permanent removal of road lighting

NI/2.26 Permanent removal of road lighting equipment shall be agreed by the Overseeing Organisation.

NI/3. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.N	Highways England. TA 501, 'Road lighting appraisal'

Appendix NI/A. Decision making scope of assessment

The scope of assessment for decision making when determining whether to approve removal of an existing road lighting scheme should include, but is not limited to, the following questions:

NI/A1 Is this an appropriate site for this intervention?

Based on quantitative information provided by collision and running cost data, are there other sites in the region that could be considered significantly more appropriate?

Based on qualitative information provided by front-line staff and road safety engineers, are there any issues which could discount implementation at this site?

NI/A2 Is this site providing a cost effective service?

Based on quantitative information provided by collision and running cost data, is this site providing a BCR >=1?

Based on qualitative information provided by front-line staff and road safety engineers, would the removal of road lighting discernibly increase exposure of the workforce and customers to risk?

NI/A3 Does a comparison of costs and effect on safety indicate the removal of road lighting is reasonably practicable and acceptable to stakeholders?

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Is there any evidence to suggest that removal of the road lighting scheme will result in a discernible shift in risk between road user and road worker or from one road user type to another? Consideration should be given to operating, roadwork and incident scenarios.

NI/A4 Can the benefits be realised?

Are the implementation costs reasonable and affordable?

What are the 5 most likely foreseeable risks and are they currently effectively managed?

NI/A5 Are there any other factors that should be taken into account and are relevant to the decision making scope of assessment?

Road Lighting
Appraisal

TA 501
Scotland National Application Annex to TA 501 Road lighting appraisal

(formerly TA 49/07)

Revision 0

Summary
This National Application Annex sets out the Transport Scotland specific requirements for road lighting appraisal.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Transport Scotland National Application Annex to TA 501.

Foreword

Publishing information

This document is published by Highways England on behalf of Transport Scotland.

This document supersedes TA 49/07, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex gives the Transport Scotland specific requirements for road lighting appraisal.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

S/1. Benefit cost ratio

S/1.1 TA 501, Clause 7.3 and 7.4 shall not apply in Scotland.

S/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Llywodraeth Cymru
Welsh Government

Road Lighting
Appraisal

TA 501
Wales National Application Annex to TA 501 Road lighting appraisal

(formerly TA 49/07)

Revision 0

Summary
There are no specific requirements for Welsh Government supplementary or alternative to those given in TA 501.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: Standards_Feedback_and_Enquiries@gov.wales

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Welsh Government National Application Annex to TA 501.