

INTERIM ADVICE NOTE 167/12 Revision 1

Guidance for the Removal of Road Lighting

Summary

This interim advice note advises service providers on actions to be undertaken to select, assess, and implement removal of road lighting. This Revision 1 supersedes the original document formally issued in July 2012.

Instructions for Use

Prior to undertaking any major lighting works on the HA network (installation, maintenance, refurbishment, replacement / renewal) service providers must demonstrate to the service manager that Full Switch-off has been considered in accordance with the assessment guidance within this IAN.

Amendments to IAN 167/12

As a result of feedback, and to recognise the Renewals of Roads (RoR) programme along with all other asset management activities, this IAN has been enhanced to aid clarification for Service Providers.

Date	Section/Page	Comment
July 2013	Table of Contents	This has been updated owing to additional text inserted into the document
July 2013	Footer	Updated to July 2013
July 2013	Page 7 1.6	Additional section 'Resourcing and Affordability'
July 2013	Page 11 2.3	Amended text under 'Estimation of running costs per link'
July 2013	Page 19 & 20	Amended text for 'Decision to progress to Lighting Removal'

Executive Summary

The Highways Agency' Strategic Road Network (SRN) is 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 by way of standard TA 49/07 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 accidents.

Based on a requirement to reduce the National CO₂ Carbon Footprint, and with the justification of low accident rates defining that TA 49/07 does not require installed lighting (based on a brief assessment), the Highways Agency propose to switch off motorway lighting on identified sections of the SRN.

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1. Introduction

This IAN provides interim guidance to service providers on actions to be undertaken in order to select, assess, and implement removal of road lighting.

The Highways Agency is committed to reduce the energy consumption and carbon emissions (CO₂) of its roadside equipment, *without a discernable shift in safety*. Any decision to remove existing lighting requires careful assessment; this is not currently covered by any other issued guidance or advice. TA 49/07, Appraisal of New and Replacement Road Lighting, provides an appraisal mechanism for new and replacement road lighting, including the assessment of capital and running costs. TA 49/07 cannot be used to determine the current viability of existing lighting schemes as it does not treat the capital investment element appropriately. Therefore new guidance is required to assess the actual benefits that an existing scheme is providing against the actual running costs. This IAN provides such advice.

1.1 Purpose and required actions

Road lighting, like any other service the Highways Agency provides, must be regularly assessed to determine if it is still providing a cost effective service. Currently, road lighting operating costs are increasing above the rate of inflation, particularly energy costs, and, benefits are falling due to: improved impact protection on vehicles; a greater prevalence of driver aids such as ABS; better road design and our LNMS safety improvements, and; better compliance with the seat belt law & speed limits.

The new carbon reduction target means we must do things differently in order to facilitate the positive changes that carbon reduction brings. Lighting schemes generally have a 25 year life and, relative to most of our other assets, have a higher than average ratio of capital cost to running costs.

1.2 Relationship

This IAN is issued as supplementary requirements and guidance to the Design Manual for Roads and Bridges, Volume 8, Traffic Signs and Lighting, Section 3, TA 49/07 – “Appraisal of New and Replacement Lighting on the Strategic Motorway and All Purpose Trunk Road Network”, issued in August 2007. Applying this IAN in conjunction with TA 49/07 will mean that less new and replacement lighting will be justified and installed. The lighting design standard (TD 34/07) sets out specific requirements, such as requiring designs for road lighting that do not emit direct light above the horizontal.

1.3 Impact of Implementation

There is an impact in terms of carbon saving is not an adjunct independent to other business targets. A reduction in carbon is usually, if not always, accompanied by:

- a reduction in running costs
 - through a reduced energy bill
 - through reduced maintenance costs
 - through reduced carbon taxes
- an improvement in workforce safety
 - road lighting lamps need changing every 3 years
 - this involves working at height, on a live carriageway, with live electricity, handling extremely hot objects and in close proximity to an intense light source.

It should be noted that lighting removal may have an impact on sign lighting. Removal of the lighting infrastructure and its associated cabling may result in lit signs having to be replaced with a self powered illumination or retroreflective sign faces.

To motorists the general perception is that road lighting seems to make journeys in the hours of darkness less stressful, providing a slight beneficial impact on traveller care. Consequently there are public sensitivities to be considered with implementing this IAN. All communications with external stakeholders, media and the public must be in accordance with the Highways Agency communication strategy specifically produced for the Removal of Road Lighting.

Lighting of motorways has traditionally been justified as a measure to improve road safety, but our most recent research into the accident figures for motorways shows that lighting reduces night-time accidents by no more than 10%, rather than the 30% reduction identified in the 1970s.

Whilst road lighting has historically been seen as contributing to casualty reduction targets, it does consume energy, thus working against the Government's long term strategy to reduce greenhouse gas emissions. If road lighting is provided then the addition of dimming controls to the installation is recommended. Although this would increase capital and maintenance cost there would be a reduction in energy use, with an anticipated net reduction to operational costs.

1.4 Scope

This IAN applies only to road lighting installations that have reached the end of their operational life. These should be removed and the TA 49/07 (Appraisal of new and replacement lighting on the strategic motorway and all-purpose trunk road network) process should be followed.

1.5 Mutual Recognition

"Any reference in this specification to a "British Standard", or to a "British Standard which is an adopted European Standard", is to be taken to include reference also to the following standards:

- (a) a standard or code of practice of a national standards body or equivalent body of any EEA state;
- (b) any international standard recognised for use as a standard or code of practice by any EEA state;
- (c) a technical specification recognised for use as a standard by a public authority of any EEA state; and
- (d) a European Technical Approval (ETA) issued in accordance with the procedure set out in directive 89/106/EEC.

Where there is a requirement in this specification for compliance with any part of a British Standard or a British Standard which is an adopted European Standard, that requirement may be met by compliance with any of the standards given above, provided that the relevant standard imposes an equivalent level of performance and safety provided for by a British Standard or a British Standard which is an adopted European Standard.

"EEA State" means a state which is a contracting party to the EEA Agreement

"EEA Agreement" means the agreement on a European Economic Area signed at Oporto on the 2nd of May 1992 as adjusted or amended"

1.6 Resourcing and Affordability

Selection, assessment, switch-off and subsequent removal of road lighting should be viewed in conjunction with the Renewals of Roads (RoR) programme. It must be considered along with all other asset management activities, in the context of the Highways Agency's Programme Development and Management processes providing a visible and consistent evidence-based approach to the prioritisation of works, allocation of funding, and reporting of the delivery of planned programmes.

The cost of switching off road lighting can vary considerably. The lowest cost scenario where ...

- lighting can be switched off in groups from the roadside electrical distribution cabinet,
- the road markings' condition is suitable for an unlit road,
- the columns can remain in situ until removal can take place with other planned works,

... can cost less than £1k/km, with residual costs for column removal at a later date as low as £4k/km. In this scenario it should be possible to fund such a low cost project out of lump sum, in conjunction with other scheduled works.

Another scenario where the power cable infrastructure is shared with other assets such as:-

- sign lighting and/or
- the road markings require remedial works and/or
- the lighting columns require removal at some time in the very near future

... costs can rise as high as £34k/km. Where the costs of switch-off and, if required, immediate column removal exceed the benefits in terms of reduced maintenance costs during the current service provider's contract, then the project should be funded from the Renewals programme

The residual cost of removing lighting columns should always be bid for via the Renewals programme and ideally scheduled with other works such as barrier inspection/renewal in order to share traffic management costs.

2. Guidance

2.1 Background

The Highways Agency is reviewing the motorway road lighting installations that have reached the end of their operational life, on carefully selected stretches of motorway with low traffic flows at night and a good safety history. By switching off the road lighting along these stretches of motorway we can reduce the carbon footprint of the motorway network. This is about making best use of developments in technology and our research into the safety of motorway lighting to reduce energy consumption, light pollution and CO₂.

This approach can save energy costs and provide benefits to the environment. Switching off lighting will benefit the environment by reducing CO₂ emissions and light pollution.

2.2 Consideration

These factors must be taken into account to clarify which guidance and instruction is to be applied when, and to what type of lighting scheme:-

- For new lighting schemes, only TA 49/07 must be used.
- For all *in situ* passively safe or barrier protected lighting installations on motorways and dual carriageways, this guidance must be applied at least once every 5 years after the first 10 years of operation. If it is decided to implement Full Switch-off a period of electrical disconnection prior to deciding whether to remove the physical infrastructure as a result of implementing this IAN, must take place. The TA 49/07 process must be applied in order to verify the decision and confirm that there is no justification for installing road lighting at a location.
- For lighting schemes that have reached the end of their operational life (for instance when remedial works account for more than half the running costs) - these will be removed, subject to economic constraints, and the TA 49/07 process must then be followed to determine whether they should be replaced.

2.3 Assessing existing road lighting

The procedure for assessing existing road lighting is a 10 stage process; see Annex B for process chart. The full details of each stage are:-

1. Service provider determines which sites within a region or area are most likely to be the better candidates for lighting removal. The purpose is to identify the subset of sites where lighting removal can be readily justified and that it is readily apparent to stakeholders that it makes sense to remove road lighting.
2. Service provider determines that each **selected site** has no obvious site specific issues that will render the site inappropriate for lighting removal. The purpose is to apply common sense and involve informed stakeholders to avoid erroneous decision making due to incomplete information borne from following a prescriptive process.
3. Service provider determines the **safety benefits** derived over the last 5 years of operation. It is now established that road lighting reduces night-time accidents on motorways & dual carriageways by 10%. It is therefore straightforward to determine an estimate of the current benefits due to an existing road lighting installation by taking the current accident rate and dividing by 9.
4. Service provider prepares and submits a Road Safety Report to provide a detailed assessment of the level of utility the road lighting is providing at the selected site. Whether it is providing that utility from a VfM (value for money) viewpoint, or with a good BCR (benefit-cost ratio) is not considered at this stage.
5. Service provider prepares and submits a Lighting Design Report to provide accurate costing of all aspects of the scheme and to answer the question "if this road had never been lit, is there a case for lighting it now?"
6. Service provider determines the running costs accrued over the last 5 years of operation of the existing installation. NetSery advise a minimum estimate of £3,000/km.
7. Service provider determines the current BCR of the installation – this is a relatively simple task of comparing the data from Stages 3 and 6 above.
8. Service provider reports findings to the HA for decision. This decision takes into account quantitative evidence from Stages 3 to 7 and qualitative evidence from Step 2.
9. The HA implements a communications plan – this ensures stakeholders are managed in a consistent way by the Highways Agency throughout the country.
10. **Implementation** – Full Switch-off is instructed by the HA for a period of one year. The accident rate is monitored during that period. After one year, if the change in accident rate confirms that the road lighting does not provide a cost effective safety intervention, then road lighting can be removed.

Stage 1 – Site Selection

Service providers must demonstrate to the HA that they have staff with sufficient competency to undertake and follow the Full Switch-off processes described.

To implement lighting removal the following actions are required as part of the processes described in this IAN.

Service providers must conduct early site selection across their area of responsibility and conduct an assessment at the earliest opportunity.

Full Switch-off must be considered as part of any maintenance area energy saving plan or where any other lighting intervention is planned.

The purpose of this stage is to identify those sites within an area where removal will:-

- affect safety the least
- be most easily implemented
- will provide a reasonable reduction in running costs

This is a coarse sift using free on-line mapping and satellite and/or ground level images and data readily available from the regional intelligence unit. A site survey or bespoke data collection should not be necessary. This sift should only be necessary in FY2012-13 in order to focus appropriately limited resources on the backlog of assessments.

Selection by geographic attribute

Lighting removal prior to end of life is restricted to motorways and dual carriageways either barrier protected or passively safe with lighting columns.

The length of the link¹ must be a minimum of 3km between junction centres.

Identification of annual night-time accident rate

Annual night-time accident rates weighted by severity of PIAs (Personal Injury Accidents) must be determined for each lit link within an area.

1. The weighting is: 1 fatality=10 serious injuries=100 minor injuries².
2. If night time only accidents are not readily available, but the overall accident rate is, then the night time accident rate can be estimated as 30% of the overall accident rate.
3. The average accident rate should ideally be taken over 5 years, but 3 years must be used as a minimum.

The annual night-time accident rate must be expressed as Fatalities & Weighted Injuries (FWIs) per annum.

¹ A link is defined as junction to junction

² Defined as "Fatalities and Weighted Injuries" – where a Fatality =1, SI=0.1 and MI=0.01

Estimation of running costs per link

Lighting costs are based mainly on energy costs (EC) which vary with the brightness of the lighting and fixed *luminaries-per-column* maintenance costs.

Cost per link must be estimated using the formula:-

Number of luminaires on link x (EC + maintenance costs, typically £30)

Where EC = £75 for Class ME3 lighting
£125 for Class ME2 lighting
£200 for Class ME1 lighting.

Ranking of sites

Each link is to be ranked according to “utility per £” using the formula:-

(FWIs/year) ÷ (annual running cost estimate)

The FWI measure is contiguous with DfT ratios emerging from work that informed the development of the values for preventing a fatality, serious and slight injury respectively. The FWI measure is used in the rail industry, whose safety risk publications have been recognised as best practise by the Health & Safety Executive.

Stage 2 – Site Verification

The purpose of this step is to apply common sense to identify those sites in which lighting is clearly providing good utility. The primary source of intelligence is local knowledge and this can be provided by our workforce and supply chain partners.

The ranked list from the previous step should be used to identify the 5 links with the poorest utility/£ along with a view from a route treatment point of view.

The selected lighting schemes should be reviewed to determine the following:-

1. That the site is considered generally suitable, i.e. there are no reasons to avoid the site that would be readily apparent to the general public, for example, quarry entrance on an APTR (All-Purpose Trunk Road) where slow moving LGVs (Large Goods Vehicles) turn right.
2. That the site is appropriate, ie. that the link has no non-trivial³ geometric departures from standard. The removal of the scheme must not compromise the route in terms of lighting, that is, any illumination on upstream or downstream adjacent locations should be carefully checked to ensure that sudden change between light, dark and back again, are avoided. (this may require cross-border liaison).
3. That the Traffic Officer Service (TOS) are not aware of any issues which need to be taken into consideration - incident/activity logs and comments from liaison with the TOS, particularly the local outstation, should be taken into consideration. This information source will highlight issues that may not appear on STATS19 data or that the service provider may not be aware of. Experience from the Midnight Switch-off programme showed the following may be an issue: animals on the carriageway; fly tipping; illegal parking of LGVs; partially shed loads near depots, and on motorways; pedestrians trespassing on the network and intermittent hard shoulders.

³ The test is the departure must represent a “danger” unless lit, and even then, it must be shown that lighting is the most appropriate risk mitigation.

4. That the service provider are not aware of any issues which need to be taken into consideration - incident/activity logs and comments from liaison with the service provider, particularly Incident Support Units, must be taken into consideration. This information source will highlight issues that may not appear on STATS19 data, or that the TOS may not be aware of. Experience from the Midnight Switch-off programme showed the service provider will be aware of: the types of obstructions left on the carriageway at the selected site, and; which assets, for example particular sections of barrier, are prone to repeated strikes

The output from this step is an assessment of the appropriateness of the link.

Stage 3 - Safety Benefit Assessment

The purpose of this stage is to obtain a rationalised and verified Personal Injury Accident (PIA) record for the site, to ensure any future decisions regarding lighting on the link are fully informed.

The safety data should be obtained from STATS19 to cover the last 5 years (minimum 3 years). When STATS19 data is not available, other groups of information will be available from either the service provider or NetServ. This data needs to be fit for purpose to undertake analysis in accordance with the steps numbered below:

1. A PIA dataset must be generated for each potential Full Switch-off location. This dataset must include:-
 - Time and date of accident
 - Number of casualties:-
 - Killed
 - Sustaining serious injuries.
 - Sustaining minor injuries.
2. PIA's must be listed clearly showing those that occur within the Full Switch-off zone⁴ and within the hours of darkness (if any). Road lighting is currently switched on and off 15 minutes after sunset and 15 minutes before sunrise.
3. The PIA's must be rationalised to exclude any which are clearly not within the Full Switch-off zone, for example, those at the junction roundabout give way lines, and those which are a recording error, for example, at a motorway location – 'failed to stop at red light'.
4. The PIA's must be rationalised to exclude any where driver gross negligence (DGN) was a significant contributory factor. These include:-
 - Intoxicated drivers. (drink or drugs)
 - Suicides and attempted suicides.
 - Excessive speeding (more than 50% over the speed limit⁵)

⁴ The geographic boundaries of the site can be determined by following the midnight switch off guidance. This will determine which parts of the site must remain lit.

⁵ This is well in excess of the design limits of the highway, and like drink driving, it normally carries an automatic ban, thus reflecting society's view that this is a **wilful** and negligent act that presents a high level of risk to other road users.

The output of this step is a rationalised and verified accident record for the site where it is proposed lighting will be removed.

Stage 4 - Road Safety Report

The purpose of this report is to determine the level of utility the road user is receiving from the road lighting. It will answer *the following questions*, with all statements, assertions and answers substantiated with supporting evidence.

- What hazards is the road lighting currently mitigating or eliminating?
- Could the hazards be managed, eliminated or mitigated by a more effective intervention?
- Which lengths of the link are benefiting significantly from road lighting, and which lengths are obtaining negligible or minimal benefit?
- Where there are clusters of night-time accidents, what are the hazards responsible and would lighting mitigate that hazard?
- Is there evidence that lighting on this link of the network is providing benefits greater than 10%?
- What is the anticipated annual increase in killed, seriously injured and minor injuries as a result of road lighting removal at the location? This should be expressed in absolute figures, for example 0.1 minor injuries.
- What is the anticipated total number of killed, seriously injured and minor injuries as a result of removal of road lighting at this location in 3 months time? (assume 25 year lifetime)
- Would the TOS safety be discernibly affected by removing lighting at the location? What are the specific hazards that would be amplified?
- Would service provider safety be discernibly affected by removing lighting at the location? (consideration should be given to the level of exposure associated with maintaining the current road lighting).

The Road Safety Report should consist of approximately 8 pages for an average length of motorway link, and will provide a 1-page annex giving a professional viewpoint on any aspect(s) of the proposed Full Switch-off. This is to provide balance to the prescriptive nature of the report content, and this particular section does not have to be substantiated.

The report must not consider comparison locations as this is not relevant during the safety benefit assessment.

Stage 5 - Lighting Design Report

The purpose of this section is to provide costings and a TA 49/07 assessment to inform decisions.

The service provider will complete the TA 49/07 process and report on whether the site, if it had never been lit, would have a justifiable case to install lighting now. Cost information is provided to ensure the project is taken forward with sufficient funding and contingency.

The Lighting Design Report will provide a robust estimation of the likely “unlit” accident rate, taking into account that the rationalised and verified accident record reflects the fact that the road *is* lit, 11% must be added to the accident record for motorways & dual carriageways.

This adjustment may be increased, or decreased, if the Road Safety Report reasonably and robustly justifies that site specific issues deem this generic figure not applicable. A lighting departure from standard must be requested and approved if a value other than 11% is used.

The TA 49/07 assessment is to cover only the lengths of carriageway which are to have the road lighting removed, and must not include those adjoining areas that are to remain lit.

To ensure the decision making process is robust and reliable, the Lighting Design Report’s assessment will provide a calculation, stating what the percentage of accident saving is required for the lighting scheme to have a Benefit Cost Ratio of 2.

Implementation costs – The report will provide estimates for the implementation of : the Full Switch-off element⁶, and; the lighting removal element.

Note that a pragmatic approach is to be adopted when considering the Full Switch-off element. *For example*, re-cabling should not be necessary, so either leave additional lights on, or remove lamps from luminaire.

Note that both Full Switch-off and lighting removal phases may have differing impacts on sign lighting. Both the disconnection of the energy supply, and subsequently, the removal of the lighting infrastructure and its associated cabling may result in lit signs having to be replaced with a self powered or “retro-reflective” signs. Reference must be made to the good energy guide to determine whether the sign must be lit before determining how it should be lit. Question whether the sign is necessary? Or whether it can it is more cost effective to move it to where power is more readily available?

The report will provide a cost estimation for re-instatement of the lighting scheme, should it prove necessary, following a Full Switch-off.

⁶ The treatment of white lining & studding should be on a pro-rata basis. White lining and studding is expected to have a serviceable life of 5 years, 100% of renewal costs can only be attributed to implementation costs if Full Switch-off requires either done within 1 year of the last renewal, with 20% reduction year on year to 0% if the last renewal was done over 5 years ago.

Stage 6 - Running Costs Assessment

The purpose of this stage is to provide accurate and complete information relating to the running costs of the lighting scheme.

The annual average running costs need to be determined for those lights that it is proposed will be removed. Running costs are comprised of the following:

1. Energy costs (available from the inventory, assume 11p/kWhr)
2. Carbon costs (£12/tonne of Carbon dioxide)
3. Maintenance costs
 - a) Lamp replacement costs
 - b) Photocell replacement
 - c) Traffic management costs
 - d) Electrical inspection costs
 - e) Structural inspection costs
4. Remedial costs (works undertaken outside of the planned maintenance cycle)
 - a) Damage repair
 - b) Fault repair
 - i. Cable
 - ii. Electrical distribution equipment
 - iii. Lamp/control gear/luminaire replacement
 - iv. Photocell replacement

Items 1 and 2 must be derived from the previous year's data.

Item 3 must be derived by examining the planned maintenance activities between present and when the scheme is 25 years old and determining the annual average. (For schemes which are more than 25 years old, the Lighting Design Report must provide a revised estimated life expectancy)

Item 4 must be determined by identifying the total cost of remedial works over the last 2 or 3 years and determining the annual average.

Stage 7 - BCR Assessment

Determine the current benefit-cost ratio. A blank copy of the example spreadsheet in **Annex A** is available from the HA Project Sponsor.

Stage 8 - Decision Taking

The purpose of this section is to provide guidance to ensure the decision is both robust and reliable.

The request for decision must be made to the HA. As a minimum, to make the decision supporting evidence and information shall be provided by the service provider to answer the following questions.

Scope of Consideration of the decision

- **Is this an appropriate site for this intervention?**
 - Based on quantitative information provided by accident and running cost data, are there other sites in the region which could be considered significantly more appropriate?
 - Based on qualitative information provided by frontline staff, are there any issues which discount implementation at this site.
- **Is this site providing a cost effective service?**
 - Based on quantitative information provided by accident and running cost data, is this site providing a BCR greater than 1.0⁷?
 - Based on qualitative information provided by frontline staff and road safety engineer, would removal of this service discernibly increase the exposure of the workforce to risk?
- **Does a comparison of costs and affect on safety indicate that the measure is reasonably practicable and acceptable to stakeholders?**
 - Based on quantitative information provided by accident and running cost data, is the projected BCR of the scheme for the remainder of its anticipated 25year lifetime acceptable?
 - Is there any evidence to suggest implementation will result in a discernable shift in risk between road user and road worker or from one road user type to another? (consider normal operating scenario, roadworks scenario and incident scenario)
- **Can the benefits be realised?**
 - Are the implementation costs reasonable and affordable?
 - Can the project be implemented with appropriately skilled staff with sufficient capacity to undertake this task and who access to specialist advisors.
- **Is our Business Reputation being placed at risk?**
 - Are there any site specific issues which we will find challenging to manage, or, for which the communications plan is not appropriate in terms of scope or content?
 - What are the 5 most likely foreseeable risks and are they currently being effectively managed?
- **Are there any other factors you consider relevant to this decision?**

⁷ The standard BCR of 2 used by the HA is applicable to capital projects only. "1.0" is only used for projects which do not have a capital element and are funded from resource or maintenance.

Reviewing the Decision

- Is the decision Rational, Equitable and Defensible?
- Reverse test – if this location had never been lit, is there a case for lighting it?

Recording the Decision

The decision must be recorded for future reference, even if that decision is to do nothing. As a minimum, the scope of the record is:

1. A clear statement of the issue
2. Options that were considered
3. The key points of the assessments and analysis that were undertaken that had a significant bearing on the decision, 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 reason why it was preferred.
5. How the decision was to be put into practice (details of and instruction of briefing given to service provider)
6. Other parties involved who took part in reaching the decision, e.g. NOM.

Stage 9 - Communications plan

Communications guidance must be sought from the Highways Agency News/Press/Media Office.

Some of the information collected in Stages 1 to 8 will be required to inform and populate the communications plan. Quality assurance procedures must be in place to ensure implementation of the communications plan is not compromised by inaccurate site specific data.

The timings and order in which the steps of the communications plan are to be implemented are both critical. All communications with external stakeholders, media and public must be in accordance with the longer-term HA communications strategy.

Stage 10 - Implementation

This section transfers knowledge and good practice from the Midnight Switch-off programme to ensure risks to the project, and project *safety* risks, are minimised.

Preliminary works

It is possible that a risk based approach to maintenance may result in the condition of the white lining and road studs falling below standards required for an unlit section. A condition survey must be conducted and remedial works undertaken if necessary.

If the electrical maintenance schedule identifies an electrical inspection will be required during Full Switch-off, then this is to take place prior to Full Switch-off to remove the need to re-energise the lighting for an electrical test during Full Switch-off.

If a Full Switch-off phase is to be implemented, temporary signs need to be erected in advance of the Full Switch-off scheme to inform users that the road lighting is not in operation. An information sign with white lettering against a blue background bearing the legend "Road lighting not in use" should be displayed for a minimum period of 3 months following implementation of the scheme.

Location Works

For Full Switch-off, the electricity supply DNO (Distribution Network Operator) or independent connection provider, will need to disconnect feeder pillars that are to be completely turned off. This must not be allowed to become a dependency of the implementation. Isolation via contactors can be used in the short term can be used to effect the switch off.

For feeder pillars supplying installations that remain powered and others that are to be switched off, selective oscillation shall be carried out by the service provider.

Testing

- Prior to switch-off:
 - Daytime test – by covering up group controlled photocells, a visual check can then be carried out to ensure that those lights required to remain lit, do so.
- on the 1st night of switch off:
 - Night-time test – a visual check must be conducted to ensure that those lights required to remain lit, do so.
 - A thorough comprehensive drive-through must be undertaken to ensure issues are identified and addressed early.

Benefits realisation

Ensure all inventories are updated.

Ensure maintenance cycles reflect the reduced hours of operation.

Monitoring

Monitoring risk level is usually best performed by accessing the incident support unit logs and, where injuries occur, liaison with the police. Note that incidents involving driver gross negligence are not to be used when calculating changes in the level of risk.

Media and stakeholder interest may be high in the initial weeks and possibly months. The monitoring process needs to be established to supply detailed information quickly in those initial months. The monitoring process can be reverted to monthly summaries once the initial period has passed.

After 3 months

The "road lighting not in use" signage can be removed from the network. The risk to the workforce when cleaning the signage during the 12 months of Full Switch-off can not be justified.

Decision to progress to Lighting Removal

After an appropriate period of time, the economic viability of re-instating the lighting should be assessed.

Determining what constitutes an *appropriate period of time* is a risk based decision. Factors that should be taken into account are, as a minimum:-

- **residual life of the lighting infrastructure** - where the residual life (defined as the residual life of the significant lighting component with the lowest lifetime, e.g., cable or column) is:-
 - very low or zero, then the period can be reduced to zero.
 - where it is high, in the order of 10 years, then the period should be a minimum of 12 months.
- **current operating BCR** - if the output of Stage 7 indicates:-
 - a BCR below 0.33, then the period can be reduced to zero as it is highly improbable that the night-time accident rate will more than treble once lighting is removed.
- **other common factors that may be considered are:-**
 - absence of VRS or roadside barrier.
 - removal as part of a project cost reduction and/or project risk reduction
 - measure during a significant road upgrade project.
 - where the proportion of night-time accidents is close to 28% (that is, the national average for unlit sections of road. This implies that road lighting is unlikely to be having a significant effect on night-time accident rates at this location).

Note that if a period of less than 12 months is selected, account needs to be taken of the seasonal differences of “after” night-time accident rates when comparing with the “before” baseline.

The economic viability of re-instating the road lighting is calculated using the following formula to give a BCR:-

$$\frac{\text{Total scheme benefits for remaining lifetime of the scheme}}{\text{Total running costs for remaining lifetime of the scheme + re-activation costs}}$$

where:-

“Total running costs for remaining lifetime of the scheme” are derived from the running cost assessment made earlier in Stage 6. The remaining lifetime is equal to 30 years minus current age of the scheme.

“re-activation costs” were provided by the Lighting Design Report earlier in Stage 5.

“Total scheme benefits for remaining lifetime of the scheme” are equal to:- the accident rate during Full Switch-off, minus the average annual “lit” accident rate, multiplied by the remaining lifetime of the scheme.

If there has been an increase in risk greater than the level necessary for the scheme to achieve a BCR of 1.0 in the above calculation, then consideration should be given to re-instating the lighting if it represents best value for money when compared along with all other asset management activities (see Section 1.6).

If the BCR of re-instatement is below 1.0, then removal should be considered as a programme activity (see Section 1.6).

Implementing Lighting Removal.

This is a standard practice of the supply chain.

Sign lighting on the link must be reviewed:

- Some signs may have been lit solely because the road was lit, these can now become unlit signs.
- The removal of the electrical infrastructure may result in signs that must be lit, losing their power. It is potentially more cost effective to replace the sign lighting with alternative lighting rather than re-cable.
- The road restraint system is to remain in situ.
- The Full Switch-off may be extended so that the column removal can take place at the same time as other programmed works on the link or avoid other programmed works on the route.

3. Withdrawal Conditions

This IAN will remain in force unless superseded by revised HA guidance.

4. Contacts

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5. Normative References

Design Manual for Roads and Bridges, Volume 8, Traffic Signs and Lighting, Section 3, **TA 49/07** – “Appraisal of New and Replacement Lighting on the Strategic Motorway and All Purpose Trunk Road Network” TSO Ltd

Design Manual for Roads and Bridges, Volume 8, Traffic Signs and Lighting, Section 3, **TD 34/07** – “Design of Road Lighting for the Strategic Motorway & Trunk Road Network” TSO Ltd

6. Informative References

Police **STATS 19** data, official statistical publication of the Department for Transport (DfT) on traffic casualties, fatalities and related road safety data.

Annex A: Example Spreadsheet for BCR calculation

Section=	Area2	M96 J1 to 2
Length=	0.5	km
Type	verge mounted lighting	
Class	ME2	
Residual life of scheme	3	years

Annual Costs	£18,773
Annual Benefits	£14,840
BCR	0.79

Costs (per annum)	
energy	£4,572
CRC Costs	£269
maintenance	£1,500
Remedial	£12,432
Total	£18,773
<u>Energy Calculation</u>	
20	columns
0.5	kW per column
11.38	hours burn per night
365.26	days
41566.588	KWhrs per annum
£4,572	cost (@11p/kWhr)
22	tonnes of CO ²
£269	at £12 per tonne
<u>Maintenance Calculation</u>	
Rule of Thumb(per km) =	£3,000
Min Maintenance costs =	£1,500
lamp replacement costs	£3,300
photocell replacment	£500
TM costs	£3,000
Electrical inspection costs	£1,800
Structural inspection costs	£2,200
Total Actual Maintenance costs=	£10,800
Pro - rata average =	£3,600
Max of above =	£3,600

Benefits	
No.of PIAs in last 5 yrs=	7
minus DGNs=	0
Annual accident rate	1.40
10% of PIAs=	0.14
value of acc. savings	£14,840

<u>Repair Calculation</u>	
2008 Scheme repairs	£1,200
2009 Scheme repairs	£23,664
pro rata	£12,432

Notes
(1kWhr causes 0.54kg of CO₂)
(£106k per PIA)

Annex B: Assessing existing road lighting

