GOOD HOUSING DESIGN – LIGHTING

Thomas Pocklington Trust
for people with sight loss

A practical guide to improving lighting in existing homes

Good Practice Guide 5 2nd edition
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The Wilberforce Trust
Supported Housing, Training and Rehabilitation Services
for People with Visual Impairments

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The content and style of this publication has been informed by people with sight loss and by housing, support, rehabilitation, occupational therapy, lighting and research professionals working in: Cardiff Institute for the Blind, Bradford City Council, Devon County Council, 'Focal Point UK', Göteborg University, Hampshire County Council, Hertfordshire County Council, London Borough of Kensington and Chelsea, 'Lighting Solutions', Medilink West Midlands, Optima Low Vision Services, Portsmouth City Council, Renfrewshire Council, Rhondda Cynon Taff Council, RNIB Cymru, St Dunstan's, Sense, the Southern Health and Social Services Trust (NI), the Southern Rehabilitation Workers' Forum, Stride Treglown Architects, Trafford Housing Trust, London Borough of Waltham Forest and Whitecroft Lighting.

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About Thomas Pocklington Trust

Thomas Pocklington Trust is a national charity dedicated to delivering positive change for people affected by sight loss.

Research is a central part of Pocklington's work. Each year we fund social and public health research initiatives to identify practical ways to improve the lives of people with sight loss and influence the services and facilities that they use.

Our research priorities are:

- The health and wellbeing of people with sight loss
- Housing and built environments that support the independence of people with sight loss
- Building the capacity of organisations and services that work with people with sight loss to shape research and use research findings.

Good Practice Guides

The Pocklington Good Practice Guide series offers advice and insight based on research projects funded by Pocklington. The guides strike a balance between giving the reader information about the background and research on the topic, and presenting findings and giving advice. They are not prescriptive, but by drawing together experiences of what works, they aim to provide support to professionals working with people with sight loss.

In this publication, the terms 'visually impaired people', 'blind and partially sighted people' and 'people with sight loss' all refer to people who are blind or who have partial sight.

The photographs in this publication are not intended to show 'best practice' but to demonstrate the housing situations in which people with sight loss may live and where improvements may be made.

Scope and purpose

Better lighting at home can make a dramatic difference to people's lives. This Good Practice Guide explains how to improve lighting to meet the needs of people with sight loss. It will be useful to anyone supporting others to live independently in their own homes, such as housing and support staff, home improvement agencies, rehabilitation workers for people with visual impairment (ROVIs) and occupational therapists (OTs). It covers every part of the home, and is also relevant to grouped accommodation.

This Guide builds on:

- *Housing for People with Sight Loss – a Thomas Pocklington Trust Design Guide*
- the views of staff working with people with sight loss
- expertise in lighting design and installation.

This icon indicates that further information can be found in the Useful Resources section on page 17.

This icon indicates terms which appear in the glossary on page 18.

How common is sight loss?

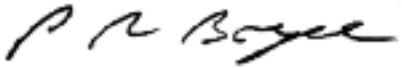
About two million people in the UK have vision impairment that affects their everyday life. Around one in five people aged over 75, and one in two people aged over 90 are living with sight loss. Sight loss is not only experienced by people in older age; over 400,000 working age people (below 65 years of age) in the UK also deal with its effects on a daily basis. Most people begin to lose their sight in later life because of normal ageing of the eye or the onset of age-related eye conditions, and the incidence of sight loss increases steeply with age. As numbers of older people in the population increase, so will the number of people with sight loss – it is predicted that by 2020 the number of people affected will rise to over 2,250,000 and that by 2050 the numbers will double to nearly four million.

The nature and degree of a person's sight loss is related to their eye condition. While there is no single lighting solution or response to sight loss, general approaches have been shown to be useful and are described in this Guide. These approaches will make homes safer, more secure and easier to live in and will support independence. Applying the advice in this publication will help the majority of people, whether or not they have sight loss, as well as people with other sensory loss.

Foreword

Lighting in the home has to fulfil several functions. First, lighting has to let people see what they need to see quickly and easily, without discomfort. What they need to see can vary from the fine print of a prescription, through the colours of clothing to flights of stairs. Second, lighting inevitably contributes to the appearance of the home, both lit and unlit. Third, lighting needs to be economic to run, easy to control and easy to maintain. The balance between these functions can shift depending on the visual abilities of the people who live in the home. For people with sight loss, the emphasis shifts towards allowing them to make the best use their remaining visual abilities but without compromising the appearance of the home or the economics and controllability of the lighting.

The problem faced by those attempting to improve the lighting of homes for people with sight loss is that lighting is simultaneously too easy and too difficult. It is too easy to provide some form of lighting and too difficult to provide good lighting. To provide good lighting it is first necessary to identify that the existing lighting is inadequate in some way and then to determine what should be done to improve it. This Good Practice Guide addresses both these objectives and provides practical and sensible lighting solutions for existing homes, room by room. For this reason, it is to be welcomed by all those with sight loss and all those who seek to enhance the quality of life of people with sight loss.



Peter Boyce, Professor Emeritus, Rensselaer Polytechnic Institute

Thomas Pocklington Trust's programme of research and development about housing for people with sight loss has informed practical improvements in independent and shared housing. This research and practice have emphasised that appropriate lighting can make the most of sight and contribute to improved quality of life and independence. That applies to everyone, and particularly people with sight loss – however that is caused.

This guide combines technical information about lighting with practical experience. It shows what can be done to make any and every home safer, easier to live in and more pleasant for older people and people with sight loss. It will be of value to anyone who seeks to support and enhance independence at home. I hope it will become an indispensable tool.

Mike Brace CBE, Chief Executive, VISION 2020 UK

Contents

Benefits of good lighting

Health, comfort and wellbeing

Natural light is important for personal health and has implications for mood, sleep and motivation. Most people express a preference for windows and natural daylight in their homes.

Daylight is usually greater near windows, and reduces when moving further away. Direct sunlight can cause harsh shadows and **glare** that may be uncomfortable and make vision more difficult. Horizontal or vertical blinds are the best way to reduce glare and control daylight.

Reducing glare is also important when choosing and positioning electric lighting: shades or diffusers should be used to prevent a direct view of the **lamp** from all normal viewing directions.

Some specific health conditions have implications for lighting: people with albinism experience discomfort in bright light; people who are autistic may find bright and/or flickering light disturbing; people with lupus may be uncomfortable in ultra-violet light; people with dementia may be agitated when daylight is lacking.

Dementia

A Guide to the design of homes and living spaces for people with dementia and sight loss emphasises the importance of natural light, good positioning of lighting and uniformity of lighting levels in and between different rooms and spaces in the home (University of Stirling, 2014).

Safety, orientation and security

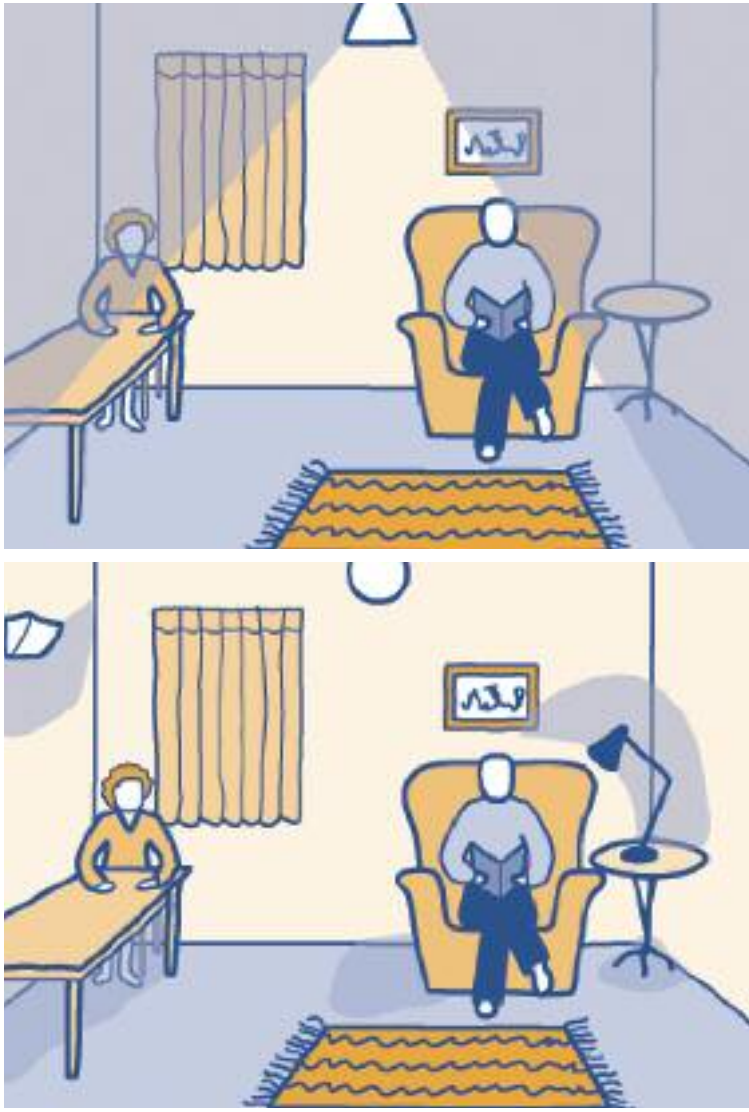
Good lighting can support individual safety and orientation by illuminating areas of risk (such as steps), tasks (such as chopping vegetables) and by making it easier to find and use door keys and doors. Different colours, types or configurations of lights can mark particular features and help with orientation. Lighting also increases security because it can indicate that a house is occupied.

Light, sight and falls

According to the National Service Framework for Older People in England, 'falls are a major cause of disability and the leading cause of mortality due to injury in older people aged over 75'. People with sight loss fall more often than others: the Audit Commission attributed 90,000 falls in England and Wales in a single year to visual impairment, estimated the cost to the NHS at £130 million and recognised that poor quality lighting was a contributory factor in falls.

Lighting for tasks

Lighting should help people carry out their usual activities within their home. There should be sufficient light for specific tasks, and an even level of light so that people's eyes do not need to readjust significantly to different light levels when they stop an activity or move away. Easy-to-use controls to switch or dim lights are important too.



Lighting from more than one source is likely to be more effective than light from a single point.

Seven characteristics of good lighting

Lighting should be part of the routine assessments of the needs of people with sight loss and part of regular reviews of maintenance, refurbishment and adaptations to their homes. Improvements do not have to involve major works; big differences can be made with small changes and at low cost. The aim is to create a visual environment that:

- maximises useful sight
- is free of glare
- offers an even level of light
- offers easy adjustment and control of all lighting sources and levels.

Discussions with people with sight loss and professionals working with them (in vision rehabilitation, occupational therapy, lighting installations and housing design and maintenance) have identified seven characteristics of good lighting which can be used to guide decisions about lighting options in every room in the home.

Lighting should always be:

1 Appropriate for the individual

Each person's needs are considered and appropriate responses found that meet individual needs, such as managing glare, and creating a visual environment that supports the person's chosen ambience and activities.

2 Sufficient for tasks, orientation and movement

For each person, a minimum level of light, from natural and / or artificial sources, is provided for ambient and task-specific purposes.

3 Even, across different areas and with minimum glare

Deep shadows or sharp changes in light levels, from one room to another or within rooms, do not occur and light levels are as even as possible. To minimise glare, lamps are not directly visible from normal directions of view.

4 Adjustable for flexibility

Switching, dimming and different lighting elements accommodate varying needs, for tasks or ambience, of all those who live in or visit the home.

5 Energy efficient and sustainable

The best use is made of energy in meeting lighting needs. Natural light is used effectively – including simple measures such as curtain tie backs and blinds to control light direction and glare. Appropriate lamps are chosen to meet lighting needs without wasting energy.

6 Simple to install, minimising disruption

Existing wiring and fittings are used wherever possible. Simple replacements or alterations, such as adding task lights, changing decorations, colours and furniture layout, or altering switches or lamps, are considered before major changes.

7 Adaptable for the future

Installations can be altered to respond to changing needs, to new occupants and to lighting innovations.

Appendix 1 offers a checklist to support assessments using these seven characteristics.

There are many options in response to individual needs and some popular approaches are outlined here.

Some lighting options

Living Room
Additional ceiling and/or wall lights for more even lighting distribution. Freestanding task lights and **uplights** as appropriate.

Kitchen
Under-unit lights to illuminate worktops, cooker and sink. Shades to reduce glare and shadow.

General
Individual switches, dimmable where possible. Good quality portable and adjustable task lights. Judicious use of colour and contrast. Blinds to control natural light from windows.

Bathroom
Mirror lights over basins. Lights over showers. Upgrade of shaver lights.

Stairs
Light shades to reduce glare. Spotlights to highlight stair edges. High **illuminance** on landings.

Bedroom
Wall uplights above bedhead. Lights in wardrobes and cupboards. More light fittings as necessary. Automated lighting on getting in and out of bed.

Adapted from work by Steve Brodrick (Lighting Solutions) for Thomas Pocklington Trust

Housing for people with sight loss – A Thomas Pocklington Trust design guide, details over a hundred ways that good housing design can improve the lives of people with poor sight. It draws on extensive research with visually impaired people.

Housing for people with sight loss – a practical guide to improving existing homes applies the Design Guide in the context of housing maintenance and improvement. Six key points frame guidance across individual homes.

Housing Sight was produced by RNIB Cymru to build on **Lifetime Homes** and address housing design that is effective for people with sight loss. It addresses colour, reflectivity and contrast, as well as lighting, and has led to further work on colour and contrast.

Visibly Better is an RNIB accreditation scheme for care homes and sheltered housing that brings together issues of colour, contrast and lighting to inform design, maintenance and refurbishment. www.rnib.org.uk

Assessing individuals' needs and meeting lighting needs at home

Mr G. is 90 years old and has advanced macular degeneration. He lives in a ground floor sheltered housing flat in Basingstoke and has mild dementia.

A particular problem for Mr G was taking his medication. He habitually did this in the kitchen but could not easily see his tablets there. Under-unit linear fluorescent lighting was provided to make this easier.

His dementia meant that Mr G did not remember to switch this new lighting on or off. Switching for the main overhead kitchen light was linked with the new under-unit lights so that all the lights are switched on and off together.

The lighting changes have made no obvious change to his home, but because Mr G is able to take his medication safely his independence and wellbeing have improved.

People's circumstances and needs vary; individual assessments are essential to make the best use of resources and offer effective responses.

Low Vision Services, vision rehabilitation staff and/or occupational therapists may provide detailed assessments of a person with sight loss and their needs. Assessment procedures are generally standardised within different services, and may be linked through a single assessment process.

People with other conditions and needs alongside sight loss (which includes many older people) may not have had a specific sight loss assessment and this means that lighting options to make the most of sight may not have been considered. Housing and support staff can then play an important role in identifying how to make the most of sight by improving lighting.

The checklist in Appendix 2 is designed to help determine the lighting needs of anyone with sight loss.

Housing design and maintenance

Most housing in the UK was not designed with the needs of people with sight loss in mind. The principles of **universal design** have informed recent design standards, such as the Lifetime Homes standards, but these include few references to lighting. New housing may not address the lighting needs of people with sight loss adequately, or even make the most of the lighting provided.

Pocklington research into lighting the homes of people with sight loss found:

- Low levels of lighting
- Uneven lighting, shadows and dark areas
- Light fittings allowing a direct view of the lamp, causing glare
- Differences between light levels in different spaces causing adaptation problems when moving from room to room
- Poor control with inadequate switching or dimming
- Lack of information on potential improvements.

Routine maintenance and refurbishment by landlords and home owners can incorporate lighting improvements, often at modest cost.

In poor housing the 'Housing, Health and Safety Rating System' equips environmental health inspectors with a tool to identify the 'risk of harm' that can arise, including from 'lack of lighting'.

Lighting and complex needs

For some people sight loss may only be one aspect of their needs. Improvements in lighting need to be carefully tailored to their specific situation, but can have a range of benefits. Anyone with hearing loss is likely to benefit from lighting that is positioned to illuminate people when they are speaking.

Installing new lighting

In new housing or major refurbishments, building, electrical or lighting engineers will install lighting to a specification provided by architects or housing teams.

In other circumstances, installations are defined by an individual usually working with a professional such as an occupational therapist (OT) or rehabilitation worker. Who installs the lighting will depend on the work to be done, the services provided by the rehabilitation worker or OT, housing tenure and how work is being undertaken and funded.

An effective approach is where a local authority sensory impairment team works directly with a lighting technician, in-house or routinely commissioned. This happens most often when installations are made in local authority housing, but it can be more widespread. In rented housing, landlords must grant permission for adaptations and alterations and may specify or provide contractors to do the work.

Local authority sensory impairment teams working with lighting technicians

The Portsmouth visual impairment team works with the Council's own 'Homecheck' service to provide tailored lighting interventions and other adaptations for people with sight loss. The service operates across tenures for people aged over 60 or with disabilities. Charges, where applicable, are based on ability to pay. Low-interest loans are also available.

In privately owned housing it will normally be necessary to engage a private contractor or a **Home Improvement Agency (HIA)**. Local authorities and local Age UK organisations may provide lists of appropriate contractors.

Minimising disruption

Most people do not like disruption in their home and lighting installations and alterations should be carried out with minimum disruption and without the need for re-decoration. This means that, whenever possible, new lighting should be provided without changes to existing wiring and fittings. Changes to mains wiring can be expensive and building regulations require such changes to be undertaken, inspected and approved by a qualified person. Minimal disruption and maximum effect can be achieved in different ways.

- Floor or table lamps can be plugged into existing wall sockets.
- Ceiling lights can be moved, or more added, by replacing the existing light point with a junction box and running cables in plastic trunking to the new light points or by using a lighting track.
- In kitchens, under-cupboard lighting can use existing sockets. If there is a shortage of sockets, single sockets can be converted to double sockets or double sockets to triple sockets.

Paying for new lighting

Where costs are incurred in housing owned by local authorities or registered social landlords these may be met by the housing provider.

In other settings the cost of lighting installations can be met, in part or in full (depending on individual circumstances) through repairs grants and **Disabled Facilities Grants (DFGs)** or, in Scotland, Disabled Adaptation Grants. Other grant assistance and/or low- or no-interest loans may also be available.

Some portable lighting may be available at low or no cost from local authority vision rehabilitation teams, OTs or Low Vision Services. Eligibility criteria will apply and Individual Budgets may be available.

The Welsh Low Vision Service

This service uses a specialist low vision examination by High Street opticians to give eligible people free loans of vision aids and appliances, including portable task lamps.

Northern Ireland Eye Clinic Liaison Service

This service provides low vision aids (including portable **task lighting**) at no cost, or a grant in lieu, for people who are registered or qualify for registration as being blind or partially sighted.

Equipment – lamps, luminaires, controls

More details of all these items are given in Appendix 3. The Rica guide, 'Choosing energy saving light bulbs for your home' produced for Pocklington in 2014 gives information on the different types of bulbs available.

Lamps

A wide range of lamps (commonly called 'bulbs') is available for use at home. Traditional GLS tungsten filament lamps are no longer generally available – they have been phased out as they are not energy-efficient.

There are three main types of energy saving lamps:

Compact fluorescent lamps (CFLs)
These are the most common energy saving lamps, which can take a short time to reach full light output after switch-on. Dimmable CFL lamps are available and are identifiable as such from the packaging.

Halogen lamps
These are the cheapest energy saving lamps and give very similar light to old-fashioned lamps. They are also the least energy efficient and the least durable. They give full light output at switch-on and are dimmable.

Light emitting diodes (LEDs)
These are the most expensive energy saving lamps. They are also the most energy efficient and durable. A £25 LED light should pay for itself within five years. Developments in lighting using LEDs are advancing rapidly and it is now possible to buy a range of lamps, including dimmable LEDs, which are identifiable as such from the packaging.

Traditional 'linear' fluorescent lamps, which are up to seven times more energy efficient and can last up to eight times longer than traditional GLS tungsten filament lamps, will continue to be available.

Luminaires

Luminaires (or 'light fittings') come in many different forms.

General lighting luminaires are commonly fixed to the ceiling or suspended from it. They may also be attached to walls or be freestanding, often in the form of uplights.

Task lighting can be provided by portable task lamps or by fixed luminaires such as miniature fluorescent luminaires over a worktop, fixed behind a pelmet under a kitchen cupboard. Spotlights focused on a task area and fixed to a room surface can also provide task lighting.

Controls

For optimum control, each lighting element should be controlled separately. Control can be either by switch or dimmer. The lighting can then be adjusted to meet changing needs associated with different activities. Some people with sight loss find that their lighting needs vary from day to day. Controls can adjust the lighting appropriately. For some people, grouping lighting and controlling it from a single point may be more appropriate. Discussions with the user will identify the best approach.

Automatic control of lighting is common for outside security lighting which is activated by movement (using passive infrared or PIR detectors). The same kind of automation can provide automatic lighting within the home. For example, a PIR or other sensor activated by getting up at night can be used to switch on a bedside lamp or lights on the route to the bathroom. This can be part of a wider telecare installation involving other sensors or devices.

Mrs A is 85 years old and has mobility problems as well as sight loss caused by diabetic retinopathy. She lives in a ground floor apartment in Paisley linked to Renfrewshire's telecare service. After a fall she returned home from hospital with a package of support that included a sensor that switches on bedside, hall and bathroom lights if she gets out of bed in the night and switches them off when she gets back into bed. The lighting increases her safety at night and reduces the risk of another fall.

Entrances

Lighting at entrances is most important at night to provide safe and navigable access when leaving and returning. Appropriate, often high level, lighting is essential in the dark. Automated lighting using PIR sensors is commonly used.

External lighting is needed on the approach to the building for:

- Identifying the front door from a distance
- Safe transit from the road to the door
- Finding the lock and inserting the key.

Intelligent homes

A demonstrator house in West Bromwich includes automated external lights at the main entrance door and pathway.

A key fob or use of a targeted SMS text message automatically opens the outside gate and turns on a 'runway' of tungsten halogen embedded lights. The entrance door is opened after a finger is swiped across a finger-print reader. Inside the house, automated blinds support easier control of light levels and glare.

Halls and stairs

Lighting at the head and foot of stairs and on landings can reduce the risk of falls and trips.

Lighting must be positioned to improve contrast between stair treads and risers – a luminaire at the top of the staircase will light the treads but the risers will be in shadow. Lamps should be shaded to prevent glare as people move up or down the stairs.

A luminaire on the ceiling just inside the front door will illuminate the door, post box and, when the door has been opened, callers.
In larger halls an additional luminaire further away from the door will give even lighting.

To avoid shadows and problems adjusting to dark or light areas, similar levels of light are needed across the hall and the rooms and stairs opening from it.

As well as good ceiling lights, task lighting over a telephone is important.

Living and dining areas

A mix of ambient and task lighting is essential to support normal activities.

General ambient lighting will typically be provided by one or more luminaires suspended from the ceiling. Diffusing shades should conceal any direct view of the lamp and reduce glare.

Depending on the room and on people's needs, other fixed lighting options include: further ceiling lighting, wall lighting, and lighting above pictures. Additional general lighting can be provided by free standing uplights, (see picture on page 25) for example to light a dark corner. Task lighting can also be provided by freestanding floor or table lights.

Furniture layout will reflect activities in the room and will affect distribution of natural and artificial light and inform the need for task lighting in different places. During daylight, furniture should be positioned to ensure that natural light shines over the shoulder of somebody with their back to the window, for example to light the book they are reading.

As well as good ceiling lights, task lighting over an armchair is important.

Bathrooms, showers and WCs

In bathrooms and shower rooms, and any other areas where moisture is likely, electrical fittings need to be protected from moisture. It is recommended that lighting work in these areas be carried out by a qualified and competent person familiar with the relevant sections of the IET Wiring Regulations (BS 7671) and fittings must conform to relevant safety standards.

Too often, inadequate levels of lighting and uneven distribution make personal care difficult. Lights over mirrors, shaver points, showers and basins are important.

Two fluorescent lights with circular diffusers on the ceiling of this bathroom ensure an even level of light. A linear fluorescent light above the mirror illuminates the face and assists personal care. The dark shaver point and door frame contrast with the light-coloured wall and there is good colour contrast between the wall tiles and the basin.

Note also the contrasting blue strip down the edge of the shower curtain making it easier to see.

Kitchens and utility areas

Appropriate lighting can make it easier to prepare and cook food. Under-unit lighting above working surfaces and placed behind a pelmet at the front of the unit provides light without glare where it is needed. Fixed or portable task lights can add extra light - such as over hobs or near washing machines and sinks.

Good general lighting can be achieved by linear fluorescent lamps that provide even levels of light across the area and reduce the risk of shadows.

Light for cooking

Cooking is a key part of everyday life. For a young man with congenital stationary night-blindness and the beginnings of a cataract on one eye, appropriate kitchen lighting was achieved through:

- control of natural light to the kitchen by a horizontal slatted blind
- six ceiling mounted mains voltage 50watt tungsten halogen downlights with wide (36 degree) beams to provide general room lighting
- linear fluorescent lighting on 'daisy chains' pointing down, mounted behind a pelmet under the front of kitchen cupboards to light work surfaces
- specialist lights over the hob to direct light onto cooking.

White kitchen units contrast with dark working surfaces and floor. Their gloss finish would not suit everyone with a visual impairment. 'Bump ons' on the microwave and washing machine controls are the only indication that the kitchen has been developed for someone with sight loss.

Bedrooms

All too often, task lighting is given inadequate attention in bedrooms. Bedside lamps should be positioned so as to prevent glare when the occupant is sitting or lying in bed. Task lighting that illuminates dressing tables and chests of drawers and the interiors of wardrobes and cupboards is also valuable.

This bedroom was lit by a single pendant suspended from the ceiling close to the window. This produced a very uneven distribution of light across the room and left some areas, such as the ironing board, inadequately lit. The luminaire was clear glass allowing a direct view of the lamp and causing glare.

The addition of the lighting track, powered from the existing wiring outlet on the ceiling, enabled two pendants to be suspended providing a more even distribution of light throughout the room. Diffusing paper spheres prevented a direct view of the lamps, even when lying in bed looking upwards, eliminating glare. The lighting track also enabled spot lights to be fitted to provide higher levels of light on specific tasks such as the ironing.

Useful resources

Finding clothes

Wardrobe and cupboard lighting is a simple intervention that makes a big difference. In Pocklington housing, linear fluorescent lights are mounted behind a pelmet at the front of cupboards and wardrobes.

The lights are controlled by a pneumatic timer switch (with benefits in reducing energy consumption) or standard on/off switches which are positioned outside the cupboard with an indicator light to show when on. Automated switches controlled by the door closure are not used as these have been found to be unreliable over time.

Publications and guidance

Goodman C (2008) ***"Housing for People with Sight Loss: A Thomas Pocklington Trust Design Guide"***, EP 84. Bracknell, IHS BRE Press.

John J (2008) ***"Colour and Tonal Contrast: The Process from Guidance to Accessible Housing – A Supplement to 'Housing Sight'"***, RNIB Cymru.

Pollock R, McNair D, McGuire B and Cunningham C (2008) ***"Designing Lighting for People with Dementia"***, Dementia Services Development Centre, University of Stirling.

Rees L and Lewis C (2003) ***"Housing Sight: A Guide to Building Accessible Homes for People with Sight Problems"***, RNIB Cymru.

Thomas Pocklington Trust/RNIB (2009) ***"Improve the lighting in your home".***

BS:7671 ***"Requirements for Electrical Installation"*** (IEE Wiring Regulations 17th Edition) British Standards Institute.

Rica (2014) ***"Choosing energy saving light bulbs for your home"***

University of Stirling (2014) ***"Good practice in the design of homes and living spaces for people with dementia and sight loss"***

Thomas Pocklington Trust (2014) ***"Housing for people with sight loss – a practical guide to improving existing homes"***, GPG 4 3rd edition.

Links

College of Occupational Therapists
www.cot.org.uk

Foundations, the national body for home improvement agencies
www.foundations.uk.com

Housing Health and Safety Rating System
www.communities.gov.uk/housing/rentingandletting/housinghealth/

Lifetime Homes
www.lifetimehomes.org.uk

Lighting Association is a lighting manufacturers trade association
www.lightingassociation.com

Social Care Association represents rehabilitation workers
www.socialcareassociation.co.uk

Society of Light and Lighting is part of the Chartered Institution of Building Services Engineers
www.cibse.org

Telecare Services Association
www.telecare.org.uk

Visibly Better scheme
www.rnib.org.uk

Glossary of lighting terms

Bulb
Correctly termed a 'lamp', a bulb is a source of optical radiation (light). Lamps are replaceable components that fit into luminaires (light fittings).

Colour appearance
Colour appearance is often characterised by colour temperature. A 7,500 **Kelvin** colour temperature will appear bluish (described as 'cold'). A 2,700 Kelvin colour temperature will appear yellowish (and 'warm').

Colour rendering
Colour rendering describes the effect of a light source on the colour appearance of objects as compared with their appearance under an ideal or natural light source. A colour rendering index (CRI) between 80 and 100 reveals colours well.

Control gear
Control gear regulates the electrical current and, therefore, the running (and in some cases starting) of a lamp. The way this regulation takes place varies for different kinds of lamp.

Disabled Facilities Grant
Disabled Facilities Grants (DFGs) are provided in England, Wales and Northern Ireland towards the cost of home adaptations that are 'reasonable and practical' to enable beneficiaries to live independently.

Glare
Glare arises from sensitivity to light. When parts of the visual scene are much brighter than the remainder, such as a direct view of a bright lamp, 'discomfort' glare can occur without impairing vision. 'Disability' glare arises from light sources pointing towards the eye, reducing contrast and impairing vision.

Home Improvement Agency (HIA)
Home improvement agencies (often referred to as 'care and repair' or 'staying put' agencies) undertake, with the aid of grants and subsidies, improvement, repair and adaptation work for older and disabled people.

Illuminance
The illuminance on a surface is the density of light falling on it (see Lux).

Kelvin See 'colour appearance' above.

Lamp
A lamp is a source of optical radiation (light). Lamps are replaceable components that fit into luminaires (light fittings). The term bulb is often used instead of lamp.

Lifetime Homes
Lifetime Homes are designed to facilitate accessibility, usability and visitability by a wide range of people with disabilities. Key aspects are embodied within building regulations.

Light (illuminance) meter
Light meters, more correctly called illuminance meters, are used to measure the amount of light falling onto a given plane.

Lumens
The lumen is a standardised unit of measurement of the total amount of visible light that is produced by a light source, such as a bulb or a tube.

Luminaire
A luminaire is the apparatus containing the light source. It connects the light source to the electricity supply, controls the distribution of light and protects it from damage.

Lux
Lux is the unit of illuminance (the density of light falling on a surface). A person with sight loss may need up to 1000 lux to undertake some tasks in the home.

PIR (passive infrared sensor)
PIRs are commonly used for security systems. They measure infrared light that radiates from objects. Changes in such light are caused by movement, the detection of which can be used to activate other devices.

Task lighting
Task lamps give light to a specific and nearby area. The user can often control the light by switching, dimming or positioning the source. Lamps are typically tungsten halogen or compact fluorescent.

Telecare
Telecare describes any support service delivered directly to a user in his/her home that is supported by information and communication technology. It includes telehealth.

Universal design
Universal designs in products, services or the built environment, are those which maximise accessibility and usability for people of different stature, physical and sensory impairments.

Uplight
Uplights (also called uplighters) are luminaires where the light distribution is predominantly upward. They can be suspended below the ceiling, wall mounted or freestanding, and require a clean, white ceiling for efficient operation.

Checklist: Occupant lighting needs

This checklist is based on the seven characteristics of good lighting, listed on page six. It can be applied to each space within the home and finally to the home overall. If the answer to any of these questions is 'No' then action should be considered.

1. Appropriate

- Does the lighting enable the occupant to move comfortably around the space?
- Does the lighting enable the occupant to carry out their activities comfortably?

2. Sufficient

- Is the space light and bright?
- Is there enough light on tasks?
- Is there enough light to move around?

3. Even

- Is the lighting even, avoiding shadows and sharp changes in light level?
- Are lamps concealed from direct view, minimising glare?

4. Adjustable

- Is each element of the lighting separately switched or dimmed?
- Are there appropriate window blinds or curtains?

5. Energy efficient

- Is daylight used whenever possible?
- Are energy efficient lamps used?

6. Simple

- Are any proposed changes to the lighting designed to avoid disruption?
- Is existing wiring and equipment being used wherever possible?

7. Adaptable

- Is any new lighting adaptable to future changes in need?
- Would the lighting be suitable for other future occupants with minimum alterations?

At the beginning of this report, seven characteristics were highlighted for determining lighting options for people with sight loss. These related to their appropriateness, sufficiency, evenness, adjustability, energy efficiency, simplicity and future adaptability. Each of the seven points requires consideration for each proposed lighting intervention. All seven should normally be satisfied.

A prelude to considering the seven characteristics is understanding the range of potential lighting interventions that could meet the needs of the person with sight loss. The options will relate to their daily living needs and their normal or desired range of family, social, leisure and work activities.

It is logical to start by setting out the options in relation to the person's needs. A checklist is offered below to facilitate this. Then for each potential option and for the proposed lighting interventions as a whole, the seven points should be considered – with options being reaffirmed or adjusted as appropriate. Use of the checklist presupposes the prior informed consent of the person with sight loss or, where appropriate, their carer.

The checklist is designed for copying and use in the field. Additional information (e.g. in the form of a cover page) will also need to be gathered on the person and the home concerned.

1. Activities

Does sight loss mean the person has difficulty undertaking some tasks in their home?

Y N

Options:

- Window cleaning, curtain tie-backs, longer curtain rails to move curtains clear of windows, removal of net curtains, cutting back foliage outside windows.
- Use of fixed task lights at key locations and/or portable task lights where tasks are undertaken (or where the person with sight loss wishes to undertake them).
- Increase the number of light sources. Ensure their location does not create glare.

Does the person have difficulty reading, e.g. letters and bills?

Y N

Options:

- Make sure person has appropriate spectacles and simple vision aids (including magnifiers).
- Consider use of technologies such as screen readers and computers.

2. Glare

Does the person experience discomfort with glare?

Y N

Options:

- Use diffusing (e.g. paper) shades or covers (for strip lights) to reduce glare and diffuse light.
- Re-arrange furnishings and/or luminaires to avoid bright light shining directly into the eyes.
- Increase control of light through dimmer switches and adjustable window blinds.

3. Hearing loss

Does the person also have hearing loss?

Y N

Options:

- Increase light levels at appropriate locations (including at the front door) to facilitate communication through lip-reading or signing.
- Position chairs in good light.

4. Getting around the house

Does the person have difficulty getting around the house?

Y N

Options:

- Improve ability to identify landmarks and switches by enhancing colour contrasts (using paint, cushions and throws, etc.).
- Reduce visual clutter.
- Replace patterned carpets and furnishings with plain contrasting colours.
- Minimise differences in light levels between rooms.
- Consider automated lighting for frequent routes.

Are there risks of falls, slips, bumps or trips in the house?

Y N

Options:

- Remove trip hazards (such as loose rugs).
- Increase lighting levels and reduce glare in areas of high risk such as steps, stairs and between rooms.
- Increase general lighting levels in all rooms.

- Consider automated lighting when getting out of bed.
- Relocate switches.
- Provide two-way light switches at key locations.

5. Dressing

Does the person have difficulty finding / matching clothes?

Options: Y N

- Provide better lighting in bedroom through additional light fittings.
- Provide lighting in wardrobes and clothes cupboards.
- Provide lighting above dressing tables.

6. Personal Care

Does the person have difficulty washing, shaving or putting on make-up?

Options: Y N

- Increase lighting levels in bath or shower room.
- Provide lighting above mirrors and shaver points.
- Improve lighting above and around wash hand basins and showers.

7. Cooking and Eating

Does the person have difficulty cooking, preparing or eating food?

Options: Y N

- Increase lighting levels in kitchen and over dining / eating area.
- Provide under-unit lighting to illuminate worktops.
- Increase colour contrasts in food preparation and eating areas including plates, cutlery and kitchen appliances.
- Reduce glare through shading lights and avoiding gloss finishes.

8. Entering the Home

Does the person have difficulty seeing their way to and through their entry door?

Options: Y N

- Provide better outdoor lighting.
- Consider PIR-activated lights by doors and above locks.
- Clearly mark the path to entry door using lights, scented plants, textured surfaces.
- Make numbers, locks and other door furniture clear by using colour contrasts and tactile clues.

9. Key Overall Points:

Will the lighting enable the occupant to move comfortably around the space/do the task? [Appropriate] Y N

Will the lighting be sufficient for the activity/task and enable the person to move around? [Sufficient] Y N

Will the lighting be even, avoiding shadows and sharp changes? Will lamps be hidden from direct view? [Even] Y N

Will the lighting be separately switched or dimmed? Will there be appropriate window blinds and curtains? [Adjustable] Y N

Will daylight be used whenever possible? Will energy efficient lamps be used? [Energy Efficient] Y N

Will the lighting changes be done with minimal disruption? Can existing wiring and equipment be used? [Simple] Y N

Will new lighting be adaptable to future changes in need? Would it be suitable for future occupants? [Future Adaptable] Y N

Download this checklist from the Pocklington website at: **www.pocklington-trust.org.uk**

1. Types of lamps and their uses

The key properties of different types of lamps (bulbs) and luminaires (light fittings) that are often used in domestic settings are summarised below.

Tungsten General Lighting Service (GLS) Lamps

GLS lamps use a lot of electricity to generate relatively little light and they have short lives. For this reason they have been mostly phased out.

Tungsten Halogen (TH) Lamps

Tungsten Halogen lamps operate on the same principle as GLS lamps but the filaments reach a higher temperature. They tend to be brighter, smaller and more efficient, and come in a wide variety of shapes and sizes. Wattages range from 10w to 500w. The quality of light from TH lamps is similar to that of GLS, but they tend to appear slightly cooler in colour.

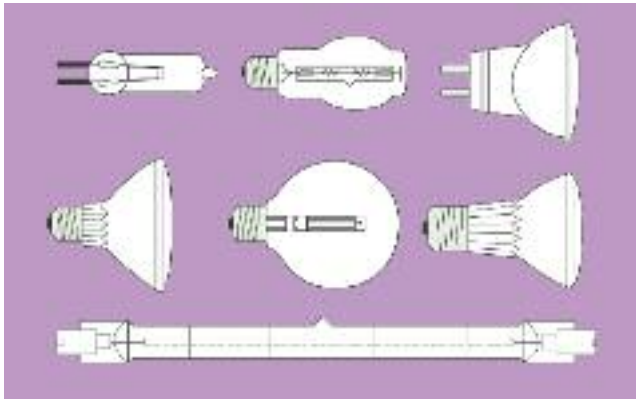
Some TH lamps connect directly to a mains electricity supply; most low wattage lamps (50w and below) run off 12v and use a transformer.

There are some TH lamps which have been designed to replace GLS lamps. The lamps are about 30% more efficient than GLS, and whilst they are not as energy efficient as CFL lamps (see table), they have the advantages of giving their full light output instantly and being dimmable. The mains voltage type TH lamps are expected to be phased out from autumn 2016.

Linear and Compact Fluorescent Lamps

Fluorescent lamps are over seven times as efficient in energy use as GLS. Good linear fluorescent lamps offer excellent **colour rendering** and it is possible for the colour appearance to range from a warm yellow light (close to that of a GLS lamp) to cooler colours similar to that of a northern sky. For domestic use it is common to use fluorescent lamps with warm colours because these match best to tungsten lamps and provide a cosy atmosphere.

Linear fluorescent lamps are available in a range of lengths, diameters and powers. The most popular diameters are T4 (12.5mm), T5 (16mm) and T8 (25mm). T4 lamps are often used as under-cupboard lights. The larger T5 and T8 lamps are used for general lighting. The length of the lamps ranges from 0.22m up to 1.8m, and their wattage from 10w to 80w.



TH lamps come in a range of shapes and sizes

Almost all modern fluorescent lamps use electronic control gear that gives an instant start and no flicker. They have a very long life but the light output tends to fall over time. To ensure appropriate lighting levels the lamp may need to be replaced before it fails.

LEDs

Light emitting diodes (LEDs) are semi-conducting materials that emit light when current flows through them. LED lamps are increasingly available in a range of shapes, sizes and fittings to replace traditional lamps. As with CFLs, they will not necessarily work with a dimmer switch and if compatibility with dimmers is required, then this will be indicated on the packaging. There are some downsides to LEDs, notably the high initial cost and possible poor colour rendering.

Light and brightness – lumens are here to stay

Most people are used to choosing a lamp by its wattage, but wattage is a measure of the power consumption of the lamp and is not a good measure of brightness. The measure of how much light is given out by a lamp is given in lumens (lm) and all packaging should now give brightness in lumens. Many manufacturers also give a 'watts equivalent' figure on their packaging to indicate the brightness level.

Colour appearance of all lamp types

Northlight	6,000-6,500 Kelvin
Cool White	4,000 Kelvin
Intermediate White	3,500 Kelvin
Warm White	3,000 Kelvin
Very Warm	2,700 Kelvin

Compact fluorescent lamps (CFL) work in the same way as linear fluorescent lamps, but the tube is folded. This means that CFLs are smaller than their linear equivalents. CFLs have shorter lives and take longer to reach their full brightness. Some have a pin base and require separate control gear (like a linear fluorescent lamp). Others have integral gear and the same base (bayonet or edison screw) as a GLS lamp, offering an energy saving alternative. The disadvantage for many people with sight loss is that these lamps can take several seconds (up to 30) to reach full brightness.

The table below summarises the performance of the various lamps.

Lamp type	Energy efficiency	Useful life (hours)	Light depreciation	Colour rendering	Start-up time	Comments
Tungsten Halogen (Th)	Poor	2,000+	Fails before critical reduction	Excellent	Instant	At power below 75w low voltage versions perform better
Linear Fluorescent	Very Good	16,000	10% loss at 16,000 hours	Good	Few seconds	Lamps perform less well with old style **control gear**
Compact Fluorescent (separate gear)	Good	12,000+	Poor output after 12,000 hours	Good	Up to 1 minute	Vast range of lamps of different quality so hard to generalise
Compact Fluorescent (integral gear)	Fair	8,000	Poor output after 8,000 hours	Good	Up to 2 minutes	
Light Emitting Diode (LED)	Very Good	20,000	Output may not drop noticeably during useful life	Good (in better quality lamps)	Instant	

2. Types of luminaires (light fittings) and their uses

The range of luminaires is vast. Three types are frequently used in the home: task lighting, general or ambient lighting and under/in-cupboard lighting. Those suitable for use will carry a CE marking (reflecting conformity with European standards).

Task lighting

Task lighting comes in a multitude of sizes and types. A range of fittings and lamps (bulbs) can support different types of illumination to suit different eye conditions and preferences.

Fixed task lighting includes wall, ceiling, cupboard or under-unit lighting that is positioned to target light on an activity. Fittings should be positioned to target a task and avoid glare.

Portable task lighting can be mains or battery powered. They can be used flexibly, with their direction and position being adjustable, can be tried out with minimum disruption and are often cheaper than fixed lighting.

Key questions to ask when selecting portable task lighting are:

- Is it easy to adjust the fitting to direct light where it is needed?
- Is the on/off switch easy to find and use?
- Does the fitting remain cool when in use?
- Is the stand firm and stable?
- Does the lamp offer appropriate light? (see descriptions above)
- Does it offer added features that are useful?

Some portable task lighting uses rechargeable batteries. The light these give is limited by the power of their battery and it is important to know whether the charger is easy to use.

A GLS lamp clamped to furniture.

A CFL with separate control gear and a heavy base.

A folding portable light with rechargeable battery.

General lighting

The images below are examples of general luminaires that can provide ambient lighting.

This luminaire holds a linear fluorescent lamp. It is ideal where a lot of light is needed along the length of the fitting and will help ensure that no hard shadows are cast. It can appear institutional.

This luminaire holds a circular fluorescent lamp. It is almost as efficient and effective as a linear luminaire and lamp and may be regarded as more appropriate for domestic use.

This luminaire offers another approach to achieving high levels of lighting without hard shadows. It combines several lamps (either GLS, TH or CFL) in one fitting and is designed to throw light upwards so that it is reflected from the ceiling and gives an even spread through the room. A further benefit of this type of luminaire is that changes can normally be made to shades. Large shades help spread light over a wider area, and reduce brightness and glare.

These luminaires are tungsten halogen (TH) spotlights recessed into a ceiling. These are very good at lighting particular surfaces but require careful 'aiming' to ensure that the light is effective and does not cause glare. This type of luminaire has two main problems: their use of reflector lamps means that care is needed to use an appropriate beam width (a narrow beam can result in pools of light and dark areas left unlit) and fixing them often requires holes to be cut through the ceiling, in which case it is important to use a luminaire that constitutes a fire barrier or fit a fire-resistant hood.

Circular or square luminaires containing fluorescent lamps, such as the one in the picture on the right, are useful for halls and bathrooms. Luminaires installed in bathrooms or other areas where moisture is present must have appropriate seals to prevent moisture entering the luminaire.

General lighting can also be provided by free standing luminaires such as the uplight shown here lighting a dark corner. This luminaire also has a separately controlled task light attached providing additional lighting on the table.

Under/in-cupboard lighting

This lighting must be suitable for the situation – such as for mounting on wooden surfaces. Lamps must not get hot even in the event of an electrical fault within the luminaire. Such fittings are generally marked with a special symbol, shown below.

Options include miniature fluorescent luminaires on battens with a shade to diffuse light, miniature enclosed tungsten halogen luminaires and luminaires containing light emitting diodes (LEDs).

Cupboard lighting comes in a range of shapes and sizes.

Many factors influence the choice of fitting, and key questions to ask are:

- Will the fitting suit the location?
- Is the fitting safe for the surface finish?
- Is switching easy and safe (including turning lights off)?
- Will lamps and luminaires remain cool in use?
- Is glare prevented?
- Does the lamp offer appropriate light?

In general, miniature fluorescent luminaires on battens are the best source of light: they are efficient and cool, and their slim size means they can be fitted under cupboards without taking up too much space.

Lighting in very restricted areas may also be provided by small, battery powered, stick-on LED luminaires. These have the advantage that they do not need to be wired in and do not get hot. The battery life may be 100 hours and it is important that they are turned off when not in use. Some incorporate PIR motion sensors and turn on and off automatically. These are also useful as markers for wayfinding, for example during the night.

Control of lighting and lighting levels

The selection of appropriate luminaires and lamps is one part of the visual environment; lighting controls and levels are another. Together these should create a good visual environment. This should:

- Be glare-free
- Offer even lighting levels
- Enable the user to control the lighting easily.

In this context, and bearing in mind the needs of other household members, flexibility in lighting is important and can be achieved by making the position of the light source variable (e.g. through the use of directional or portable task lamps) or through switching and dimming arrangements.

Making light switches as conspicuous as possible is useful. There is a wide range of switch cover plates and surrounds that can enhance visibility.

Dimmer switches are most often used with tungsten GLS or tungsten halogen lamps. Most linear fluorescent lamps and CFLs which do not have integrated gear will only dim if they are fitted with dimming control gear and there is a separate electrical input to control output of the lamp. This usually means extra wiring running from the switch to the light fitting. Some CFLs with integral gear will run with dimmer switches.

The tables opposite offer guidelines for lighting levels for different tasks and rooms (and a maximum level of difference within or between rooms). These offer a starting point to consider how much illuminance is needed but, because people's needs are varied, should be treated with caution and with attention to the positioning of lamps.

Selecting and using a light meter

At least a Type F (field) meter (as defined in British Standard BS 667:2005) is necessary to give the required level of reliability. A meter with a range from 0 to 1,000 lux is adequate. These are available with manual or (more costly) auto range changes and with a remote or built-in light detecting cell. A cell remote from the main meter body means that the meter can be read with less risk of it being affected by any shadow.

In using a meter, care is needed to ensure that the reading taken is representative of the actual conditions. When measuring electric lighting levels, daylight should be excluded and lamps allowed to run up to their full level of brightness. Task lighting measurements should be made at the position of the task and in the same plane, e.g. horizontal, vertical, etc.

Over time, the sensitivity of meters can drift and regular checks need to be made to ensure correct calibration.

Suggested illuminances (LUX) appropriate for tasks

Task definition	Examples of activity	Suggested LUX
Routine	Showering/bathing	100 – 300
	Brushing teeth	200 – 300
	Washing (in bathroom)	100 – 300
	Finding keys	100 – 300
Time consuming	Reading/writing	200 – 1000
	Washing up	200 – 500
	Having a meal	200 – 500
Short detailed	Selecting clothes (wardrobe/drawer)	100 – 200
	Using the telephone	100 – 400
	Putting on shoes	100 – 300
Requiring concentration and with risk	Making a cup of tea	200 – 1000
	Cooking in the kitchen	200 – 1000
	Shaving	200 – 1000

Suggested illuminances (LUX) on the floors of each room

Rooms in the home	Suggested LUX
Hallway	100 – 300
Lounge	100 – 300
Kitchen	200 – 300
Bathroom	100 – 300
Bedroom	100 – 300
Stairs (on treads)	100 – 200

Suggested illuminance (LUX) differences between rooms

The lighting level in a room should not be more than twice the level in an adjoining room.

Illuminance levels are measured using a **light (illuminance) meter.**

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