Thomas Pocklington Trust
for people with sight loss

Lighting in and around the home: A guide to better lighting for people with sight loss

Endorsed by the
Institution of Lighting Professionals

About Thomas Pocklington Trust

Thomas Pocklington Trust is a national UK charity dedicated to delivering positive change for people affected by sight loss. Research is central to Pocklington's work. We fund and collaborate on social research in areas such as design and technology, rehabilitation, employment and health and support needs. The main aims of our research are: to raise awareness; to increase knowledge and understanding of needs; to identify practical ways to improve the lives of people with sight loss; and to influence the services, facilities and products that they use.

About the Guide

This Guide is a revised and updated edition of Pocklington's lighting Guide: Good Housing Design – Lighting: A practical guide to improving lighting in existing homes. The research and revision for this edition was carried out by Peter Hodgson, Lighting Consultant for Thomas Pocklington Trust, with further expert input from Peter Raynham at University College London.

Acknowledgements

Thomas Pocklington Trust is grateful to the case study participants for their valuable contribution. Thanks are also due to everyone involved in the preparation of previous editions of the Guide and to the research teams at University College London and the University of Reading, whose original work has informed the facts, principles and advice contained within it. The content of the Guide has also been shaped by the experiences of people with sight loss and by many professionals working throughout the UK in housing and support, rehabilitation and occupational therapy, architecture and design, assistive and inclusive technology and the provision of lighting products.

The luminaire diagram shown in Figure 3 has been reproduced with kind permission of the Institution of Lighting Professionals, from its *Guidance Notes for the Reduction of Obtrusive Light GN01:2011* **https://www.theilp.org.uk/documents/obtrusive-light/**

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Introduction

Scope and purpose of the Guide

There have been significant changes to light sources since Pocklington produced its first Lighting Guide in 2010 (second edition 2015). The moves towards low energy lamps and the use of long life LEDs (Light Emitting Diodes), often in new forms of light fitting such as long strips, mean that in many cases it is not necessary or practical to change the LEDs or to allow for replacement lamps in the design of light fittings.

This technology is relatively new and there has been limited feedback on LED lighting from people with sight loss. However, the Guide includes case studies based on Pocklington's experience of installing this type of light source for visually impaired people. We would welcome comments from others on what they think of LED lighting or other recent developments in the design and control of lighting.

This publication explains how to improve lighting to meet the needs of people with sight loss. A reduction in the provision of professional advice and support services in recent years has led to an increased need for self-help, to ensure that people can live independently and safely in their own homes. While earlier editions of the Guide were aimed largely at frontline professionals, such as housing and support staff, home improvement agency staff, vision rehabilitation officers (ROVIs), eye clinic liaison officers (ECLOs) and occupational therapists (OTs), this edition is also written for people with sight loss and their family members and friends.

The Guide covers every part of the home and includes some guidance on external lighting for safer access to and from the home. The guidance is also relevant to shared and cluster types of accommodation.

In Pocklington's guides and research reports, the terms 'people with sight loss', 'people with visual impairment' and 'blind and partially sighted people' are used interchangeably.

This publication builds on earlier reports and guides, including:

Housing for People with Sight Loss: A practical guide to improving existing homes (Pocklington Good Practice Guide 4)

http://www.pocklington-trust.org.uk/project/a-thomas-pocklington-best-practice-guide-for-housing-design/

Assistive and Inclusive Home Technology: A guide for people with sight loss (Pocklington)

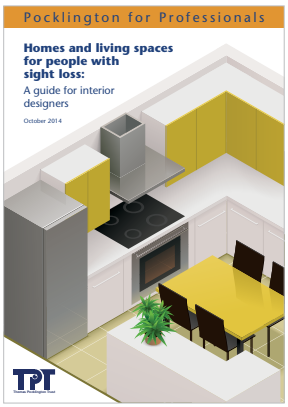
http://www.pocklington-trust.org.uk/project/assistive-inclusive-home-technology-guide-launched-people-sight-loss/

Making an Entrance: Colour, contrast and the design of entrances to the homes of people with sight loss (Pocklington)

http://www.pocklington-trust.org.uk/project/house-entrances-for-sight-loss/

Daylighting in older people's housing: A guide (Pocklington)

http://www.pocklington-trust.org.uk/project/daylighting-older-peoples-housing-guide-housing-design-professionals-architects/



Homes and living spaces for people with sight loss: A guide for Interior designers (Pocklington)

http://www.pocklington-trust.org.uk/project/interior-design-for-sight-loss/

Design of homes and living spaces for people with dementia and sight loss (University of Stirling with Pocklington)

http://www.pocklington-trust.org.uk/project/design-of-homes-and-living-spaces/

How common is sight loss?

It is estimated that more than two million people in the UK have sight loss that is severe enough to have a significant impact on their daily lives (The State of the Nation Eye Health 2016, RNIB). For an estimated 39% of these people, their sight loss is due to uncorrected or under-corrected refractive error (short-sightedness, long-sightedness or astigmatism). Their vision could be improved by wearing correctly prescribed glasses or contact lenses.

The second most common cause of sight loss is age-related macular degeneration (AMD), which affects almost half a million people (23% of those with sight loss).

Around 400,000 people have cataracts that affect their daily lives (19% of those with sight loss). Most forms of cataracts can be treated.

An estimated 150,000 people have glaucoma (7%) and around 100,000 people have diabetic retinopathy (5%).

Other eye conditions, including a wide range of congenital conditions and eye injuries, make up the remaining causes of sight loss (7%).

One in five people aged 75 and over and one in two aged 90 and over in the UK is living with sight loss.

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 and often relatively simple approaches to improving lighting have been shown to be useful and are described in the Guide. Applying the key principles and using these approaches will make homes safer for mobility and carrying out daily tasks, as well as more secure and easier to live in. Effective lighting boosts confidence and supports independence. Following the advice in this publication will also benefit and be appreciated by the majority of the population, whether or not they have sight loss, as well as people with other sensory loss, learning disabilities or dementia.

Principles and practicalities of good lighting

Benefits of good lighting

Health, comfort and wellbeing

Natural light is important for personal health and can influence mood, sleep and motivation. Daylight is important to the body's circadian system, which controls daily and seasonal body rhythms, and is linked to various functions of the body (e.g. the sleep/wake cycle, and changes in core body temperature and in hormone secretion). Disruption to this system from lack of light can cause problems such as depression and poor sleep quality, which could lead to more serious problems.

Exposure to bright daylight within the natural 24-hour cycle of light and dark, including during the winter months, is very important for health. It can be particularly difficult for older people to receive adequate exposure to strong daylight; on average, people over 65 and those over 85 spend 80% and 90% of their time at home respectively. In addition, some normal effects of ageing, such as the yellowing of the eye-lens, diminish the amount of light received by photoreceptors (cells that respond to light falling on them).

Therefore, it is important that occupants of buildings, particularly those with limited mobility and people who do not go outside very much, have access to high levels of daylight, particularly in the morning, to assist the entrainment of their circadian system.

Connection to the outside world

Most people express a preference for windows and natural daylight in their homes. Windows can give occupants a sense of connection to the outside world. Many people with partial sight can detect changes in weather, season and time of day, or be aware of the presence of human activity outside. People with sight loss often appreciate this sense of connection to the external environment, particularly if, like some older people, they are largely housebound. An interesting view can have a therapeutic effect on occupants, improving their wellbeing.

Making the best use of daylight

Daylight is usually greater near windows and reduces when moving further away. However, obstructions to windows may reduce the amount of daylight that can get into a room. Windows may be obstructed internally by large objects placed on the window sill, net curtains or curtains that are not fully drawn back. Externally, windows can by blocked by vegetation. It is also important to keep windows clean.

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.

Safety, orientation and security

Good lighting can support individual safety and orientation by illuminating areas of risk, such as steps, and 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

Vision is fundamentally involved in movement, balance, gait and stability. Practice guidance on the management of falls from the Royal College of Occupational Therapists identifies impaired vision as an intrinsic risk factor for falling (RCOT, 2015). Even relatively minor falls can reduce mobility and independence and increase depression and isolation (NICE, 2013). Contributory factors for people with sight loss may include: Reduced depth perception; poor sensitivity to contrast; distorted lines or edges; and loss of peripheral vision.

Research has indicated that a significant minority of older people with sight loss limit their activities due to a fear of falling (Wang, 2012). Appropriate domestic lighting, especially near the top and bottom of stairs, is very important to falls avoidance but often needs to be part of a combined approach, including rehabilitation and exercise to assist people to improve their balance and increase their muscle strength and fitness.

Lighting for everyday living

Improved lighting should help people carry out their usual activities more easily. There should ideally be a high and even level of ambient light throughout the home to allow people to move around safely, and sufficient light for specific tasks. Even levels of lighting mean that people's eyes do not need to readjust significantly to different light levels when they stop an activity or move away from it. 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, as demonstrated by Figures 1 and 2.

Figure 1: Illustration showing the narrow area that is lit when one central ceiling light with a lamp shade is used to light a room. Two people are in the room, one sitting at a table on the left and the other reading in an armchair on the right. A triangle of light is cast in the room from the central light fitting, with only half of the table being fully lit.

Figure 1

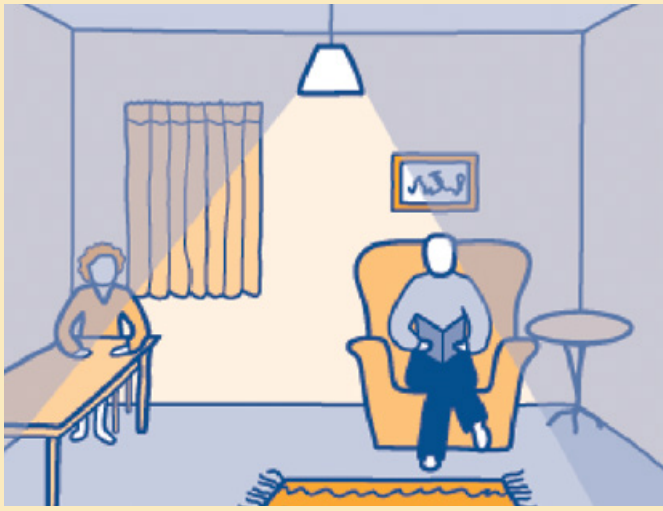
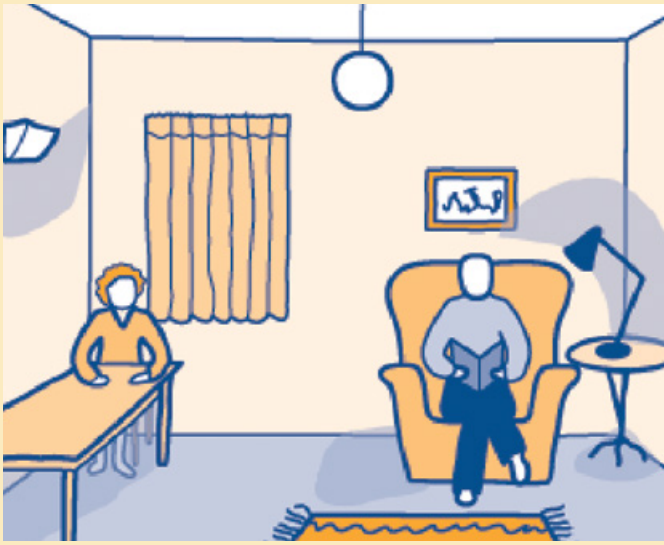


Figure 2: Illustration of the same room as in Figure 1, this time with three light sources: a wall lamp above the table, a round central ceiling lamp and a desk lamp beside the person reading. The table is fully lit and the rest of the room has improved lighting.

Figure 2



Glare

Controlling 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.

Lighting and health conditions

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; and people with dementia may be agitated when daylight is lacking.

The seven characteristics of good lighting

Lighting should be included within routine assessments of the needs of people with sight loss. It should also be an integral 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

A person's needs should be considered and appropriate responses found that meet individual needs, such as managing glare. Try to create a visual environment that supports the person's chosen ambience and activities.

2 Sufficient for tasks, orientation and movement

A minimum level of light, from natural and/or artificial sources, should be 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, should be avoided, and light levels should be as even as possible. To minimise glare, the bright areas of light sources should not be directly visible from normal directions of view.

4 Adjustable for flexibility

Providing switching, dimming and different lighting elements will help 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 should be made of energy in meeting lighting needs. It is vital to maximise use of available natural light, including simple measures such as curtain tie backs and blinds to control light direction and glare. Appropriate lamps and/or luminaires should be selected to meet lighting needs without wasting energy.

6 Simple to install, minimising disruption

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

7 Adaptable for the future

Ideally installations should be able to be altered to respond to changing needs, new occupants and lighting innovations.

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

Case Study: *Irene*

Irene is 85 years old and has mobility problems, as well as sight loss caused by diabetic retinopathy. She lives in a ground floor apartment linked to the local telecare service. After a fall, she returned home from hospital with a package of support that included a sensor that switches on a bedside light and 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.

Some lighting options

There are many options in response to individual needs and some popular and practical approaches are outlined here. They are adapted from work by Steve Brodrick (Lighting Solutions) for Thomas Pocklington Trust.

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

Living room

- Additional ceiling and/or wall lights for more even lighting distribution
- Freestanding task lights and uplights, as appropriate

Bathroom

- Lights over basins and showers
- Upgrade of shaver lights
- LED strip lights to provide shadow free illumination

Bedroom

- Wall uplights above or to the side of bedhead
- Lights in wardrobes and cupboards
- Automated lighting on getting in and out of bed

Kitchen

- Under-unit lights to illuminate worktops, cooker and sink
- Light shades to reduce glare and shadow

Stairs

- Spotlights to highlight stair edges
- Light shades to reduce glare and shadow
- High illuminance on landings

For more options and useful tips to improve lighting, see the following:

Lighting your home to make the most of your sight
http://www.pocklington-trust.org.uk/project/lighting-homes-to-make-most-of-your-sight/

The colour, light and contrast manual
https://www.amazon.co.uk/Colour-Light-Contrast-Manual-Environments/dp/1405195045/ref=sr_1_1?ie=UTF8&qid=1495814760&sr=8-1&keywords=cook+and+bright+environments

For building professionals, the relevant British Standard Code of Practice documents are BS8300 – 2:2018, Buildings – Code of Practice and BS8300 – 1:2018, External environment – Code of Practice. They are available to purchase at **https://shop.bsigroup.com/Browse-by-Sector/Building--Construction/Disability-access/**.

This British Standard looks at the design of buildings and their ability to meet the requirements of disabled people. It explains how architectural design and the built environment can help people make the most of their surroundings and includes ‘best practice’ recommendations.

Case Study: *Dee*

Dee has optic neuritis (inflammation of the optic nerve), which damaged her eyesight ten years ago. The condition means that she finds it difficult to detect something unless it is moving, or if it contrasts strongly with its background. She is able to get around her flat and follow familiar routes and can use a PC and mobile phone screen, but has difficulty reading and writing.

She lives in a studio flat and her landlord installed new lighting in 2017.

In the studio, linear fluorescent lights were replaced by dimmable linear LED luminaries, one over her bed area and the other on the opposite side of the room, close to her wardrobe and cupboards. The lights are operated by large, easy to use 'rocker' dimmer switches.

Dee says the ability to turn up the light by the wardrobe is good for picking out clothes' colours that go together. She can't put up with bright light for more than half an hour but has an adjustable task light beside the settee that she can use, as it gives good direct light for a task but is shielded from her eyes.

In the kitchen, there is another dimmable linear LED luminaire on the ceiling, LED self adhesive strip lights over the worktops (on the bottom of the wall cupboards) and lights over the hob in the extractor unit.

Dee describes the new lighting in the kitchen as "brilliant"; there is no glare from under-cupboard lights and the ability to dim the main light is a big help, often using just the task lighting. She finds cooking far easier with the over-hob lights.

The wall tiles in the kitchen have a gloss finish, which can cause difficulties for people affected by glare. Dee finds that glare is not a problem for her, but ideally tiles and surfaces should have a matte finish.

In the bathroom, two circular LED ceiling luminaries have been installed on the ceiling, together with a sensor-operated over-cabinet light. The ceiling lights are on one switch, and not dimmable. Dee would ideally like separate dimmer switches for each ceiling light, as she often doesn't want the bright lighting, but this would require re-wiring of the bathroom lighting.

As with the kitchen, the existing tiles have a gloss finish and also little contrast with fittings. Dee doesn't find that glare or reflections off the tiles cause any problems but the lack of contrast is not ideal for her.

Overall, the new lighting is major improvement, as Dee needs things brighter to be able to see detail, but also needs to have lower lighting levels when not doing detailed tasks.

Assessing individual needs

Lighting should be part of routine assessments of the needs of people with sight loss and should be included in regular reviews of maintenance, refurbishment and adaptations to their homes.

People's circumstances and needs vary; individual assessments are essential to make the best use of resources and offer effective responses. Professionals such as staff from Low Vision Services, vision rehabilitation officers (ROVIs) and/or occupational therapists may all make 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. However, people with other conditions and needs alongside their sight loss (which includes many older people) may not have had a specific sight loss assessment and lighting options to make the most of their sight may not have been considered. Housing and support staff can play an important role in identifying how to make the most of sight by improving lighting.

Reductions in funding and availability of services may mean that an individual struggles to get an assessment. In this case, family members or friends can use the checklists in Appendix A and B as tools to work through with the person with sight loss and help to determine their lighting needs.

The checklist in Appendix B provides options for adaptations and improvements that may assist.

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** (see box below for more information) have informed current design standards, such as Lifetime Homes, but most standards include few specific references to lighting. New housing may not address the lighting needs of people with sight loss adequately, or even make the most of natural daylight or the artificial lighting provided.

The principles of universal design are outlined in the table below:

Principle	Description
1. Equitable use	The product should be usable by people with diverse abilities, including people with significant sensory impairments.
2. Flexibility in use	The product's design should accommodate a wide range of needs and preferences and enable choice regarding method of use. In regard to visual impairment, this could involve offering multi-sensory options, such as audio based control or tactile feedback.
3. Simple and intuitive use.	The technology should be easy and natural to use. For example, arranging user information according to its importance is helpful for people who are unable to visually scan things quickly.
4. Perceptible	Information – all user information should be perceptible to people with various sensory impairments. Visual information should be big and bold and ideally also available through auditory or tactile mediums.
5. Tolerance for error	The technology should allow for human error and should minimise the adverse consequences of accidental or unintended actions. General robustness is important to visually impaired technology users, who may be more likely to knock things onto the floor.
6. Low physical effort	The product should be usable with minimum physical effort. In relation to sight loss this might involve minimising the need for users to strain their eyes while using the technology.
7. Size and space for approach and use	Appropriate space should be provided to use the product.

Problems with lighting in existing homes

Pocklington research into existing lighting in the homes of people with sight loss has found a number of common problems:

- Low levels of lighting
- Uneven lighting, shadows and dark areas
- Light fittings that allow 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 and/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 quality 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', which includes threats to physical and mental health associated with inadequate natural or artificial light, and depression and psychological effects due to lack of natural light, lack of a window with a view, and stress caused by intrusive, artificial external lighting at night.

Lighting and complex needs

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

Installing new lighting

In new housing or major building refurbishments, lighting will be installed to a specification provided by architects or housing teams. However, the design may not necessarily take account of the needs of people with sight loss.

In other circumstances, installations are specified by the occupant, 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, the housing tenure (owned or rented) and how the work is undertaken and funded.

One effective approach is to have a local authority sensory impairment team working directly with a lighting technician, who may be in-house, or an external specialist who is commissioned. This usually happens when the installations are in local authority housing, but it can be more widespread. In rented homes, permission must be sought from the landlord for any adaptations and alterations. The landlord may nominate or provide contractors to do the work.

In privately owned housing it will normally be necessary to engage a private contractor or a Home Improvement Agency (HIA). The national body for HIAs, Foundations, has a 'find your local HIA' tool on its website: **http://www.findmyhia.org.uk/**. Local authorities and local Age UK organisations may be able to provide lists of appropriate contractors.

Minimising disruption

Most people do not like disruption in their home and the aim should be to complete alterations and lighting installations with minimum disruption, and without the need for redecoration. 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:

- Additional floor or table lamps can be plugged into existing wall sockets.
- Ceiling lights can be moved, or more of them 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, on which several light fittings can be fitted.
- 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). 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 in some circumstances, Individual Budgets may be available.

Case Study: *William*

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

A particular problem for William 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 William did not remember to switch the 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 William is able to take his medication safely, his independence and wellbeing have improved.

Lamps, luminaires and lighting controls

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

When improving the lighting, there are two main options:

- Change the lamp (bulb) in the existing luminaire (light fitting)
- Get a new luminaire (light fitting) and install it

In general, changing the lamp is the easier and cheaper option. However, swapping lamps in an existing luminaire does not always give the desired solution and care is needed to ensure that the replacement lamp will work correctly and safely in the existing fitting. In particular, it can be dangerous to use a lamp whose wattage exceeds the value for which the luminaire was designed.

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:

Light Emitting Diodes (LEDs)

These are the most energy efficient and long-lasting light sources. However, they may be slightly more expensive than other lamps. LEDs run best when they do not get too hot, so it is not always a good idea to retro-fit a LED into an enclosed luminaire. 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. If you want the lamp to work with a dimmer switch, it is important to check that it is a compatible LED lamp.

Compact fluorescent lamps (CFLs)

These were formerly the most common energy saving lamps, but can take a short time to reach full light output after switch-on. Dimmable CFL lamps are available and are identifiable from the packaging. In general these lamps do not dim well and may flicker as they dim. Whilst CFL lamps are still available in many instances, it may be worth the additional cost to use LED lamps instead.

Halogen lamps

These are the cheapest energy saving lamps and give very similar light to old-fashioned lamps, but they are also the least energy efficient and the least durable. They give full light output at switch-on and are dimmable. While halogen lamps are more efficient than traditional GLS lamps, by modern standards they are not that good, so some types of halogen lamps have already been phased out and it is likely that most will be phased out in the very near future (2018).

'Linear' fluorescent lamps

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 for the foreseeable future. Modern fluorescent lamps (with electronic control gear) flicker far less than older lamps (with a 'starter' that requires replacement at intervals) and can work with appropriate dimmer switches.

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 luminaires or by fixed luminaires, such as miniature fluorescent or LED luminaires over a worktop, fixed behind a pelmet under a kitchen cupboard. Spotlights focused on a task area and fixed to a wall or ceiling can also provide task lighting.

LED built into luminaires – LEDs can last a long time, so there may be no need to change the lamps during the life of a luminaire. Increasingly, LED luminaires are being designed with integral LEDs where it is not possible to change the light source, as they may last for twenty years. This has opened the way to more innovative designs for lighting.

Lighting Controls

For optimum control, each lighting element should be controlled separately. Control can be either by a switch or a 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, and controls can adjust the lighting appropriately. For some people, grouping their 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 that 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.

There is a bewildering array of control technology available and it is increasingly common to have systems that can be controlled from smartphones, tablet computers or touch panels mounted on the wall. Before installing such a system, it is vital to ensure that the control interface is accessible to the person who will be using the lighting and that they fully understand how to adjust the lighting so that it meets their needs.

Due to the wide range of equipment on the market, it is necessary to check that all the components being used for a given task are compatible. For example, there are often problems when replacement LED bulbs are used with dimmers designed for use with tungsten filament lamps.

Significant recent advances in assistive and inclusive technology (AIT) have created many new opportunities for people to overcome everyday problems and challenges associated with sight loss. Inclusive technology such as counter lights can usefully illuminate work surfaces, and dimmer switches enable a greater degree of brightness control.

Lighting systems now exist which show different ways in which mainstream technology could be particularly useful for some people with sight loss. For example, such a system might offer the ability to vary the brightness, hue and tint of the lighting, enabling a wide range of subtly diverse options. These innovative systems may be remotely controlled via a mobile device, such as a smartphone or tablet.

For more information, see Pocklington's report, 'Assistive and Inclusive Home Technology: A guide for people with sight loss.' **http://www.pocklington-trust.org.uk/project/assistive-inclusive-home-technology-guide-launched-people-sight-loss/**

Case study: *James*

James has the eye condition retinitis pigmentosa, which, among other things, results in him having difficulty seeing in the dark. His sight is gradually deteriorating and he now has limited useful vision. He lives in a two bedroom ground floor flat.

A Rehabilitation Officer (ROVI) from the local authority carried out a lighting assessment and arranged for some lighting improvements to be undertaken in conjunction with James' landlord, a housing association.

Before the adaptations, the lighting in the living room was provided by two pendant lights with 60 watt lamps and shades. These were replaced with circular LED luminaires, which give a high level of illumination. No dimmers were provided but James says this is not an issue with his condition. He needs the maximum amount of light and often has the lights on during the day, unless it is very bright outside.

In the hallway, the lighting was originally two baton fittings with shades. These have also been replaced with the same luminaires as were fitted in the living room.

James says he can see far more in the living room and hall than he could with the previous lighting. He describes the new lights as "very helpful and really good".

His ROVI is now arranging for the lighting in the two bedrooms to be replaced with similar circular LED fittings, which will improve James' ability to carry out activities in these rooms. He is also getting brighter external lights by the front door to his flat and additional lights on the pathway outside.

Lighting in areas of the home

Entrances and External Lighting

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

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

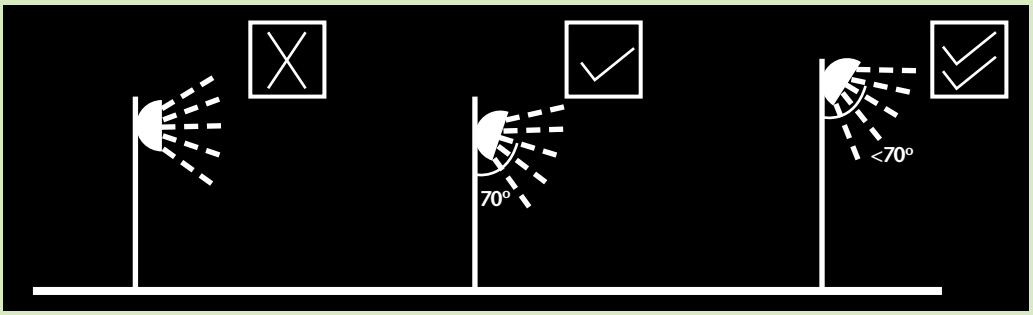
Lights over the door, on any external steps and on the pathway are important at night. Lighting which automatically illuminates the doorway or entrance when approached is helpful and an added security measure. Also, some lights are available with sensors that can be set to come on automatically when light levels are low at different times of the day.

Consideration could also be given to a bollard or post lit with LED lights at the front of the property, in order to light up the entrance, which acts as a landmark. Highlighting the sides of pathways with luminescent materials or LEDs that can be seen at night will make the route easier to follow. In locations where providing an external electricity supply may be difficult, there are battery powered LED external lights with sensors that might be suitable. In addition, better lighting on the door inside the exit can help.

An important consideration when installing outside lights is positioning them to ensure that wall-mounted external lights do not cause too much glare for someone walking towards the house. The diagram shows the optimum angle to reduce direct glare.

Figure 3: The figure below indicates how to keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. In areas with low ambient lighting levels, glare can be very obtrusive and extra care should be taken when positioning lighting fittings.

Figure 3 – Luminaire aiming angles



Poor **Okay** **Good**

PIR motion sensors are often used to control outside lights. When using such devices, it is important to set them up so that they have the correct sensitivity, so that the light comes on when there is a person in the area to be lit but not when an animal scurries by or a car passes on the road.

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 – only having a luminaire at the top of the staircase will light the treads but leave the risers in shadow. The light sources and the bright parts of light fittings should be kept out of the field of view as far as possible. It can be a good idea to use large light fittings, so that light is emitted from a large area of relatively low brightness.

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 in adjusting to dark or light areas, similar levels of light are needed across the hall and in the rooms and stairs leading from it.

Living and dining areas

A mix of ambient and task lighting is essential to support daily activities. General ambient lighting will typically be provided by one or more luminaires suspended from the ceiling. The bright areas of light sources should not be directly visible from normal directions of view.

Depending on the room and on individual 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, for example to light a dark corner. Task lighting can also be provided by freestanding floor or table lights.

The furniture layout in the room will reflect activities and affect distribution of natural and artificial light. It will also dictate the need for task lighting in different places. During daylight hours, 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.

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 is 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.

One common solution to the safety problem posed in such areas is to use light fittings that run off low voltage (48v or less). The power supply unit for such fittings can be placed outside the bathroom in a dry secure area. This arrangement can provide an easy way to produce an electrically safe installation. This solution works well for many LED light sources, as they can run off low voltages.

Inadequate levels of lighting and uneven distribution make personal care difficult. Lights over mirrors, shaver points, showers and basins are important. Providing strip lights mounted at the top of the walls can be a good way to provide uniform lighting with a minimum of shadows.

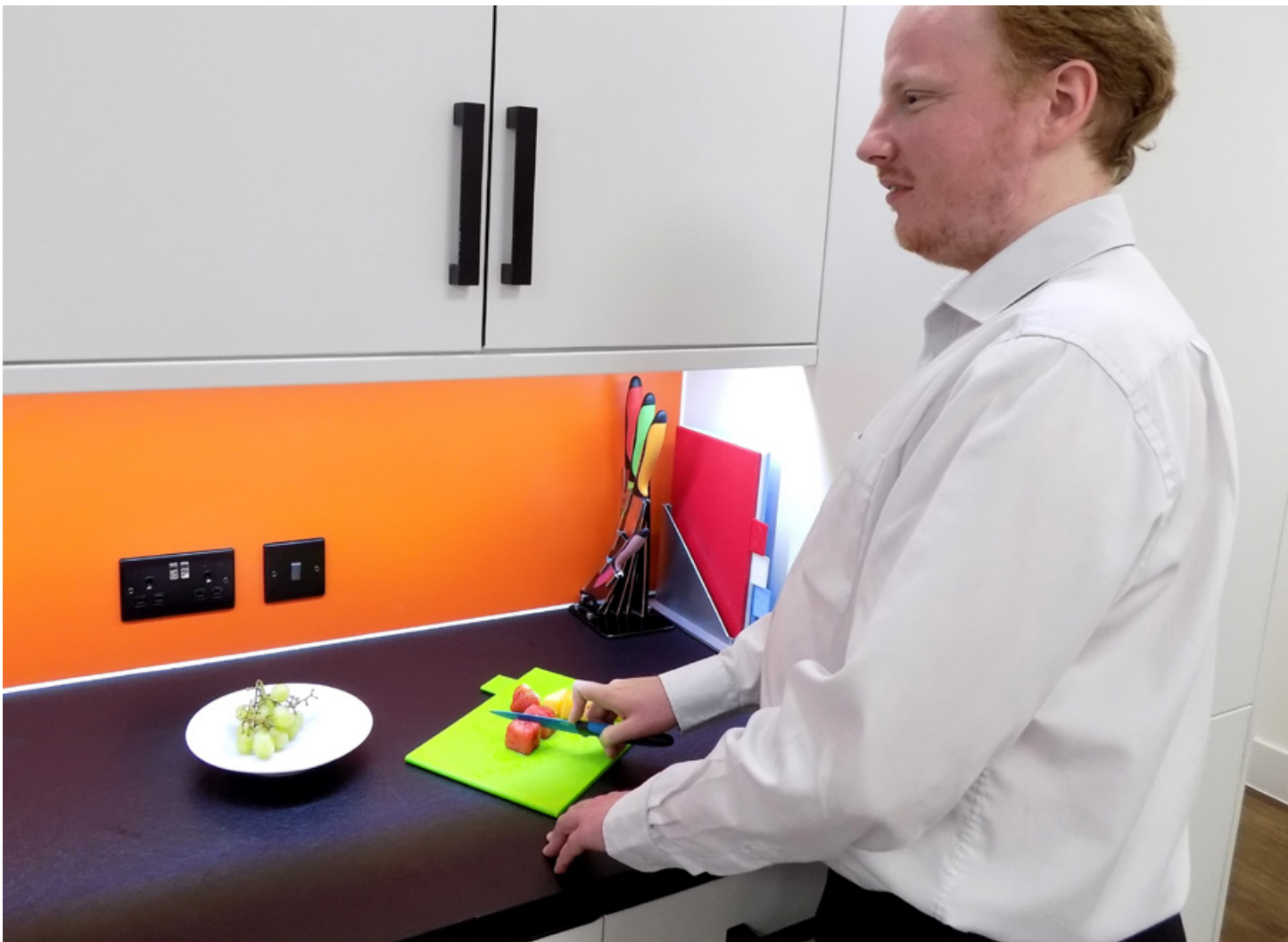
Two lights with circular diffusers on the ceiling of this bathroom ensure an even level of light. A linear light above the mirror illuminates the face and assists personal care. The dark shaver point and door frame contrast with the light-coloured wall and there is good colour contrast between the wall tiles and the basin. There is also a 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. Good general lighting can be achieved by linear fluorescent lamps or LED strips that provide even levels of light across the area and reduce the risk of shadows. Under-unit lighting fitted on the bottom of wall cupboards, placed behind a pelmet at the front of the unit and above working surfaces, provides light without glare where needed. This can be provided by LED over-counter lights or self-adhesive LED strip lights which can be powered from existing electrical sockets, avoiding the need for intrusive works.

Fixed task lights can add extra light – such as over hobs or near washing machines and sinks. However, care is needed to ensure that the lights are not exposed to direct heat from a cooker or steam from a kettle.

While there are portable task lights available, careful consideration should be given to the use of any that have trailing cables in the kitchen, as these may give rise to safety problems; self contained battery powered task lights are safer.



Bedrooms

All too often, task lighting is given inadequate attention in bedrooms. Bedside lamps should be positioned to prevent glare when the occupant is sitting or lying in bed. Task lighting that illuminates dressing tables and chests of drawers or the interiors of wardrobes and cupboards is also valuable. This can be provided by LED strip lights (similar to over-counter lighting in kitchens) or by battery operated LED lights that are now available and can be installed in locations where it would otherwise be difficult to install hardwired lighting.

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

Wardrobe and cupboard lighting is a simple intervention that can make a big difference. In this cupboard, 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.

Useful resources

A range of professionals should be able to provide information and advice, although their knowledge of lighting may be variable:

Occupational therapists

ROVI specialists (Rehabilitation Officers – Vision Impairment)

Optometrists

Doctors

Eye Clinic Liaison Officers (ECLOs) and other eye hospital staff

Housing managers

Support workers

Local authority social services departments (especially Sensory Teams)

Low vision clinics

Disability resource centres (may be able to try out products in practice)

Technology roadshows such as Sight Village

National sight loss organisations – magazines, newsletters, advice lines

RNIB Shop

Local sight loss organisations

Local home improvement agencies (HIAs) (advice on home adaptations)

Sight loss sector (UK)

Thomas Pocklington Trust – **www.pocklington-trust.org.uk**

Royal National Institute of Blind People – **www.rnib.org.uk**

Guide Dogs – **www.guidedogs.org.uk**

Blind Veterans UK – **www.blindveterans.org.uk**

Macular Society – **www.macularsociety.org**

Sense – **www.sense.org.uk**

Seeability – **www.seeability.org**

Royal Society for Blind Children – https://www.rsbc.org.uk

Glossary of lighting terms

Bulb

Correctly termed a 'lamp', a bulb is a source of 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 (described as '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.

Downlight

A light fitting that is usually mounted on or close to the ceiling and that throws most of its light downwards towards the floor.

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
This relates to colour temperature – See 'Colour appearance' above.

Lamp
A lamp is a source of 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 visit ability 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.

Light Source
A light source is a source of light but it is not necessarily replaceable and may be permanently fixed into a luminaire (light fitting).

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 light

A light fitting designed to provide task lighting in order to carry out activities more effectively. Most task lamps are adjustable, so that the user can have light where it is needed.

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 or her home that is supported by information and communications technology. The term telecare is often used where services are provided through technology in the home.

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.

Appendices

Appendix A: Checklist – Individual lighting needs

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

1. Appropriate

- Does the lighting enable the occupant to move around comfortably?
- Does the lighting enable the occupant to carry out 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 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 new or proposed lighting adaptable to future changes in need?
- Can additional lighting be added without making changes to the wiring?
- Would the lighting be suitable for other future occupants with minimal alterations?
- Is the lighting easily accessible without using steps or a ladder?

Appendix B: Checklist – Activity-based lighting assessment

This checklist is intended to assist professionals such as occupational therapists, ROVIs and support workers to assess the lighting needs of visually impaired clients. It can also be used by family, friends or people with sight loss to guide informal or self-assessment. It can be useful for people who are newly diagnosed with sight loss, as well as those who have been visually impaired for a long time. The checklist supports assessments using the seven characteristics, highlighted earlier, for determining lighting options for people with sight loss.

To make the assessment, go through each activity on the checklist in turn and ask the person whether they have difficulty undertaking that activity.

Having established which activities are more difficult for them, ask which areas are more important, in terms of finding a solution to make their daily life easier, and identify 'major difficulties'. Then go through each 'major difficulty' activity in order of importance and ask the following questions:

How do you carry out this activity?

Focus on the kinds of devices, products, appliances or equipment they use for the activity (including their own individual workarounds).

What are the difficulties you have in carrying out this activity?

Find out where the person feels the problem lies.

Would better background lighting, task lighting (or both) make this activity easier?

Are any of the 'Options' appropriate to improve their ability to undertake the task?

1. Activities

Does sight loss mean you have difficulty undertaking some tasks in your home?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

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.

Do you have difficulty reading e.g. letters and bills?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options

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

2. Glare

Do you experience discomfort with glare?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options

- Use diffusing (e.g. paper) shades or covers (fluorescent strip lights) to reduce glare and diffuse light if required to existing lights/luminaires.
- Ensure that light shades are as large as possible, so that the light is spread over a large area to reduce the source luminance
- 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

Do you have hearing loss?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

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

Do you have difficulty getting around the house?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

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?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

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.
- Highlight thresholds, edges, changes of level etc (using paint or tape)
- Increase general lighting levels in all rooms.
- Consider automated lighting when getting out of bed.
- Relocate switches.

5. Dressing

Do you have difficulty finding / matching clothes?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options:

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

6. Personal Care

Do you have difficulty washing, shaving or putting on make-up?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options

- 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

Do you have difficulty cooking, preparing or eating food?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options:

- 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

Do you have difficulty seeing your way to and through the entry door?

No difficulty ☐

Minor difficulty ☐

Major difficulty ☐

Not relevant ☐

Difficulty due to VI: Yes / No

Options

- Provide better outdoor lighting.
- Consider PIR-activated lights by doors and above locks.
- Clearly mark path to 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 you to move around comfortably/do the task? [Appropriate]

Yes / No

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

Yes / No

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

Yes / No

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

Yes / No

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

Yes / No

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

Yes / No

Will new lighting be adaptable?

Yes / No

Appendix C: Lights and lighting factsheet

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 mostly been phased out.

Tungsten Halogen (TH) Lamps

Tungsten Halogen lamps operate on the same principle as GLS lamps but in TH lamps, 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. There are some TH lamps that have been designed to replace GLS. They have the advantages of giving their full light output instantly and being dimmable.

Some TH lamps connect directly to a mains electrical supply; most low wattage ones (50w and below) run off 12v and use a transformer. However, while the lamps are about 30% more efficient than GLS, by modern standards they are not very good, and so some types of halogen lamps have been phased out and it is likely that most will be phased out soon.

LEDs

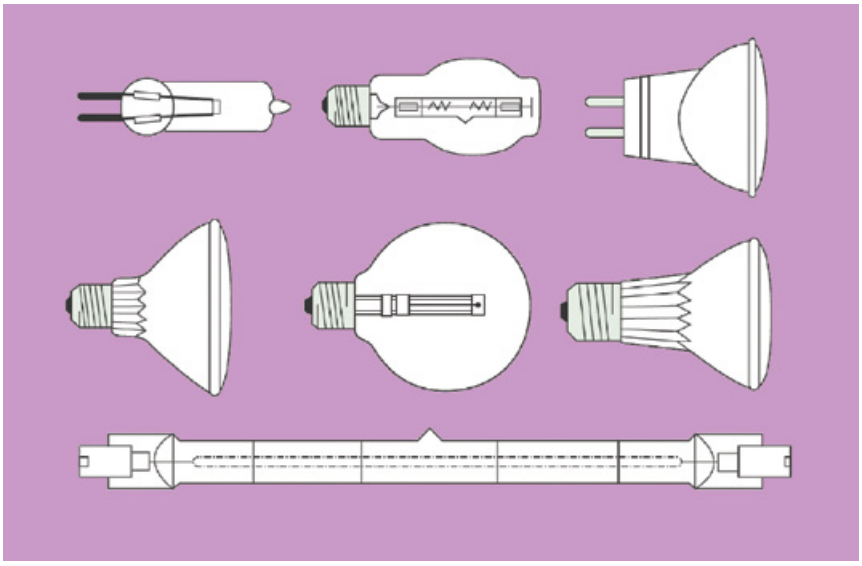
Light emitting diodes (LEDs) are semi-conducting materials that emit light when current flows through them. LED lamps are available in a range of shapes, sizes and fittings to replace traditional lamps. Increasingly, luminaires with integral LEDs are being sold, as the light sources can have very long lives and there is no need to change them during the life of a luminaire. LEDs are available in strip form, often with a self-adhesive backing, that can be cut to the required length, connected together and linked to a low voltage “driver” that plugs into an electrical socket, offering options to light awkward spaces or be innovative with lighting.

There are some downsides to LEDs, notably the high initial cost (although as they are increasing in popularity, costs are falling) and possible poor colour rendering. 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.

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 tend to be 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 4w 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.

Compact fluorescent lamps (CFL) work in the same way as linear fluorescent lamps, but the tube is folded, twisted or spiral shaped. 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 time (up to 30 seconds) to reach full brightness.

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 not a good measure of brightness. The measure of how much light is given out by a lamp is in lumens (lm) and all packaging should now give brightness in lumens. Many manufacturers also give a 'watts equivalent' figure on their packaging to relate the light output to that of traditional tungsten lamps.

Colour appearance of lamps

Packaging for lamps often indicates the colour of the light omitted, either by a verbal description or by reference to a 'colour temperature' (see glossary for more details).

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

The list below summarises the performance of the various lamps

Lamp type: Light Emitting Diode (LED)

Energy efficiency: Very good

Useful life (hours): 20,000 (some LEDs may last much longer)

Light depreciation: Output may drop during useful life

Colour rendering: Good (in better quality lamps)

Start-up time: Instant

Lamp type: Linear fluorescent

Energy efficiency: Very good

Useful life (hours): 16,000

Light depreciation: 10% loss at 16,000 hours

Colour rendering: Good

Start-up time: A few seconds

Comment: Lamps perform less well with old-style control gear

Lamp type: Compact fluorescent

Energy efficiency: Good

Useful life (hours): 12,000+

Light depreciation: Poor output after 12,000 hours

Colour rendering: Good

Start-up time: Up to 1 minute

Comment: Hard to generalise due to wide range of lamps and quality

Lamp type: Compact fluorescent (integral)

Energy efficiency: Fair

Useful life (hours): 8,000

Light depreciation: Poor output after 8,000 hours

Colour rendering: Good

Start-up time: Up to 2 minutes

Lamp type: Tungsten Halogen (TH)

Energy efficiency: Poor

Useful life (hours): 2,000+

Light depreciation: Fails before critical reduction

Colour rendering: Excellent

Start-up time: Instant

Comment: At power below 75W, low voltage versions perform better

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. However, LED lamps are increasingly used in portable light sources and due to their low power requirements, battery life can be long.

Portable battery powered LED light

Task light with heavy base

A folding desk light

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 circular LED luminaire is very efficient and high output versions are available that give as many lumens as a 40w fluorescent lamp. They are available in various finishes and are appropriate for domestic use.

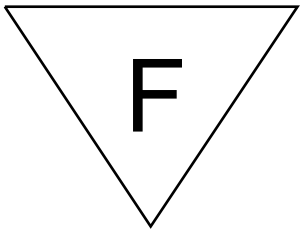
This luminaire offers another approach to achieving high levels of lighting without hard shadows. It combines several lamps (TH, CFL or LED) in one fitting and is designed to throw light upwards so that it is reflected from the ceiling and gives an even spread through the room. A further benefit of this 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.

This type of luminaire uses either tungsten halogen (TH) or LED 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-cupboard and 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 and their LED equivalent; self-adhesive LED strip lighting; miniature enclosed tungsten halogen luminaires; and luminaires containing LEDs.

Many factors influence the choice of fitting and key questions 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?

Lighting in very restricted areas may also be provided by small, battery powered, adhesive 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 free from glare
- 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. by using 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 control 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. LEDs do not a necessarily work with dimmers either. However, some CFLs and LEDs will run with dimmer switches but check the packaging to confirm that they will.

Appendix D: Suggested illuminances (LUX) for different tasks

The tables below offer guidelines for lighting levels for different tasks and rooms (and a maximum level of difference within or between rooms). They 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. The lower figure given is the minimum recommended for someone with sight loss; the upper figure is the level recommended for someone with both sight loss and dementia.

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

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.

Rooms in the home	Suggested LUX	Minimum LUX for someone with sight loss and dementia
Hallway	100 – 300	300
Lounge /Dining	100 – 300	300
Kitchen	200 – 300	600
Bathroom	100 – 300	300
Bedroom	100 – 300	200
Stairs (on treads)	100 – 200	150

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