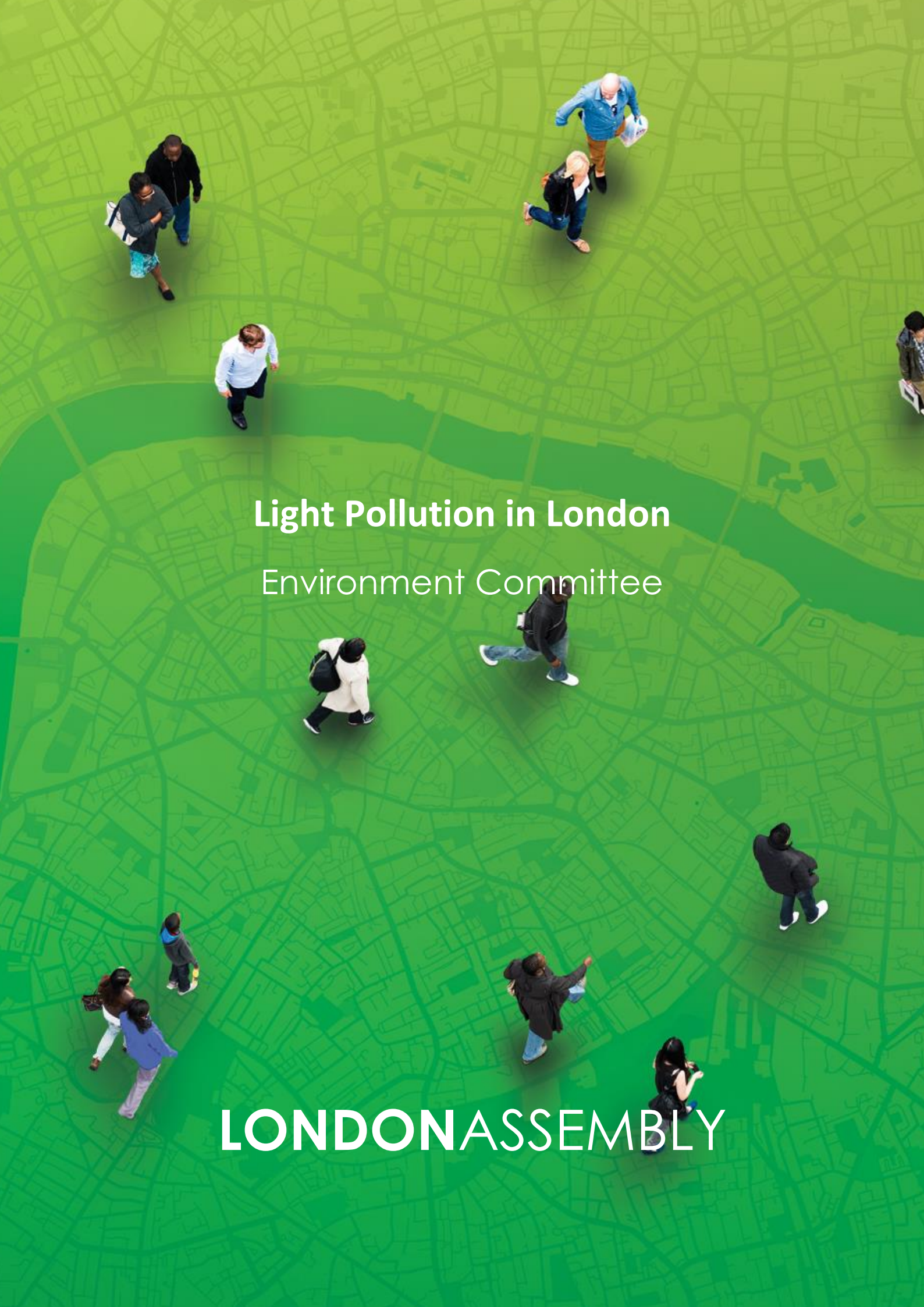

Light Pollution in London

Environment Committee

LONDONASSEMBLY

Environment Committee

This investigation was carried out by the Environment Committee in 2022-23, with Zack Polanski as Chair, and the Assembly Members listed above.

The Environment Committee examines all aspects of the capital's environment, by reviewing the Mayor's strategies on air quality, water, waste, climate change and energy.

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Foreword

Zack Polanski AM
Chair of the Environment Committee 2021-23

On the Environment Committee we have spent a lot of time investigating air pollution – and the well-researched damaging health effects on people in our city.

There is a lot of attention on the national stage to the state of our rivers – and the threats from sewage pollution and the need to tackle water pollution.

Rarely though – do you see or hear politicians or scientists in the mainstream talking about light pollution.

Yet as you'll see from our investigation – the damaging effects for both people and wildlife are pretty clear.

In designing and planning our cities – there can often be a tension between modern city life and protecting nature. This report makes clear that there are interesting and innovative ways of doing both and these should be embraced.

Too often though there is a lack of clear policy or strategy about how to do this – and creating a more coherent narrative about light pollution in the same way we talk about clean air and clean water will be a huge step towards protecting nature.

Throughout this report – there are calls on both the Government and the Mayor to take action on this. As with so many parts of environmental policy – it requires the two to align and be pointing in the same direction.

There's no environmental justice without social justice too – and light pollution is no exception. Those who live in concentrated, crowded areas should have access to enjoy the sky and enjoy not only our planet but others do.

Thank you to everyone who contributed to this report – and I hope it's the beginning of an urgent conversation about this important issue.

Executive summary and recommendations

Between October 2022 and February 2023, the London Assembly's Environment Committee ran an investigation into noise and light pollution, and their impacts in London. This report focuses on the Committee's findings on light pollution, and its recommendations for how the Mayor, London boroughs and the Government should address this issue.

We found significant limitations within the existing policy framework around the control of artificial light. Therefore, we recommend that light pollution should be managed through a focused strategy at a London level, rather than controlled only through the planning system. We also recommend that this city-wide strategy on light pollution should go alongside an awareness-raising campaign among businesses to encourage better lighting design and practice.

Recommendation 1

When and if it is referred to him, the Mayor should refuse the planning application to develop the MSG Sphere in Stratford, to prevent light-pollution impacts on the surrounding environment and residents. If the planning application is judged to need determination by the Secretary of State, then the Secretary of State should refuse on the same grounds.[1]

Recommendation 2

The Mayor of London should develop a city-wide strategy committing to reducing light pollution. This should include monitoring and target metrics, plus raising awareness about the impacts and costs of light pollution among businesses.

Recommendation 3

The Government should commit to targets for reducing light pollution in the UK, including specific targets for major cities.

Recommendation 4

The Mayor should work with businesses to ensure that they adhere to best practice and avoid contributing to light pollution where possible – for example, by switching off or dimming lights when not needed. This includes, but is not limited to, retail and office spaces, and advertising hoardings.

[1] *The Conservative Group does not believe it is the Committee's place to ask the Mayor and the Secretary of State to make a certain decision on a live planning application as this could be considered unlawful under predetermination*

Recommendation 5

The Mayor should continue to ensure that all GLA and TfL buildings are working toward reducing light pollution, and should set a time frame by which buildings should meet their targets of reduced light emissions. This is in line with his work with the GLA Group to deliver energy-efficiency measures across their estates.

Recommendation 6

London boroughs should reduce energy cost and light pollution from street lighting by implementing LED lights, with remote dimming and timers. The Mayor should develop and consult on guidance that sets out how London boroughs can do this, noting that any changes to street-lighting practices should also be subject to local consultation.

Recommendation 7

The City of London's new Lighting Supplementary Planning Document (SPD) provides guidance and technical requirements regarding effective and sustainable lighting design.[2] London boroughs should explore the potential to review effective practice from the City of London, to inform their own SPDs.

[2] City of London, Light + Darkness in the City: A Lighting Vision for the City of London, June 2018

Chapter one: Sources and impacts of light pollution

What is light pollution?

Light pollution refers to excessive or misdirected artificial light. Direct sources of artificial light at night include street lighting; office and commercial buildings; advertising and billboards; signage; and outdoor facility lighting (such as sports facilities). When light is scattered across the atmosphere, it results in 'skyglow', a pink or orange glow in the night sky.[3] The amount of pollution caused by artificial light at night is dependent on whether the direction, amount, intensity, glare and timing of the light is perceived to be appropriate and necessary for its purpose.[4]

> "We consider the experience of light in the wrong place or at the wrong time as light pollution; the timing of illumination may be as important a factor as the actual level of light. Light pollution can take various forms, and may originate from both diffuse and point sources:
>
> **Glare:** The excessive contrast between bright and dark areas in the field of view.
>
> **Light trespass:** Unwanted light, for example from adjacent properties and activities.
>
> **Light clutter:** The excessive grouping of lights, for example in roadside advertising which can prove a dangerous distraction to motorists.
>
> **Light profligacy:** Over-illumination which wastes energy and money.
>
> **Sky glow:** A combination of reflected and refracted light from the atmosphere. A major effect of sky glow at night is to reduce contrast in the sky. This is the most pervasive form of light pollution and can affect areas many miles from the original light source.
>
> **An absence of darkness:** Artificial light makes experiencing natural night-time lighting conditions impossible in many parts of the country."[5]

As a busy and vibrant city, London has various sources of potential light pollution, including street lighting, office buildings, shop lighting, advertising and other forms of illumination that are used to light urban spaces in creative ways.

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[3] *Insect Conservation and Diversity*, Assessing long-term effects of artificial light at night on insects: what is missing and how to get there, volume 14 issue 2, March 2021
[4] See, for example: the Commission for Dark Skies, Blinded by the light?, 2019
[5] The Royal Commission on Environmental Pollution, Artificial Light in the Environment, 2009

"What makes London a bit more different is your development. You have got all these technologies getting better for streetlights, but now with LEDs you are getting much more creative ways to light urban spaces. It is much cheaper, more colourful, much more interactive, and it is like a bit of a war of attrition. When you have got a developer who wants to make their building attractive at night, they will look to illuminate it at night and doing so is very different without having to use significant uplighters."

Dan Oakley, Dark Sky Consultant and Volunteer for CPRE, the countryside charity

The impact of light pollution is not always immediately obvious to those living with it. However, our investigation revealed several significant and concerning impacts of light pollution on not only the natural world in London, but also Londoners' quality of life.

Light pollution and biodiversity

At the meeting of the Environment Committee on 7 February 2023, the Committee heard from a panel that described the detrimental impacts of artificial light at night on wildlife and biodiversity.[6]

"Biodiversity is governed by a series of natural cycles, and the one that has existed since the dawn of time is night and day. If you can think about that, everything has evolved to coincide with the sun rising, the sun setting, the moon ris[ing] and set[ting], until about 200 or so years ago where we started to light things up and we started to alter that cycle. If you think that everything has evolved until that point to carve out niches within the natural world and then we start to alter that, it [artificial light] is obviously having a massive impact."

David Smith, Advocacy and Social Change Officer
Buglife

These impacts differ for different species. David Smith stated:

> *"We see this [the impact of light pollution] across all species that have been studied, whether that be birds, mammals, reptiles or in a particularly significant aspect,*

[6] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

> *insects, as well. There seems to be greater impact from artificial light [on insects] than others – that may be due to the sheer numbers of them making up more diversity of life than other species, and it may be due to their size as well. We can see those impacts through a range of different things, whether they be sub-lethal impacts – so altering behaviour, altering physiology – to lethal impacts, which may be caused through direct collision with high-powered lighting, or it may be caused through exhaustion, being attracted to lighting. There is a series of different things."*[7]

There is strong evidence of the detrimental impacts of artificial light at night on the migration, reproduction and feeding patterns of bats, birds and insects, and on the daily light cycles of plants.[8] In addition, research states that the widespread transition to LED lighting has a particularly negative effect for the insects that are most sensitive and responsive to the short wavelength end of the light spectrum.[9]

David Smith described how the impacts of different wavelengths and the colour of lighting vary for different species:

> *"The blue, cooler lights and the ultraviolet (UV) lights are lights that we cannot see, but species like moths are particularly subject to these and it can completely impact their ability to see flowers, for example. We see this with a complete reduction of 60 per cent in pollination rates under areas that have been lit by lights – you can see a direct cause and effect of the lighting there."*[10]

The overall decline of pollinators is a matter of national and international concern.[11] The UK Government's 2014 National Pollinator Strategy stated:

> *"If pollinators went into steep decline, our countryside would be a less beautiful place as they are essential for biodiversity and our wider environment. They maintain the diversity of wildflowers and support healthy ecosystems, particularly by helping plants to produce fruits and seeds which birds and other animals rely on. They are valued and appreciated by the public, and, as part of our natural world, contribute to our health and well-being."*

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[7] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

[8] See, for example: *Nature Ecology & Evolution,* A meta-analysis of biological impacts of artificial light at night, 2 November 2020; *Insect Conservation and Diversity,* Special Issue: Impacts of artificial lighting at night on insect conservation, March 2021; and Assessing long-term effects of artificial light at night on insects: what is missing and how to get there, March 2021

[9] *Insect Conservation and Diversity,* Special Issue: Impacts of artificial lighting at night on insect conservation, March 2021

[10] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

[11] See, for example: University of Cambridge, Pollinators: first global risk index for species declines and effects on humanity; UN News, On World Bee day, human activity blamed for falling pollinator numbers, 20 May 2019

It added:

> *"The health of our £100bn food industry, which is at the heart our economy, would be damaged [if pollinators went into steep decline]. Without the service nature provides, some of that food would become a lot harder to grow and more expensive."*[12]

The Government has since published a Pollinator Action Plan, 2021 to 2024.[13] Its most recent report into the status of pollinating insects, published in February 2023, found:

> *"There was an overall decrease in the pollinator indicator from 1987 onwards. In 2019, the indicator had declined by 21 per cent compared to its value in 1980. The long-term trend was assessed as declining."*[14]

Quite simply, the loss of pollinators threatens our food security. A 2022 briefing from the House of Lords Library states that biodiversity loss (along with climate change) is among the 'biggest medium to long term risks to UK domestic food production'.[15] It is essential for our survival to understand and address the different contributing factors to biodiversity loss, and light pollution is part of that picture.

The effects of light pollution on people

The Committee also heard from panel members about the impact of light pollution on Londoners' quality of life. Robert Massey (Deputy Executive Director, Royal Astronomical Society) and Dan Oakley drew attention to skyglow and our ability to view the stars. They described the compromised view of the night sky.[16]

"We are all affected by light, and we are seeing a slow reduction in the quality of the night sky across the UK – that is being measured by sky quality measurements, by satellite and by hand-on-the-ground measurements. We are seeing a slow loss of the night sky, which is becoming to the detriment of us and to the natural world."

Dan Oakley, Dark Sky Consultant and Volunteer for CPRE, the countryside charity

[12] Department for Environment, Food and Rural Affairs (DEFRA), The National Pollinator Strategy: for bees and other pollinators in England , November 2014
[13] DEFRA, National Pollinator Strategy: Pollinator Action Plan, 2021 to 2024, May 2022
[14] DEFRA, Status of pollinating insects, updated 21 February 2023
[15] House of Lords Library, Impact of climate change and biodiversity loss on food security, 1 September 2022
[16] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

Robert Massey noted, "We tend to see darkness as almost as living in a quiet place is a privileged setting. People pay more to live in dark and quiet spaces." He argued that being able to see the night sky is an educational and social justice issue, adding: "There is an urban/rural divide here; if you live in the inner city, you are denied access to this."[17]

Intrusive light shining into homes has the potential to result in annoyance and sleep disturbance; and could impact on quality of life.

Currently, research on the impacts of light pollution on human health is at an early stage and not conclusive. There is evidence to show that exposure to artificial light at night can suppress melatonin and disrupt circadian rhythms in humans, which can be linked with adverse health impacts.[18] Dan Oakley said:

> *"Melatonin is the key hormone that the brain produces and when we have disrupted sleep, we suppress that hormone which regulates your sleep cycle. When you are asleep, your body wants to repair and if you are exposed to artificial light that affects the way your body repairs itself. […] We are animals just as much as the rest of the natural world and we will suffer in the same way as the natural world does."* [19]

However, studies investigating the exposure to artificial light at night may not necessarily distinguish between internal light (which could, for example, include domestic lights and the use of devices with screens) and external light (what might be known as light pollution).[20]

Unnecessary artificial light at night can also result in wasted energy and carbon emissions. Robert Massey said:

> *"It is not just street lighting [that can cause light pollution]; it is things like shops that are lit up all night and offices that are lit up all night. There is no real need for this. It is not really serving any purposes, and in an environment where energy prices are spiking, and where we are trying to see London and other cities move towards a net zero target, then this can contribute to that. 800,000 tonnes of carbon dioxide (CO2) are emitted by street lighting in the UK each year – it is a significant factor."*[21]

Whilst our panel focused on light pollution, lighting in cities is clearly also necessary for individual safety and comfort. Lighting is also important for many functions including, but

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[17] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[18] *Chronobiology International,* Systematic review of light exposure impact on human circadian rhythm, 12 October 2018
[19] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[20] *British Journal of Cancer,* Domestic light at night and breast cancer risk: a prospective analysis of 105 000 UK women in the Generations Study, 23 January 2018
[21] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

not limited to, commercial and cultural functions and the night-time economy. We agree with panellists that artificial light at night should not be considered as a binary, between light or dark; but lighting systems and practices should be well designed to reduce unnecessary and wasted light.

The International Dark Sky Association has said that glare from bright, unshielded lights can decrease safety as it reduces the amount people can see.[22] Indeed, a research project by the built environment consultancy Arup found that 'brighter lights don't make people feel safer'. Arup found 'a correlation between higher brightness levels of light and unsafe perceptions of space', explaining that 'brighter lights can create high contrast areas and stark no-go zones that deter people's freedom of movement at night'.[23]

According to a new Lighting SPD on which the City of London has recently consulted, effective lighting design should be subject to several criteria. The Committee supports the City of London's emphasis on the need to balance several lighting-design criteria in order to meet the needs of all residents, and to manage the impact on the environment. The design criteria set out by the City of London include:

- functional – safety, security, accessibility, legibility (how we navigate space and orientate ourselves)
- cultural – experience, character, heritage, flexibility
- sustainable – social, economic, environmental.

"No one is suggesting that we make our cities completely dark at night; however, responsible lighting which reduces carbon emissions and allows the city to work, but at the same time minimises the impact on the natural environment, would be welcome."

Robert Massey, Deputy Executive Director
Royal Astronomical Society

Addressing light pollution effectively should be achieved through thoughtful lighting design that maximises the safety, aesthetics, accessibility and legibility of a space.

[22] International Dark-Sky Association, Lighting, Crime and Safety, accessed April 2023
[23] Arup, Lighting the way for women and girls: a new narrative for lighting design in cities

Chapter two: The planning system and light pollution

At the meeting of the Environment Committee on 7 February 2023, we heard from panel members about the limitations of the existing policy framework in preventing and reducing light pollution, and the lack of a national or London-level strategy to reduce light pollution.[24]

We heard concerns from some panel members that there are no national or London-level environmental regulations that set requirements for monitoring and addressing light pollution. David Smith stated that, despite the term 'light pollution', light is not treated as a 'pollutant' in the same ways as other pollutants related to air quality and noise.

> *"The thing that we in the UK […] are missing are single policy instruments with regards to light pollution. Quite often, legislation or policy is very piecemeal, very sporadic and follows guidance. It is a stark contrast to other forms of pollution in that it actually sticks out on its own. As we have seen here, it is combined in with noise pollution quite often, but we see noise pollution having WHO guidelines and monitoring and light does not get that level of treatment."*
>
> **David Smith, Advocacy and Social Change Officer**
> **Buglife**

Like noise, artificial light is addressed within 'statutory nuisance' laws under the Environmental Protection Act 1990.[25] However, these laws do not tackle all forms of potential light pollution, and they exempt sites such as transport premises (railways, bus stations, airports, etc). For the artificial light to count as a statutory nuisance, it must either 'unreasonably and substantially interfere with the use or enjoyment of a home or other premises', or 'injure health or be likely to injure health'.[26] This means that these laws do not account for the impact of light pollution on the environment and on biodiversity.

Indeed, we heard from panel members who stated that statutory nuisance legislation is not adequate to control light pollution because the criteria it sets is too narrow, and it focuses only on the impact of light emissions on humans, rather than the environment.

[24] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[25] Department for Levelling Up, Housing and Communities (DLUHC) and Ministry of Housing, Communities and Local Government (MHCLG), Light pollution, published March 2014 and updated November 2019
[26] Ibid

Artificial light is also addressed through the planning system and related environmental legislation. At the Committee meeting, GLA official John Diver (Senior Strategic Planner, Design, Heritage and Environment) explained that 'artificial lighting and issues of light intrusion are covered by a number of different legislative regimes and frameworks', including guidance produced by professional bodies, and that 'all of these provide mechanisms and framework for the control of environmental impacts'.[27]

National planning guidance sets out some potential impacts of artificial light on people and on the environment, and describes factors that should be considered with regard to when, where and how much artificial light is associated with a development. In addition, under national planning regulations, developments that are likely to have significant effects on the environment are required to carry out environmental impact assessments, which are submitted during the planning process to local planning authorities (LPAs).[28]

John Diver also referred to policies in the London Plan that cover lighting.[29] For instance, Policy D8 Public realm sets out that, within the development plans made by London boroughs, and development proposals made by applicants, "Lighting, including for advertisements, should be carefully considered and well-designed in order to minimise intrusive lighting infrastructure and reduce light pollution."[30] Policy D9 Tall buildings sets out "Buildings should be designed to minimise light pollution from internal and external lighting".[31]

John Diver stated: "The vast majority of planning decisions in London […] are assessed and determined at a local level by LPAs against their local development plans." He added:

> *"Most of, if not all of the boroughs as local planning authorities have already produced or are producing specific policies that deal with issues of light intrusion for new developments. When determining applications, they also have the ability to impose planning conditions that relate to external lighting, which include curfew hours and lumen levels, and planners may – and often do in issues where it is complex – consult with lighting professionals as part of that process to get those mitigation measures right […] all of those decisions are informed by those national guidance documents produced by industry bodies".*[32]

In a response to a recent Mayoral Question, the Mayor also summarised how he addresses light pollution:

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[27] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[28] DLUHC and MHCLG, Environmental Impact Assessment, published 6 March 2014 and updated 13 May 2020
[29] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[30] Mayor of London, The London Plan, March 2021
[31] Ibid
[32] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

> *"For new developments, my London Plan includes various policies which require buildings to be designed and operated in a manner that avoids excessive light pollution. For instance, policies on Public Realm, Tall Buildings and London View Management all require good design that ensures lighting is carefully considered and minimises light pollution. Other policies, such as Agent of Change and Supporting the Night Time Economy also require careful consideration of lighting to ensure that any lighting is appropriate for its locations and avoids disturbances to existing uses, views and wildlife. In addition to the above, the energy hierarchy for new developments requires new buildings to be designed to use less energy as part of the initial 'Be Lean' stage. Securing the use of low energy light bulbs and motion sensors to avoid wastages are therefore common expectations for energy assessments in new major developments."*[33]

However, planning decisions only affect future developments, rather than addressing the existing light emissions of our built environment. By relying on the planning system to identify and tackle environmental impacts of light pollution, we miss out on the opportunity to understand and reduce the harm to biodiversity arising from unnecessary and excessive artificial light in our capital. David Smith stated:

> *"If we only consider it [light pollution] as [part of] planning, we are accepting the levels of light pollution that we currently have because most buildings and lights are built and installed."*[34]

Panel members including Dan Oakley, Robert Massey and Doug Wilkinson (Director of Environment and Operational Services, Enfield Council) described other issues with relying on the planning system to address light pollution. Dan Oakley described the need for technical knowledge within planning authorities about artificial light.[35]

Doug Wilkinson stated that local authorities approach the issue only in terms of the light from the specific proposed development in the planning application, rather than taking a more 'strategic view' of light pollution. Doug Wilkinson also described issues related to enforcement of planning conditions around controlling light:

> *"Planning enforcement are probably overwhelmed with a huge number of issues that they deal with breaches in planning compliance. It will be based on the level of complaints received to the local authority and then, like everything, trying to balance capacity and priorities around addressing that. If I am being totally honest, lights being left on in a building is probably not one of the top priorities."*[36]

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[33] Mayor's Questions, Light Pollution (1), 6 April 2023
[34] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[35] Ibid
[36] Ibid

He went on to say:

> *"Some of the buildings that probably emit the most light are probably multi-occupation buildings as well. It is pinning down who is actually to blame: is it the landlord? Is it the tenant? Which tenant? […] trying to track down the responsible person to deal with, whether it is issuing a fine or proceedings, can be complicated."*[37]

David Smith drew attention to the GLA's own example of City Hall:

> *"Too often, we have well-lauded, sustainable, eco-friendly buildings – we are sat in one [City Hall]. I would like to question what light pollution impact assessment was conducted on this building, given that there are skylights to have, as far as I can tell, no shields or screens on them. They are all glass-fronted buildings, which do cast light out, so how is that actually being enforced and taken into consideration?"*[38]

In response to a Mayor's Question about light pollution from City Hall, the Mayor stated:

> *"City Hall was rated 'Outstanding' by BREEAM when first built, and has since been refurbished and made even greener. It generates its own renewable heat and power, and its modern controls minimise energy usage. Most of the lights at City Hall are LED and the remaining will be replaced with LED lights soon too. The office areas and meetings rooms have local sensors with timer to reduce lighting pollution. The perimeter lighting around City Hall also operates by day light sensors. Procedures are also in place to turn public lights off outside of event hours."*[39]

Clearly, there are trade-offs to be managed in terms of the materials and design of buildings, in order to minimise light pollution, though the Committee recognises there are many other factors at play – including the need to maximise energy efficiency, and to select construction materials with lower embodied carbon. Therefore, minimising light pollution is one of many potentially competing objectives.

However, it is evident that new developments with significant light-pollution impacts are still coming forward, such as the MSG Sphere. While existing guidance documents and planning policies provide a complex framework around controlling artificial light, the current state of light pollution in London, and the fact that a development proposal such as the MSG Sphere has been provisionally granted planning permission, suggests that the existing framework is not fit to manage the problem of light pollution.

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[37] Ibid
[38] Ibid
[39] Mayor's Questions, GLA Energy Efficiency, 21 November 2022

Case Study: MSG Sphere Development

The impacts of artificial light and light pollution at the planning stages of new buildings are a live issue in our city. For example, the proposed MSG Sphere development has been the subject of much discussion in relation to light pollution. The planning application from the Madison Square Garden Company (MSG) proposes a large-scale live music and entertainment venue with an auditorium (with capacity for up to 21,500 people) next to Stratford Station in East London.

The design of the proposed building is spherical, with a 'skin' of over 1 million LEDs that would be programmable and could display images on the surface of the building. A proposal to display adverts was submitted alongside the main proposal. The following diagram shows the process to date of the MSG Sphere planning application (this is a high-level summary of the key stages and does not include every detail of the process).

Figure 1: Timeline of major stages in the planning proposal for the MSG Sphere[40]

Because the location of the application is within the boundaries of the London Legacy Development Corporation (LLDC), MSG submitted the planning application to the LLDC in 2019. The LLDC Planning Decisions Committee took the decision in March 2022 to approve the planning application.[41]
However, developments of 150 residential units or more and/or developments over 30 metres in height are referable to the Mayor at two stages. At Stage 1, the Mayor provides comments on the application and assesses whether it complies with the London Plan policies. After Stage 1, the application is then considered by the LPA, in this case the LLDC.

After making its decision, the LPA is then required to refer the application back to the Mayor for his final decision. This is known as a Stage 2 referral. At Stage 2, the Mayor may direct refusal, or allow the LPA to determine the application.

Concerns around the potential impact of light pollution have been raised at various stages of the planning process.

In his Stage 1 comments in July 2019, the Mayor said, "As presented, the application does not comply with the London Plan and draft London Plan." He added:

> *"The proposal must ensure that surrounding residential amenity is not compromised. Appropriate mitigation measures must be secured to control the impacts of noise, vibrations and light pollution, including solar glare."*[42]

Environmental statements were submitted by the applicant as part of the planning application, and considered the impact of both light intrusion on the residential area, and the upward sky glow.[43]

In March 2022, a report by the LLDC's planning officers assessed the proposal (including the light-pollution impacts) and concluded that the proposed development would comply with the Local Plan for the area. The report recommended that the Planning Decisions Committee approve the application.[44] It stated:

> *"The scheme has been designed to minimise its effects on nearby sensitive uses, particularly in respect of noise and light pollution and would gain support from the Agent of Change principle (policy D13)."*[45]

The planning application was discussed at the LLDC's Planning Decisions Committee in March 2022, which approved planning permission.[46] During the meeting, potential benefits, adverse impacts and mitigations of the proposal were discussed. The discussions covered other opportunities and challenges posed by the proposal, including positive comments about the potential to raise the profile of the area and support jobs; and concerns about the impact on transport and the impact of the advertising. Concerns were raised by local politicians, residents and the AEG (which operates the O2 Arena) about the impact of light pollution on residents and the wildlife of the area. These concerns included

[40] This timeline was created for this report, using information set out in the following sources: Queen Elizabeth Olympic Park, MSG Sphere Planning Application; Mayor of London, Planning Application search: Angel Lane, Stratford; LLDC, Report by planning officers to Planning Decisions Committee on MSG Sphere, 22 March 2022; and LLDC, Minutes of the Meeting of the LLDC Planning Decisions Committee, 22 March 2022.
[41] LLDC, Minutes of the Meeting of the LLDC Planning Decisions Committee, 22 March 2022
[42] Mayor of London, Planning Application search: Angel Lane, Stratford
[43] Queen Elizabeth Olympic Park, MSG Sphere Planning Application
[44] LLDC, Report by planning officers to Planning Decisions Committee on MSG Sphere, 22 March 2022
[45] LLDC, Minutes of the Meeting of the LLDC Planning Decisions Committee, 22 March 2022
[46] Ibid

that 'intense moving lights would disturb wildlife on the Park' and that 'residents had a right to rest and blackout blinds did not make up for a blighted home life'.[47]

During the meeting, the following mitigations were outlined in relation to amenity concerns:

- building façade luminance limits (below Institution of Lighting Professionals thresholds)
- limitation of illumination of surrounding properties
- pre- and post-curfew controls (switched off at 11.30pm or 12.00am)
- the creation of a Digital Display Monitoring Group and a Digital Display Management Strategy
- blackout blinds provided on request to those living within 150m of the proposed development as a precautionary measure
- a telephone complaints line would open during the first year of operation.[48]

While some members of the LLDC Planning Decisions Committee noted that 'the proposed light levels are extremely modest as no different to an office block', other members discussed their concerns about the impact of the light on residents and the adequacy of the mitigation measures.[49]

Following the LLDC's decision in 2022 to approve planning permission, the Mayor explained the process for Stage 2 referrals in response to a Mayor's Question: "When it is referred I can either direct refusal or let LLDC approve the application – as it is within the LLDC's remit it is not eligible for Mayoral call in."[50] When an application such as this is referred to the Mayor, he has 14 days to make the decision to allow it to stand or to direct refusal.

When we asked Mayoral officials about the MSG Sphere at the Committee's meeting on 7 February 2023, they were unable to comment, saying: "It is a case the Mayor is going to be considering at Stage 2 shortly."[51]

We heard strong concerns from panel members, including Dan Oakley, about the proposed MSG Sphere. When asked whether the planning system was fit for purpose to control light pollution, in the context of the MSG Sphere, Robert Massey responded:

> *"I would say no because you only have to look at the proliferation of buildings of that type. It is a test, I guess. We will see how this [the MSG Sphere] is determined, but at the moment, the fact that a developer feels able to come forward with that*

[47] LLDC, Minutes of the Meeting of the LLDC Planning Decisions Committee, 22 March 2022
[48] Ibid
[49] Ibid
[50] Mayor's Questions, MSG Sphere, 23 May 2022
[51] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

kind of proposal suggests to me that they have some confidence that it will be approved. If that is the case, then I would argue that the guidance at a national level is not fit for purpose. It is alluding to the need to control light pollution, but it does not appear to have enough teeth."[52]

Following this, on 7 February 2023, the Department for Levelling Up, Housing and Communities, issued an Article 31 Direction to the LLDC,[53] which means the LLDC cannot issue a decision until the Secretary of State has confirmed whether he wants to 'call-in' the application for his determination. Procedurally there are no changes in the planning process until the Secretary of State reaches a decision. The planning application will still be referred to the Mayor of London for a Stage 2 direction.[54]

Recommendation 1

When and if it is referred to him, the Mayor should refuse the planning application to develop the MSG sphere in Stratford, to prevent light-pollution impacts on the surrounding environment and residents. If the planning application is judged to need determination by the Secretary of State, then the Secretary of State should refuse on the same grounds.[55]

[52] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

[53] Letter from Department for Levelling Up, Housing and Communities to LLDC, 7 February 2023. On 3 April 2023 the Department sent a follow-up letter to clarify that the Article 31 Direction applied only to the planning application for the Sphere and not to the application for advertising consent: Letter from Department for Levelling Up, Housing and Communities to LLDC, April 2023.

[54] Queen Elizabeth Olympic Park, MSG Sphere Planning Application

[55] *The Conservative Group does not believe it is the committee's place to ask the Mayor and the Secretary of State to make a certain decision on a live planning application as this could be considered unlawful under predetermination*

Chapter three: Better lighting design and practice

Given the limitations of the existing framework and the planning system regarding light pollution, panel members have discussed the importance of the Mayor of London committing to address light pollution as part of a focused strategy. Currently, the Mayor's Environment Strategy, published in 2018, acknowledges the negative impacts of light pollution on wildlife and refers to planning policy as an approach to address it.[56]

David Smith called for monitoring of light pollution at a London level, and for targets for the reduction of light pollution:

> *"The pollution monitoring that takes places across London should be really applauded, that information is readily available and there is no reason why we cannot introduce light pollution monitoring. If you look at all of the air pollution monitoring stations, there is no reason why we could not have light meters there so we can at least see what those levels are like. I believe that that level of direction would be really helpful for not just local boroughs to introduce their own targets and policies on light pollution, but for the wider public to understand this as well. Fundamentally, we are lacking awareness of this issue."*[57]

Without city-wide monitoring of light pollution, it is not possible to understand or act on the problem.

It is possible to measure light pollution through satellite observation, ground monitors, and observation by the naked eye.[58] CPRE, the countryside charity, produces maps of light pollution in the UK as seen by satellite imagery, showing that the highest densities of light shining up into the night sky are from London.[59] There is limited quantitative data on what the highest sources of light emissions are in London, though satellite imagery can give an indication. CPRE writes that 'light pollution from motorways and trunk roads shows prominently on the national map', and 'the M25 is clearly visible around London'. The CPRE maps are divided into 400 x 400 metre squares. Within London, the brightest square in London is near Wembley Stadium in the London Borough of Brent.[60] The darkest location within London is found in Bromley. However, CPRE writes that there are no 'truly dark skies' in London, according to CPRE's definition of 'dark sky'.[61] The CPRE research shows that

[56] Mayor of London, London Environment Strategy, May 2018
[57] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[58] *Science*, Citizen scientists report global rapid reductions in the visibility of stars from 2011 to 2022, 19 January 2023
[59] CPRE, England's Light Pollution and Dark Skies
[60] CPRE, Night Blight: Mapping England's light pollution and dark skies, 2019
[61] Ibid

monitoring and mapping can help to understand where upward light pollution is concentrated in London, and therefore where there is potential for the GLA or local authorities to focus attention. However, satellite imagery is only one form of monitoring light pollution and while it enables us to understand sky glow, it does not capture the impact of artificial light at night at ground level. David Smith explained:

> *"If we were to lower the overall aspect of lighting, it is going to achieve probably more than just focusing on creating darker spaces, which are perhaps better for things like astronomy because you are looking at creating that pocket to be able to see the night sky. When we are looking at the animal kingdom, most species do not look up; they look down or they look sideward. We have to be careful about talking about just creating darkness for looking upwards; we have to create an overall level."*[62]

Robert Massey commented on the importance of education and awareness of the impacts of light pollution; and suggested that London could benefit from a city-wide awareness-raising campaign, led by the Mayor.

"I would not get into a binary conversation about this. Personal safety matters for everybody. Well-designed lighting systems matter for everybody. They do not need to be anything like as harsh and we do not have to stick to this guidance of brighter is better, and it is worth challenging that perception as well. If there is a public education campaign to be had here around unnecessary lighting, that ought to be part of it. Being able to see is not just a matter of simply the illumination you have."

Robert Massey, Deputy Executive Director
Royal Astronomical Society

Panel members agreed that an awareness-raising campaign should emphasise both the impacts of light pollution, and the wasted energy and cost element. As David Smith emphasised, "Light pollution represents wasted energy, which represents wasted money."[63]

[62] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[63] Ibid

"There is a real opportunity for the Mayor to show leadership, to set a citywide strategy with targets and then develop guidelines that could be brought in in the boroughs, having their own strategies."

David Smith, Advocacy and Social Change Officer
Buglife

We heard from panel members that a city-wide strategy on light pollution, led by the Mayor, could incorporate other initiatives outside of the planning system to reduce light pollution.

These initiatives could include 'curfews' for artificial light at night from commercial and office buildings. For instance, panel members[64] referred to other countries including France, where since July 2018 all businesses have had to turn off all illuminated signs, adverts and window displays at specific times of night.[65] While 'curfew' timings may not always be appropriate, where light at night is important for personal safety, businesses and the night-time economy, the GLA should explore the potential opportunities and limitations of initiatives that involve encouraging businesses and advertising hoardings to switch off or dim lights at certain times of night.

David Smith described how in response to the energy crisis, 'countries took quite quick and rapid action with regards to light pollution and its contribution to their energy levels'. He added:

> *"Germany, France and Spain are examples where they did this very quickly and looked immediately at what I would consider vanity lighting, the lighting up of municipal buildings and things like that, advertising hoardings, so that they could quickly go, 'Here is a curfew for when these lights are going to go off in order to save money.' It has been done elsewhere and it was done very quickly; however, it was not something, although it is being discussed and planned, that was very quickly rolled out in the UK. Instead, there was a look towards how we get more energy rather than reducing the consumption of energy."*[66]

Panel members also described how dimming or turning off lights at certain times, using dimming technology, timers, and motion sensors to ensure that lights are off when not

[64] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[65] International Dark-Sky Association, France Adopts National Light Pollution Policy Among Most Progressive In The World, 9 January 2019
[66] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023

needed, could make a significant impact on reducing light pollution. Robert Massey emphasised that better lighting design and practice is not about reducing necessary light, but about ensuring the direction, intensity and colour temperature of the light are suitable for its purpose.

> *"What you often think about in this debate is switching all the lights off or not, it is [not] that binary, actually. Apart from technological solutions, there are practical things you can do like installing adequate shielding and changing the colour spectrum of the lights... There are a lot of innovative things you can do that would have a minimal impact on people's perception. Also, there is often the assumption that brighter is better for, say, things like safety and so on. That is not necessarily the case because you get glare. Whether that is personal safety or someone driving, if lighting is too bright, it can be as bad."*[67]

With relation to better lighting design and practice, David Smith gave the example of Shanghai, which has recently introduced environmental regulation on light pollution. The regulation includes the control of reflective materials on the outside of buildings. He added: "Shanghai is considered the city with no night, and so that is a huge step for it to take and there is no reason why we cannot take that here in London." [68]

We heard from panel members that some boroughs are moving towards smart LED lighting to have more remote control over the timing and intensity of streetlights, for different times of the day.[69] Doug Wilkinson said that Enfield Council replaced 22,000 streetlights with LED lights, and that 'probably the big driver' around this was energy consumption and carbon, but that the reduction in light pollution was also a factor for the council.[70] Doug Wilkinson and David Smith discussed that there is an inconsistency across UK local authorities in terms of streetlight practices, and commented that standardisation across local authorities on this issue would be useful. The GLA should develop and consult on guidance that sets out how London boroughs can reduce energy cost and light pollution from street lighting by implementing LED lights with remote dimming and timers, noting that any changes to street lighting should also be subject to local consultation.

We note in this context that the City of London's new Lighting SPD provides guidance and technical requirements, including 'District Brightness Zones' and corresponding curfew times and luminance levels.[71] The City of London's SPD states:

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[67] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[68] *China Daily*, Shanghai wants to dim light pollution, 5 August 2022
[69] City of Bradford, The Smart Street Lighting Project
[70] Environment Committee, Transcript of Agenda Item 5 – Light and Noise Pollution, Part Two – Panel 2, 7 February 2023
[71] City of London, Light + Darkness in the City: A Lighting Vision for the City of London, June 2018

"A visual survey of the existing lighting was conducted as part of this study … The key issues identified were:

- *Over-lighting: many areas have higher levels of illumination than required*
- *Glare: certain types of light fittings being employed create excessive glare*
- *Scale: the mounting height of some fixtures create an inappropriate scale for pedestrians*
- *Variety: there is considerable inconsistency and variety born out of piecemeal upgrading*

Additional issues raised through stakeholder meetings and briefing materials include:

- *Architecture: whilst some unimportant buildings are overlit many landmarks remain dark*
- *Media: many signs, media screens and advertising sites are too bright*
- *Colour: coloured lighting is sometimes used in inappropriate places*
- *Hierarchy: street lighting does not always respect hierarchy, particularly in conservation areas*
- *Character: the lighting does not always appropriately reflect the character of an area*
- *Energy use: many commercial buildings have their lighting left on even when empty*
- *Retail: retail frontages are often over lit and spill too much light into the environment*
- *Flexibility: current lighting does not suit the needs of the evolving public realm design and use"*

The City of London's SPD provides guidance on thoughtful design of lighting – including intensity, colour and scale – to achieve an appropriate balance of light and dark depending on the space and its purpose, and to mitigate excessive light or glare.[72] London boroughs should review the approach of the City of London to inform their own SPDs.

Mayoral action on light pollution

The Mayor has acknowledged the impact of light pollution, noting:

> *"The GLA has not made any direct assessments on the impact of light pollution on nature. However, there is already a wealth of scientific evidence to conclude that light pollution does cause harm to wildlife and is getting worse."*[73]

The Mayor recently set out his leadership on light pollution, stating:

[72] City of London, Light + Darkness in the City: A Lighting Vision for the City of London, June 2018
[73] Mayor's Questions, Light Pollution (6) , 28 March 2023

> *"My Night Time Strategy Guidance advocates for best practice in lighting, referring to the Institute of Lighting Professional's Guidance Note for the Reduction of Obtrusive Light and suggests identifying opportunities where Urban Night Sky Place designation could be sought. The 24 Hour London team ran an online night surgery, as part of the Night Time Policy Forum, entitled 'Dark Sky & Ecology Night Surgery', which addressed light pollution. These surgeries allow members to ask a panel of experts for their thoughts on the best way to tackle a specific topic in their own Night Time strategies."*[74]

In response to another recent Mayoral Question, he has indicated that he may take further action on this issue: "For the developing London Local Nature Recovery Strategy, I will look into this emerging new guidance and industry best practice and how it may apply to London."[75]

We welcome this commitment. CPRE states that, based on satellite imagery,

> *"London has the highest level of light pollution and is 24 times brighter than the darkest region of the South West. It is also eight times brighter than the next brightest region – the North West."*[76]

As the UK city with the highest level of light shining up into the night sky, it is essential that London takes action on light pollution, through a city-wide strategy that includes monitoring and targets, and awareness-raising about the impacts and costs of light pollution.

Streetlights are a major source of artificial light at night, and are operated differently across different London boroughs. Therefore, we recommend that the GLA should develop and consult on guidance that sets out how London boroughs can reduce energy cost and light pollution from street lighting by implementing LED lights with remote dimming and timers.

London boroughs should also be encouraged to review the City of London's new Lighting SPD, in terms of setting guidance for thoughtful design of lighting across their local areas.

Another major source of artificial light is from commercial buildings and advertising hoardings. The GLA should explore how businesses and advertising hoardings might be encouraged to switch off or dim lights at certain times of night.

Finally, it is also important that the Mayor shows leadership by ensuring that all GLA and TfL buildings are working toward reducing light pollution.

We set out the below recommendations in detail:

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[74] Mayor's Questions, Light Pollution (1), 6 April 2023
[75] Mayor's Questions, Light Pollution (6) , 28 March 2023
[76] CPRE, Night Blight: Mapping England's light pollution and dark skies, 2019

Recommendation 2

The Mayor of London should develop a city-wide strategy committing to reducing light pollution. This should include monitoring and target metrics, plus raising awareness about the impacts and costs of light pollution among businesses.

Recommendation 3

The Government should commit to targets for reducing light pollution in the UK, including specific targets for major cities.

Recommendation 4

The Mayor should work with businesses to ensure that they adhere to best practice and avoid contributing to light pollution where possible – for example, by switching off or dimming lights when not needed. This includes, but is not limited to, retail and office spaces, and advertising hoardings.

Recommendation 5

The Mayor should continue to ensure that all GLA and TfL buildings are working toward reducing light pollution, and should set a time frame by which buildings should meet their targets of reduced light emissions. This is in line with his work with the GLA Group to deliver energy-efficiency measures across their estates.

Recommendation 6

London boroughs should reduce energy cost and light pollution from street lighting by implementing LED lights, with remote dimming and timers. The Mayor should develop and consult on guidance that sets out how London boroughs can do this, noting that any changes to street-lighting practices should also be subject to local consultation.

Recommendation 7

The City of London's new Lighting SPD provides guidance and technical requirements regarding effective and sustainable lighting design.[77] London boroughs should explore the potential to review effective practice from the City of London, to inform their own SPDs.

[77] City of London, Light + Darkness in the City: A Lighting Vision for the City of London, June 2018

Other formats and languages

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Hindi

यदि आपको इस दस्तावेज का सारांश अपनी भाषा में
चाहिए तो उपर दिये हुए नंबर पर फोन करें या उपर दिये
गये डाक पते या ई मेल पते पर हम से संपर्क करें।

Vietnamese

Nếu ông (bà) muốn nội dung văn bản này được dịch sang tiếng Việt, xin vui lòng liên hệ với chúng tôi bằng điện thoại, thư hoặc thư điện tử theo địa chỉ ở trên.

Bengali

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Greek

Εάν επιθυμείτε περίληψη αυτού του κειμένου στην γλώσσα σας, παρακαλώ καλέστε τον αριθμό ή επικοινωνήστε μαζί μας στην ανωτέρω ταχυδρομική ή την ηλεκτρονική διεύθυνση.

Urdu

اگر آپ کو اس دستاویز کا خلاصہ اپنی زبان میں
درکار ہو تو، براہ کرم نمبر پر فون کریں
یا مذکورہ بالا ڈاک کے پتے یا ای میل
پتے پر ہم سے رابطہ کریں۔

Turkish

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Arabic

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فرجاء الاتصال برقم الهاتف أو الاتصال على
العنوان البريدي العادي أو عنوان البريد
الإلكتروني أعلاه.

Punjabi

ਜੇ ਤੁਸੀਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਦਾ ਸੰਖੇਪ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਲੈਣਾ ਚਾਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਇਸ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਉਪਰ ਦਿੱਤੇ ਡਾਕ ਜਾਂ ਈਮੇਲ ਪਤੇ 'ਤੇ ਸਾਨੂੰ ਸੰਪਰਕ ਕਰੋ।

Gujarati

જો તમારે આ દસ્તાવેજનો સાર તમારી ભાષામાં
જોઈતો હોય તો ઉપર આપેલ નંબર પર ફોન કરો
અથવા ઉપર આપેલ ટપાલ અથવા ઈ-મેઈલ સરનામા
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