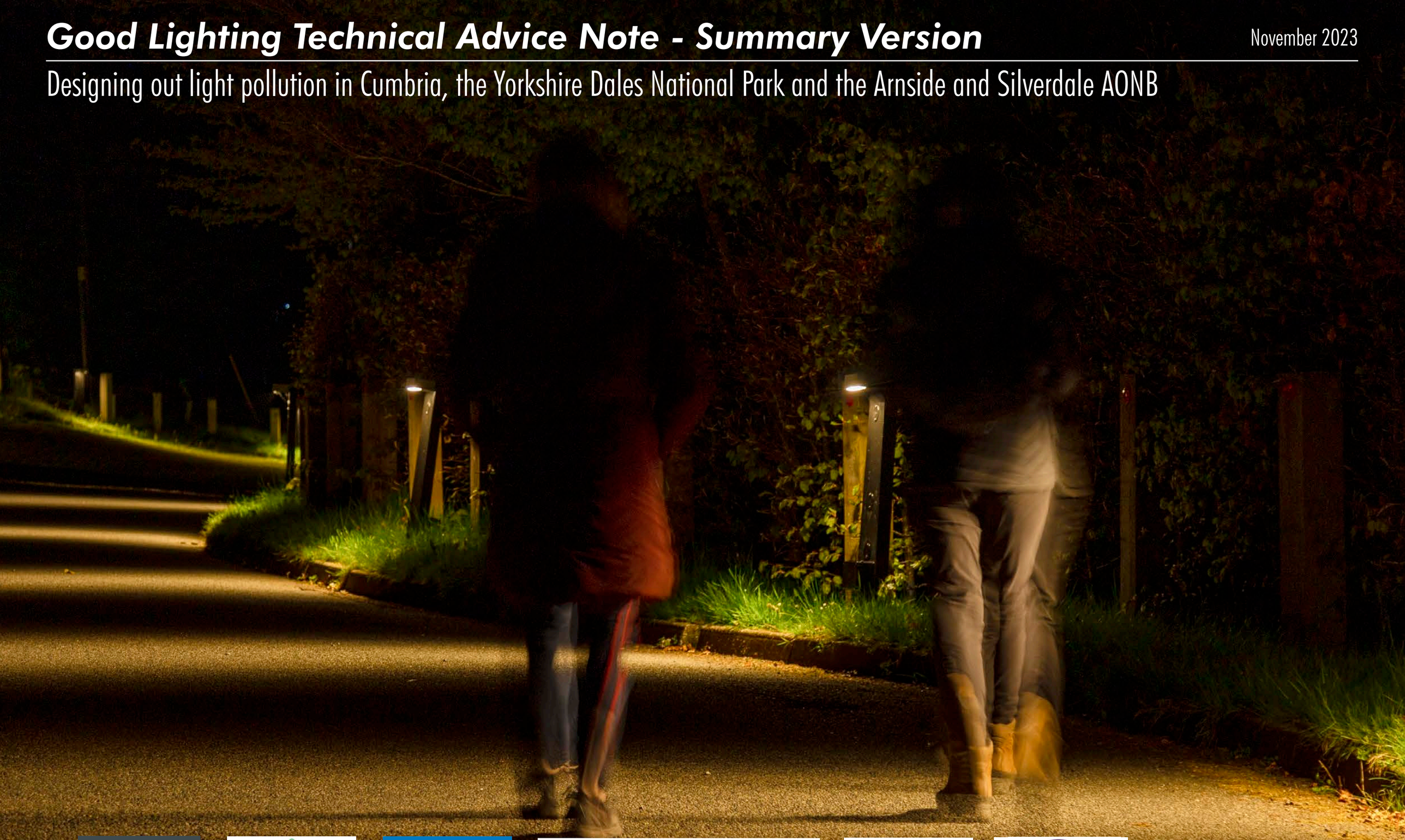
Good Lighting Technical Advice Note - Summary Version

November 2023

Designing out light pollution in Cumbria, the Yorkshire Dales National Park and the Arnside and Silverdale AONB



FRIENDS OF THE LAKE DISTRICT

Cumberland Council

LANCASTER CITY COUNCIL
Promoting City, Coast & Countryside

Lancashire County Council

Westmorland & Furness Council

YORKSHIRE DALES National Park

Lake District National Park

dark source

"For millennia, on every clear night, humans have wondered at the awe-inspiring spectacle of the starry heavens…The light from distant stars and galaxies takes hundreds, thousands, even millions of years to reach us – what a tragedy to lose it in the last millisecond of its journey."

Bob Mizon, Commission for Dark Skies,
Disappearing Stars

British Astronomical Association

Commission for Dark Skies

DarkSky INTERNATIONAL

The countryside charity

CAMPAIGN for NATIONAL PARKS

buglife

NATURAL ENGLAND

Solway Coast Area of Outstanding Natural Beauty

Arnside & Silverdale Area of Outstanding Natural Beauty

UK DARK SKIES PARTNERSHIP

INSTITUTION OF LIGHTING PROFESSIONALS

Royal Astronomical Society

Cumbria Wildlife Trust

NORTH PENNINES Area of Outstanding Natural Beauty

United Nations Educational, Scientific and Cultural Organization · North Pennines UNESCO Global Geopark

dark source

Cover Image by Dylan Parry Evans

1.0 INTRODUCTION

The Good Lighting Technical Advice Note (TAN) has been developed by ***Dark Source Lighting Design Studio*** and ***Friends of the Lake District*** (CPRE - The Countryside Charity, Cumbria branch) in collaboration with the local planning authorities to provide technical lighting guidance to planners, applicants, architects, developers, electricians, property owners, communities and lighting professionals.

The planning process is the mechanism through which to look at places, sites and proposals holistically and take into account the full range of economic, environmental and social considerations. Yet lighting is all too often considered in isolation as an after-thought to the planning process, rather than as part of wider planning goals or community visions.

This leads to:

• The gradual, incremental accumulation of lighting eroding the aesthetic quality and character of places and landscapes, as well as harming biodiversity and human health; and

• Poorly thought out designs that add to visual clutter and increasing levels of sky glow.

A key aim of the TAN is to reverse this trend and support planners in delivering lighting best practice and the 5 Good Lighting Outcomes:

1) Energy and Carbon Savings - Artificial lighting is a precious resource not to be wasted. Lighting can account up to nearly 6% of the global CO2 emissions and 20% of the electricity used worldwide. Wasteful poor lighting undermines the Zero Carbon Cumbria's net zero target by 2037. Install the minimum number of lights to fulfil the task. Choose lights with the lowest embodied energy. Achieve maximum efficiency of Lumen output per Watt. Lights to be on only when required.

2) Attractive and Safe Spaces - Sensitive lighting contributes to place-making, inclusive spaces, public realm character and ambience. Uniformity and legible visibility is lost through harsh lighting glare and cluttered/disorienting light sources. Retain natural darkness in green spaces wherever possible.

3) Residential Amenity & Well-Being - Protecting residential amenity is an established planning consideration, and common law 'quiet enjoyment' of your property. Good lighting minimises disruption to people's sleep and prevents light spill causing nuisance. During the hours of darkness humans produce the hormone Melatonin, which is an antioxidant,anti-inflammatory, and reduces blood vessel permeability, anxiety and stress. Seeing the stars connects people to nature improving mental and physical well-being.

4) Enjoying Dark Skies Heritage - Astro-tourism & Astro-photography are growing in popularity, particularly valuable for increasing staying visitors over the winter months and providing much needed income to different parts of Cumbria. Reversing sky glow from preventing lighting shining above the horizontal plane is vital.

5) Protecting Biodiversity - The day and night (light and dark) cycle is encoded in the DNA of all living creatures, and darkness is essential for nature to flourish. Planning decisions consider biodiversity net gain and Cumbria is a leading area for nature recovery. All lighting must be sensitive to the habitats and species directly or potentially affected.

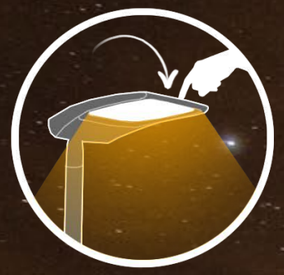
The TAN gives guidance on the necessary information to submit with planning applications, other consents (such as Notifications of Intent and Listed Building) and to inform the lighting design process, in order to conserve and enhance the Dark Skies across Cumbria and Yorkshire Dales, whilst also supporting energy saving, biodiversity and human well-being.

Even where planning consent is not required, those seeking to install new lighting or replace existing lighting can play their part by following the Good Lighting Principles.

You can view the full TAN document ***here***.

Background Image by Richard Jakobson

1. Don't light unless it's necessary.
Is the light really needed to fulfil a clear task or function?



2. Light only what needs to be lit.
Avoid over lighting and clutter, direct light downwards and use the correct beam distribution.

3. Light should be no brighter than necessary.
Our vision is harmed when intense light glares. Use lighting sensitively, and ensure it's comfortable on the eye.

4. Use warm colour temperatures.
2,700 Kelvins or lower utilised throughout.

5. Use switch off, dimming or PIR sensors.
Only have lights on when needed, and help reduce carbon emissions and save on your electricity bills.

6. Use lower mounting height where possible.
Lower mounting height contains light more effectively.

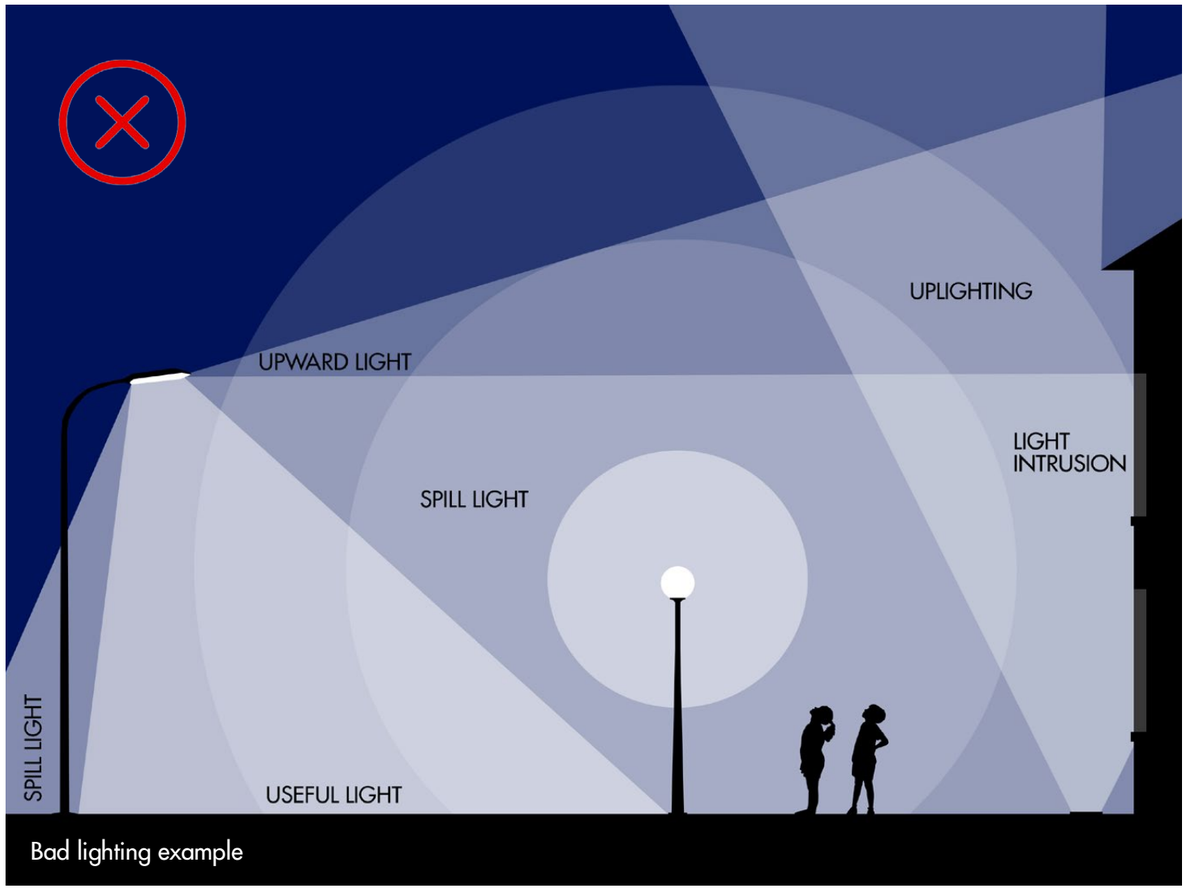
7. Limit internal lighting spilling outside
Avoid extensive glazing, fit blinds, external shutters and/or use tinted or electrochromic glass.

8. Keep light away from wildlife.
Nature needs darkness to function and be healthy.

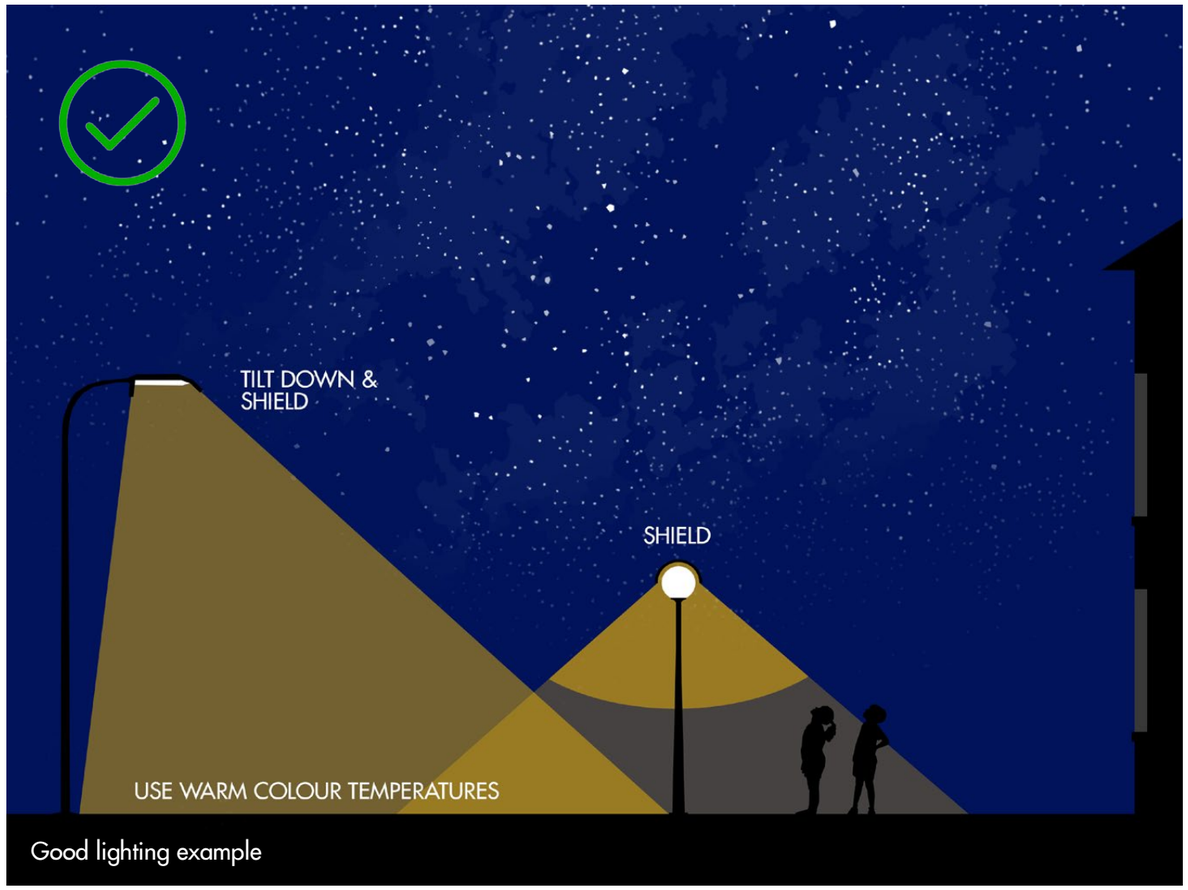
Background Image by Rob Fraser

2.0 GOOD PRACTICE EXAMPLES

There are clear causes of light pollution & simple ways to eliminate it:



Bad lighting example



Good lighting example

<u>Light pollution & nuisance is caused by the factors listed below:</u>

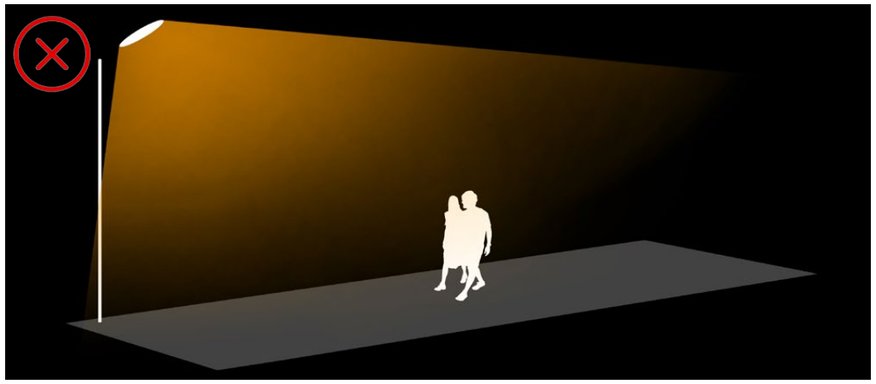
- Light going upwards.
- Light trespass into or out of the houses.
- Use of cool colour temperatures.
- Unshielded & glary lighting.
- Intense light which gets reflected from the floor plane.

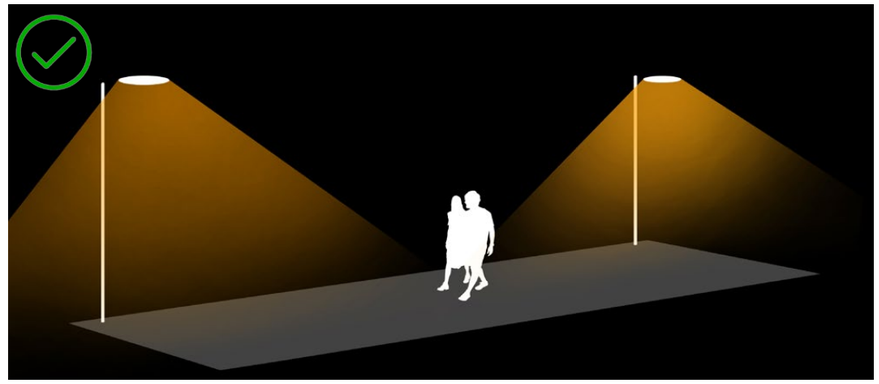
<u>Light pollution can be eliminated through the measures below:</u>

- Use the light where it is needed & in the amount it is needed.
- Shield the light and do not allow it to go upwards or sideways.
- Reduce glare through accessories or using the correct light distribution.
- Use of warm colour temperatures.
- Utilise dimming profiles, timer (astronomical clock), photocell, lighting control systems or PIRs.

• Use lower mounting level and do not illuminate a large area with a single source. This will result in a steep tilt angle causing glare and light pollution.

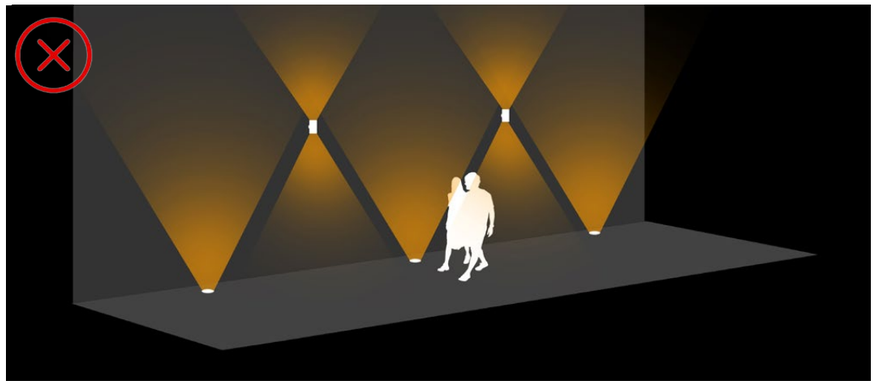
• Distribute the task between multiple down-facing luminaires. As long as the quantity is not excessive, using multiple luminaires can be a helpful method for illuminating targeted areas without causing light spill & glare.

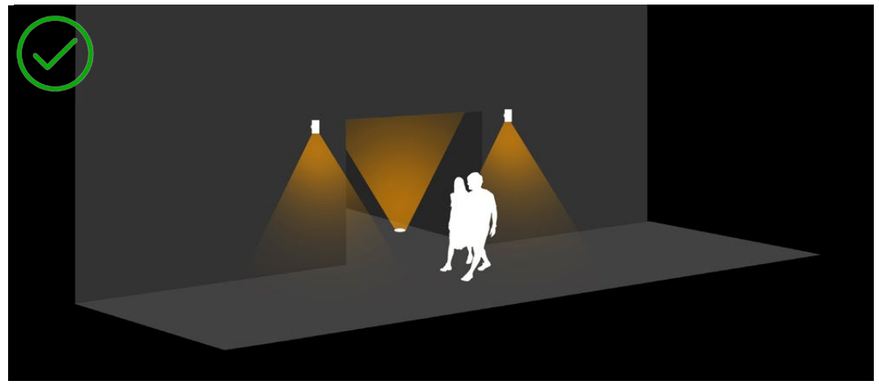




• Uplights can only be considered when the upward spill is contained.

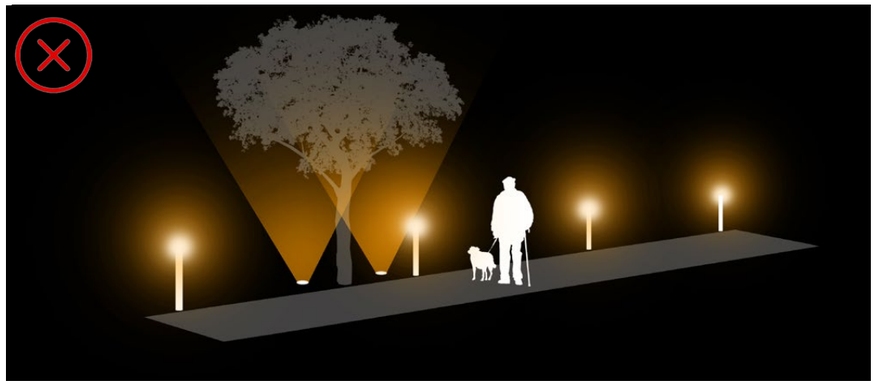
• Building-mounted downlights can be considered to complement street lighting if they won't cause excessive illumination.

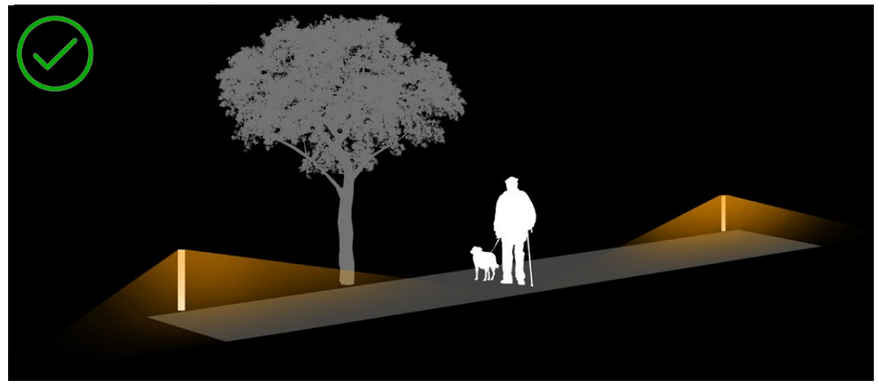




• Do not illuminate soft landscape & planting for decorative purposes. Do not use glowing or beacon lights.

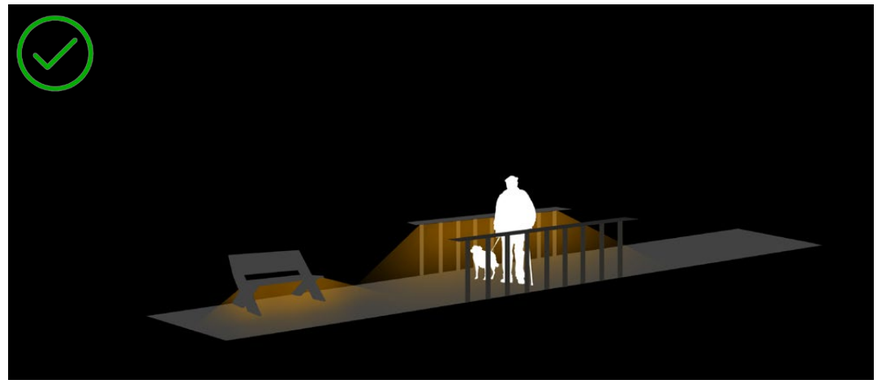
• If you ***are not expected*** to meet a certain lighting standard, it is perfectly acceptable for the lighting effect to be intermittent & variable.
• If you **are expected** to meet a lighting standard, it would be helpful to achieve a certain level of uniformity. Uniformity means that the lowest level of light is higher than 0. Higher minimum lux value means higher uniformity level.

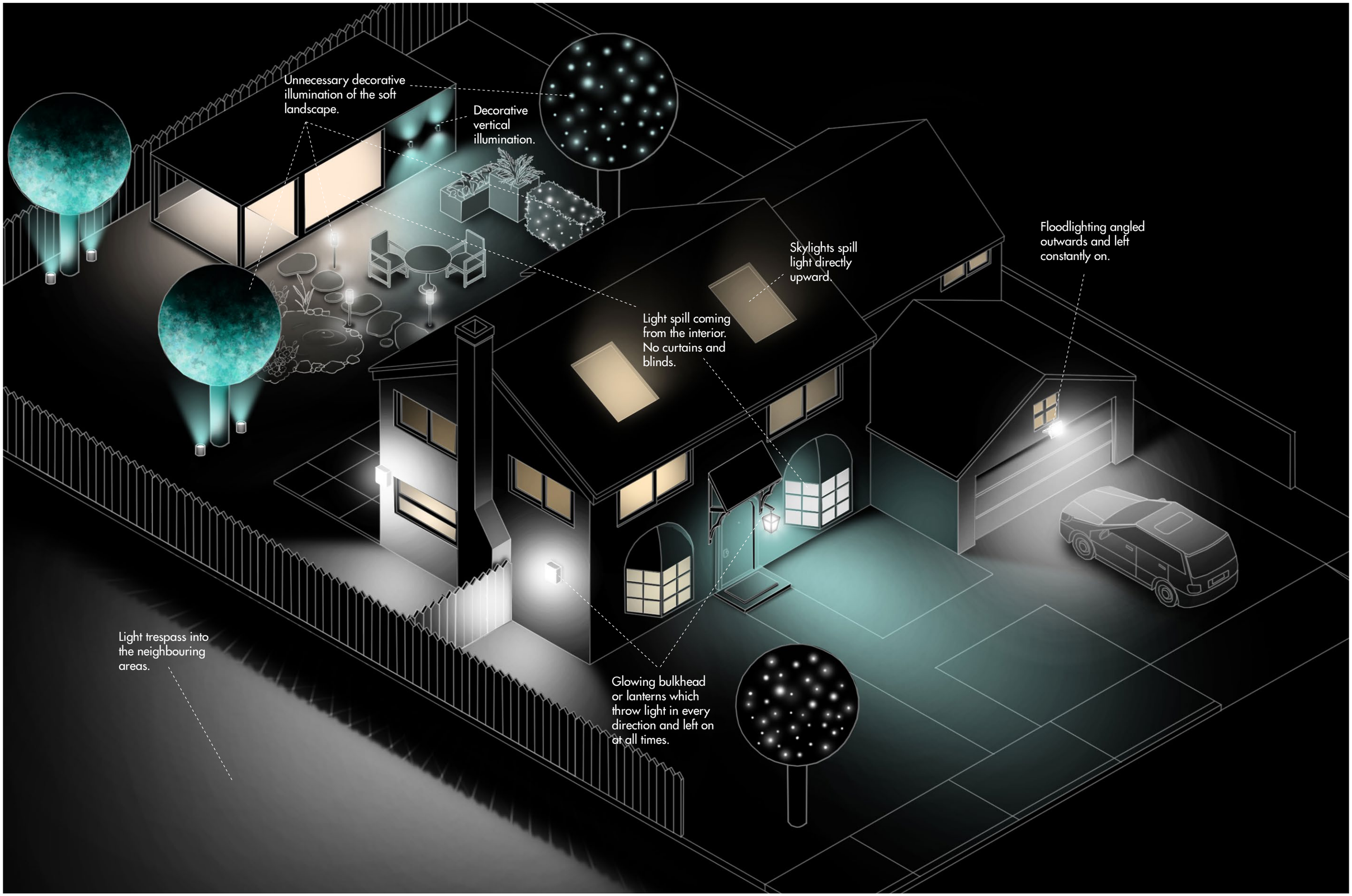


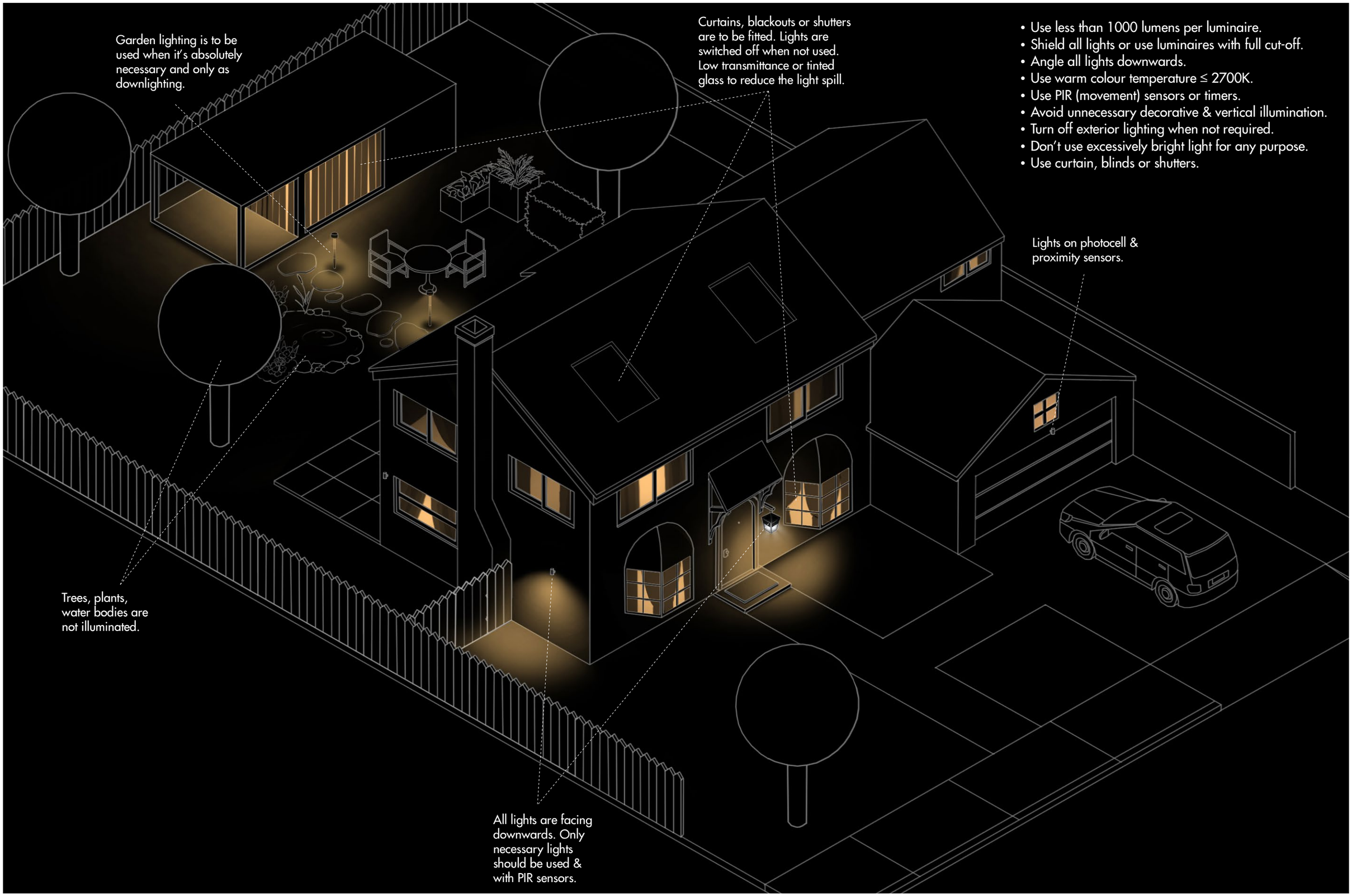


• Don't use luminaires which throw light above the horizon level. Use lights with 0 Upward Light Output Ratio.

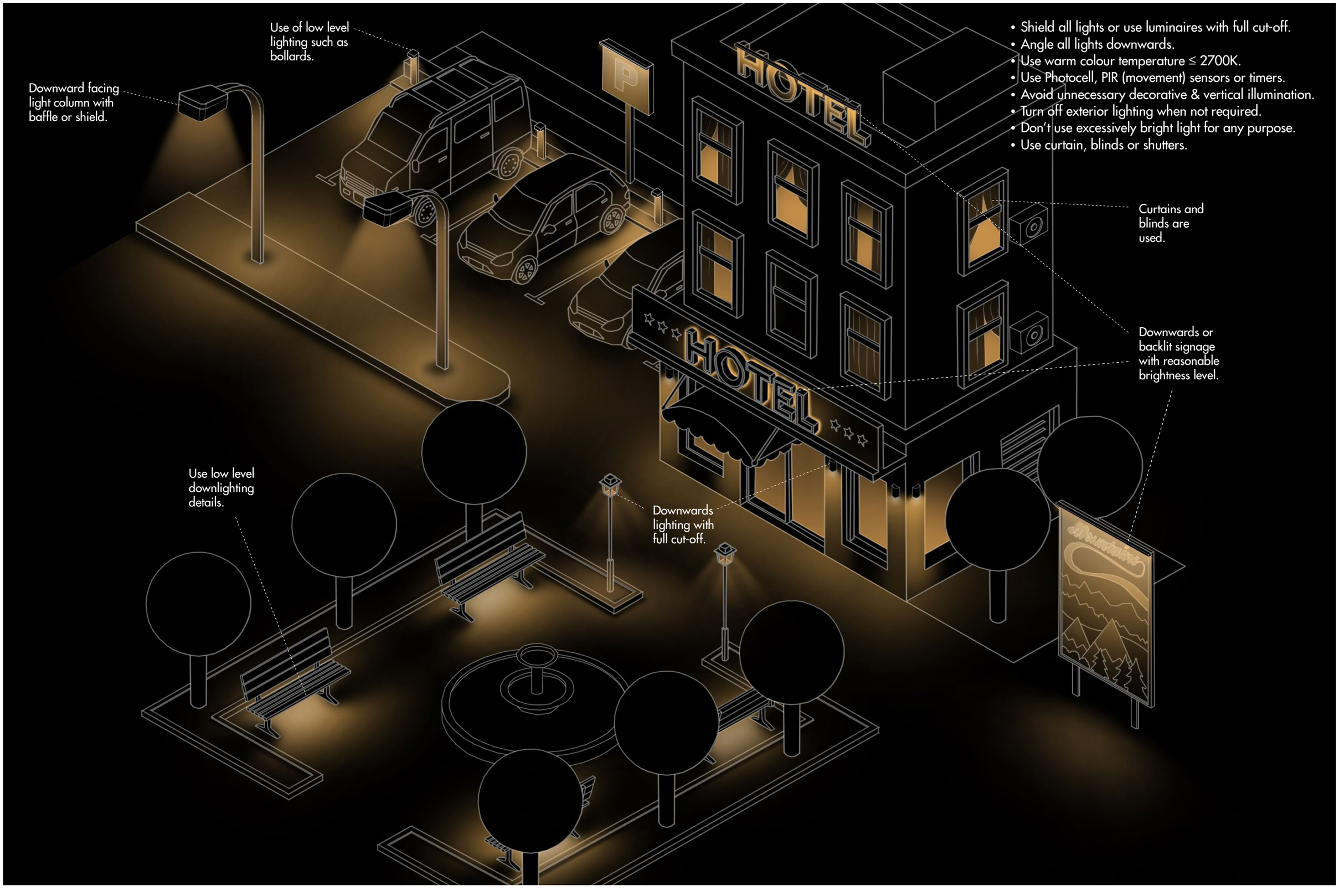
• You can integrate and conceal the lighting elements within the existing & low level structures.

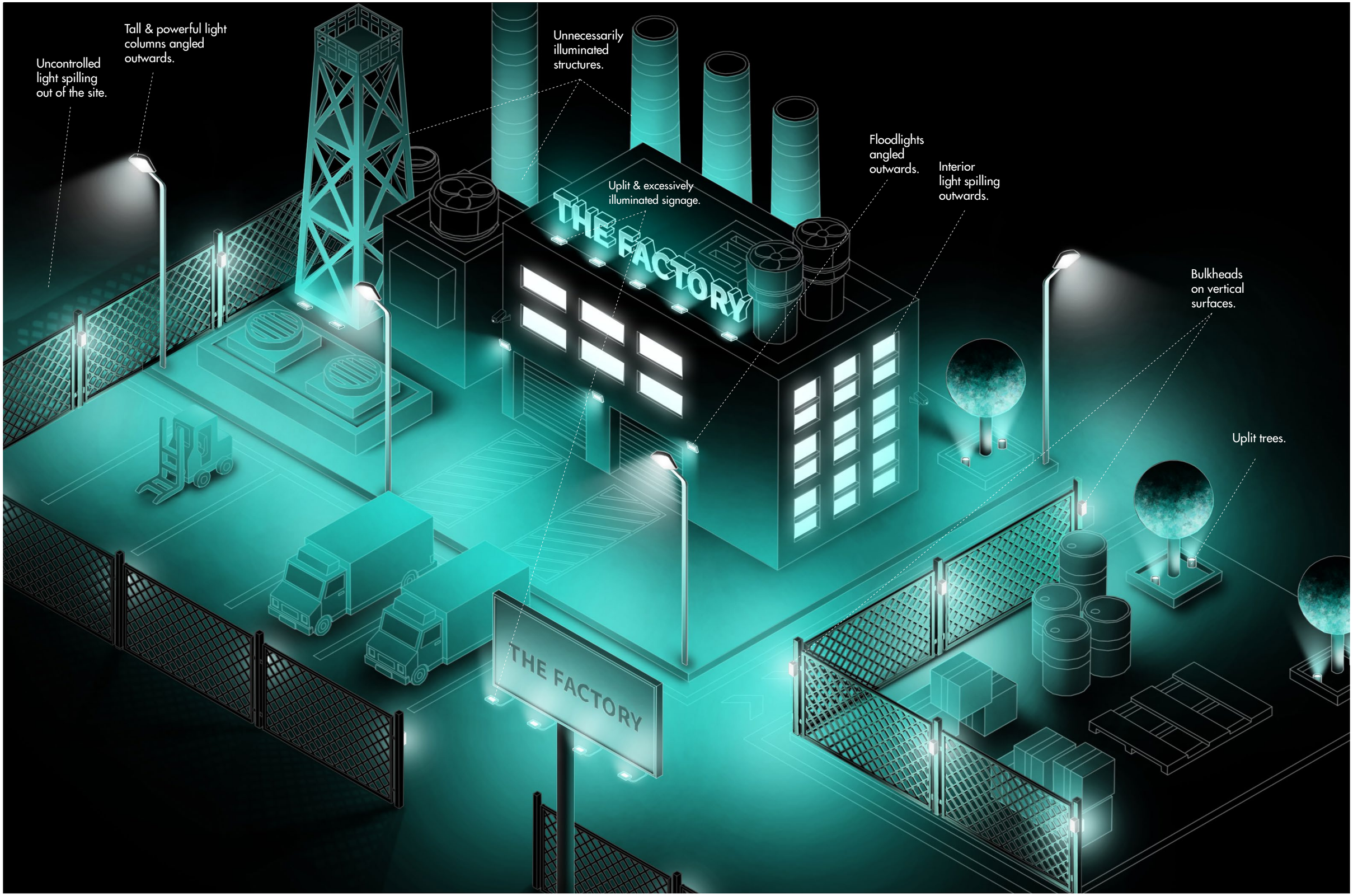


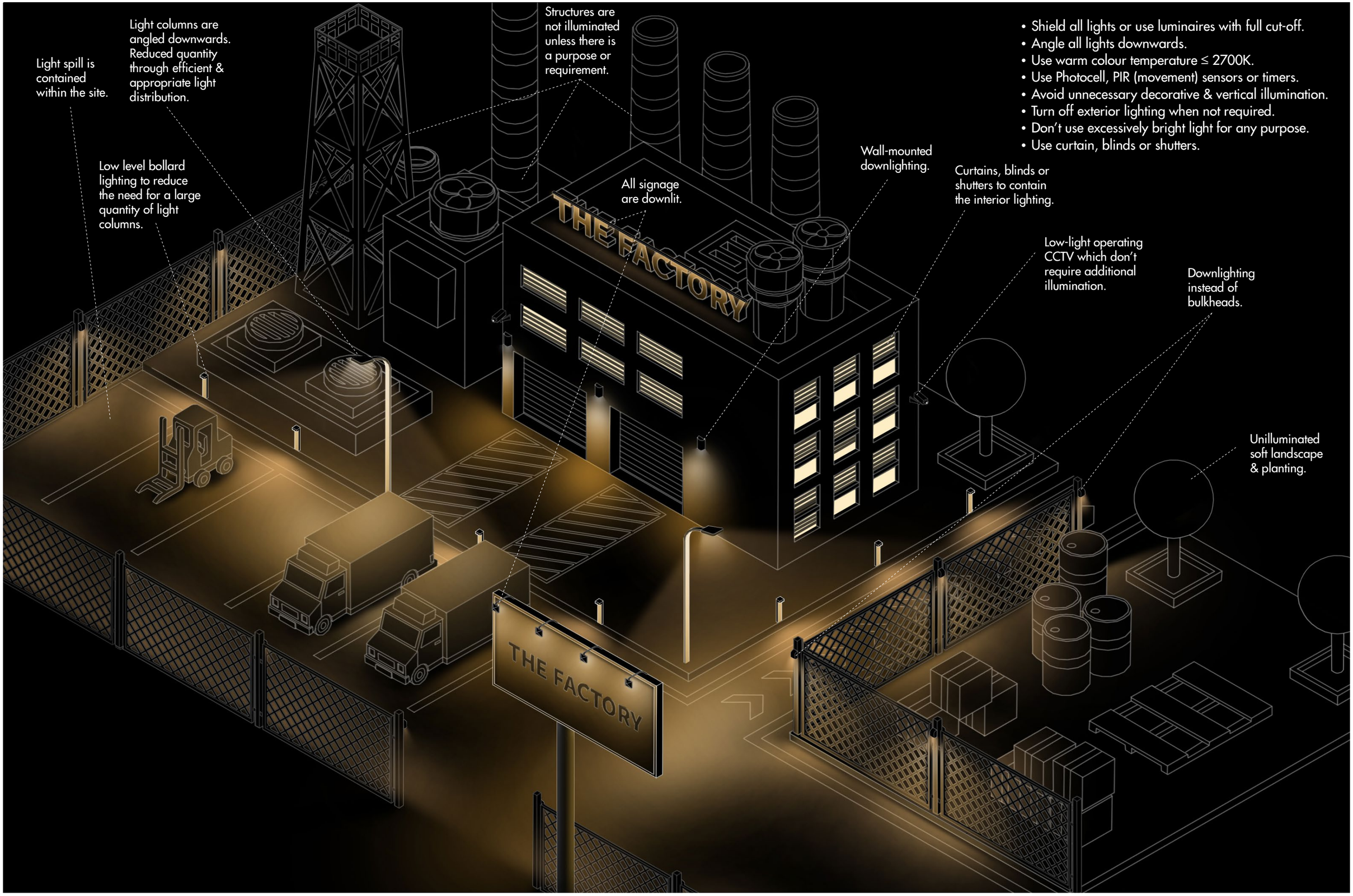

Unnecessary decorative illumination of the soft landscape.
Decorative vertical illumination.
Skylights spill light directly upward.
Floodlighting angled outwards and left constantly on.
Light spill coming from the interior. No curtains and blinds.
Light trespass into the neighbouring areas.
Glowing bulkhead or lanterns which throw light in every direction and left on at all times.

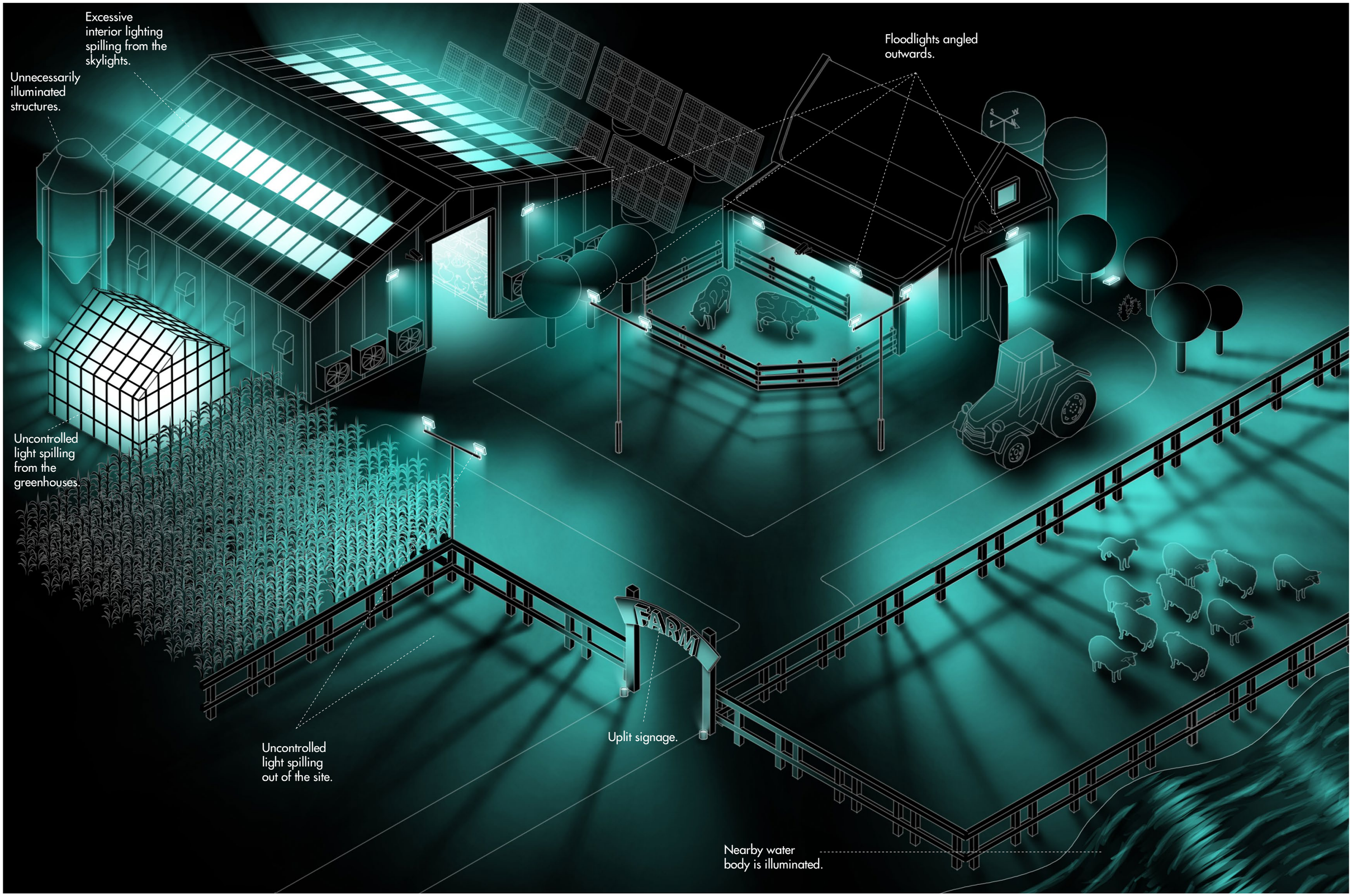

Garden lighting is to be used when it's absolutely necessary and only as downlighting.
Curtains, blackouts or shutters are to be fitted. Lights are switched off when not used. Low transmittance or tinted glass to reduce the light spill.
• Use less than 1000 lumens per luminaire.
• Shield all lights or use luminaires with full cut-off.
• Angle all lights downwards.
• Use warm colour temperature ≤ 2700K.
• Use PIR (movement) sensors or timers.
• Avoid unnecessary decorative & vertical illumination.
• Turn off exterior lighting when not required.
• Don't use excessively bright light for any purpose.
• Use curtain, blinds or shutters.
Lights on photocell & proximity sensors.
Trees, plants, water bodies are not illuminated.
All lights are facing downwards. Only necessary lights should be used & with PIR sensors.

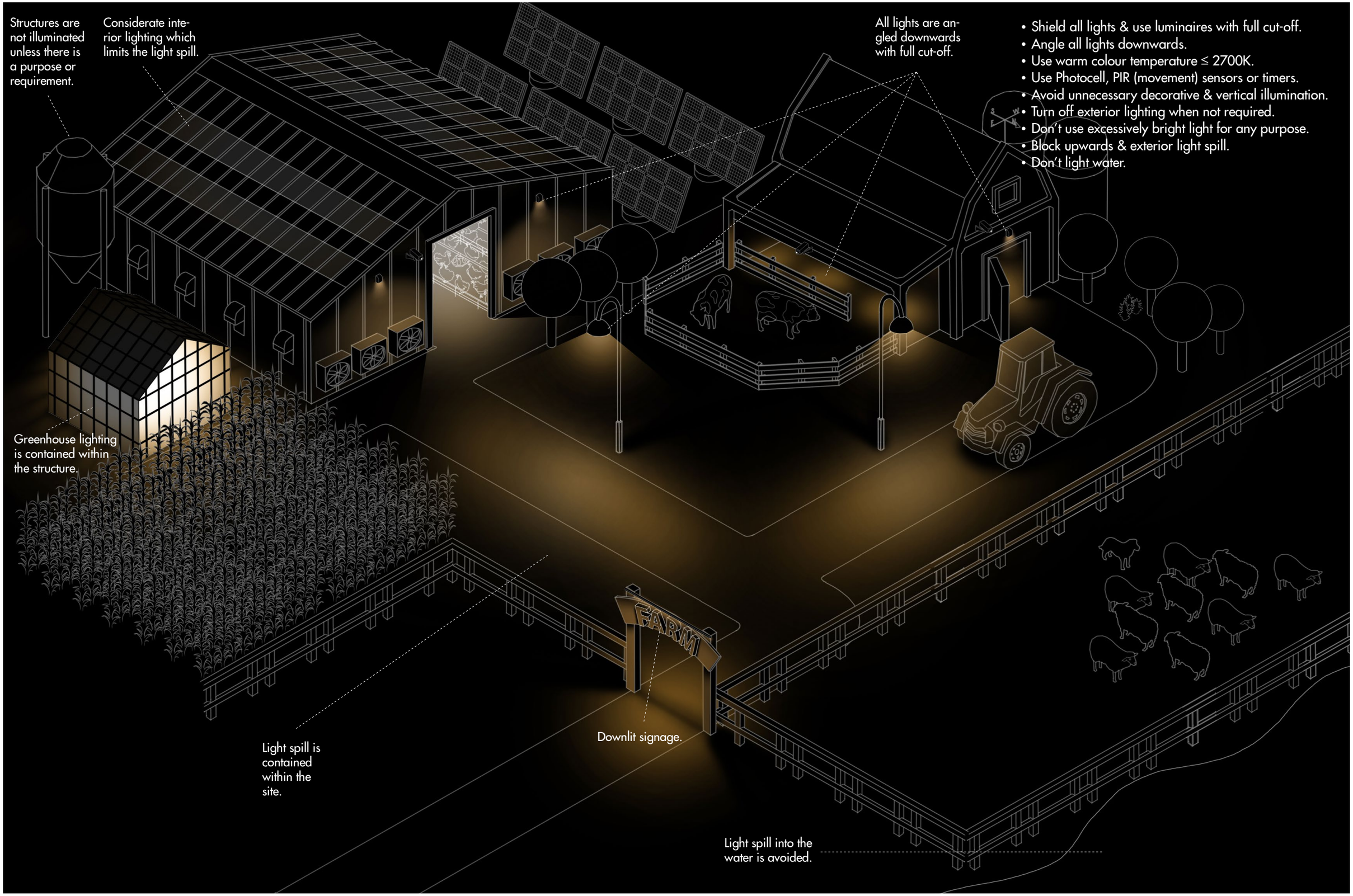

* Applies to all commercial establishments, pubs and small retails.
Light columns are angled upwards with unnecessarily high number of powerful luminaires.
Excessive landscape & decorative lighting with significant upwards output.
HOTEL
HOTEL
P
All signage are excessively illuminated.
Facades are uplit.

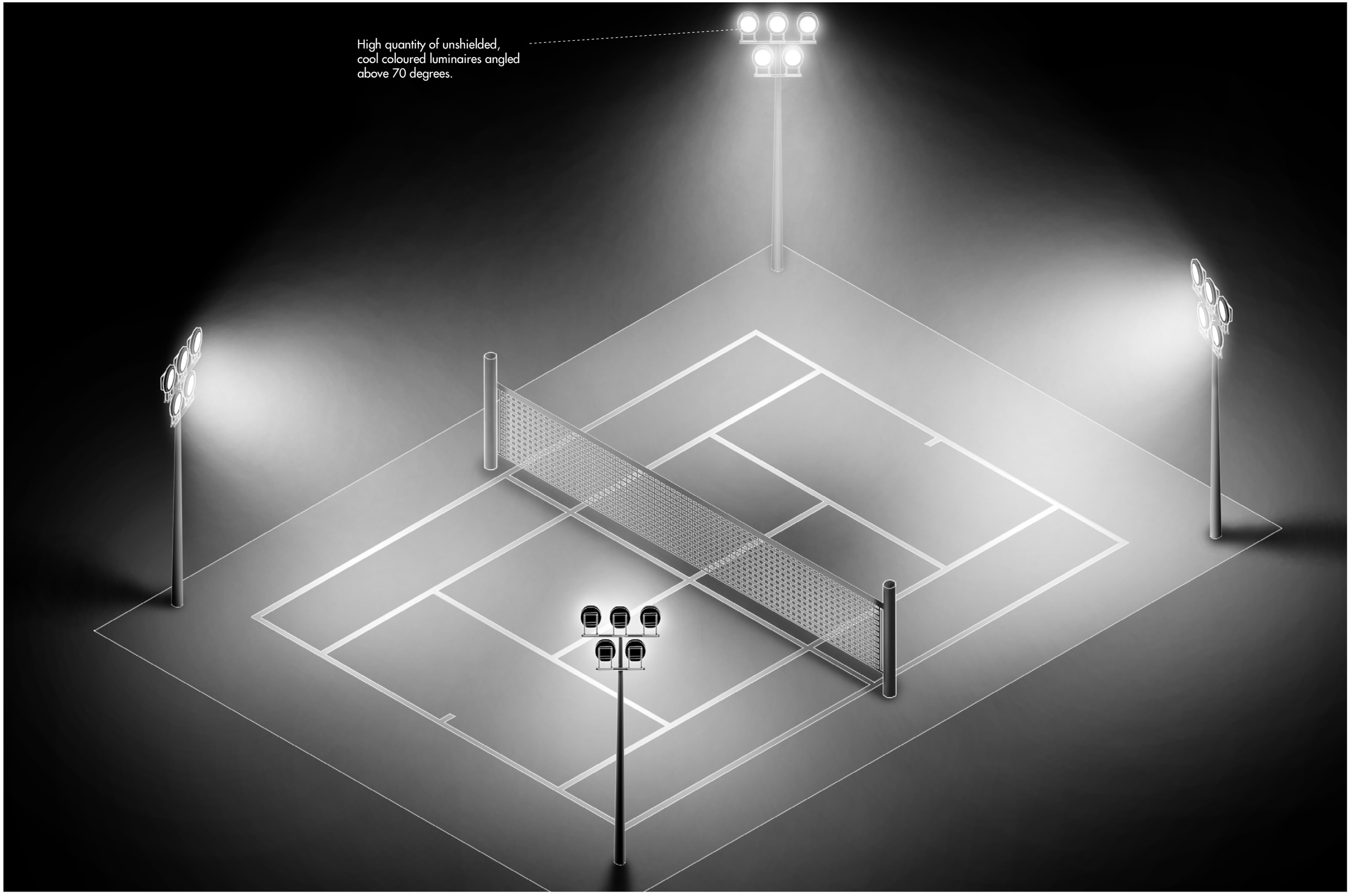

Use of low level lighting such as bollards.
Downward facing light column with baffle or shield.
• Shield all lights or use luminaires with full cut-off.
• Angle all lights downwards.
• Use warm colour temperature ≤ 2700K.
• Use Photocell, PIR (movement) sensors or timers.
• Avoid unnecessary decorative & vertical illumination.
• Turn off exterior lighting when not required.
• Don't use excessively bright light for any purpose.
• Use curtain, blinds or shutters.
Curtains and blinds are used.
Downwards or backlit signage with reasonable brightness level.
Use low level downlighting details.
Downwards lighting with full cut-off.
HOTEL
HOTEL
P

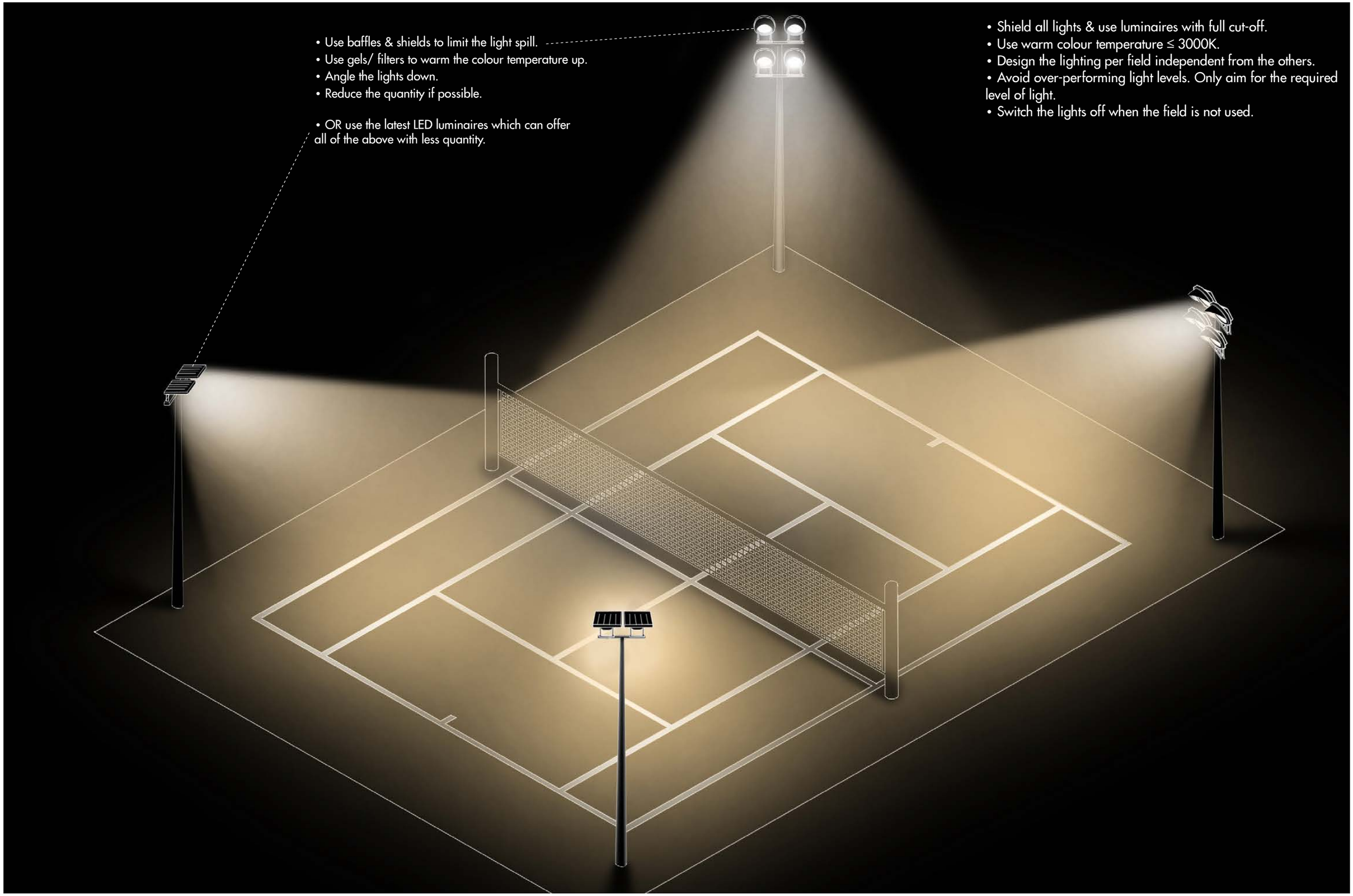

Uncontrolled light spilling out of the site.
Tall & powerful light columns angled outwards.
Unnecessarily illuminated structures.
Uplit & excessively illuminated signage.
THE FACTORY
Floodlights angled outwards.
Interior light spilling outwards.
Bulkheads on vertical surfaces.
Uplit trees.
THE FACTORY

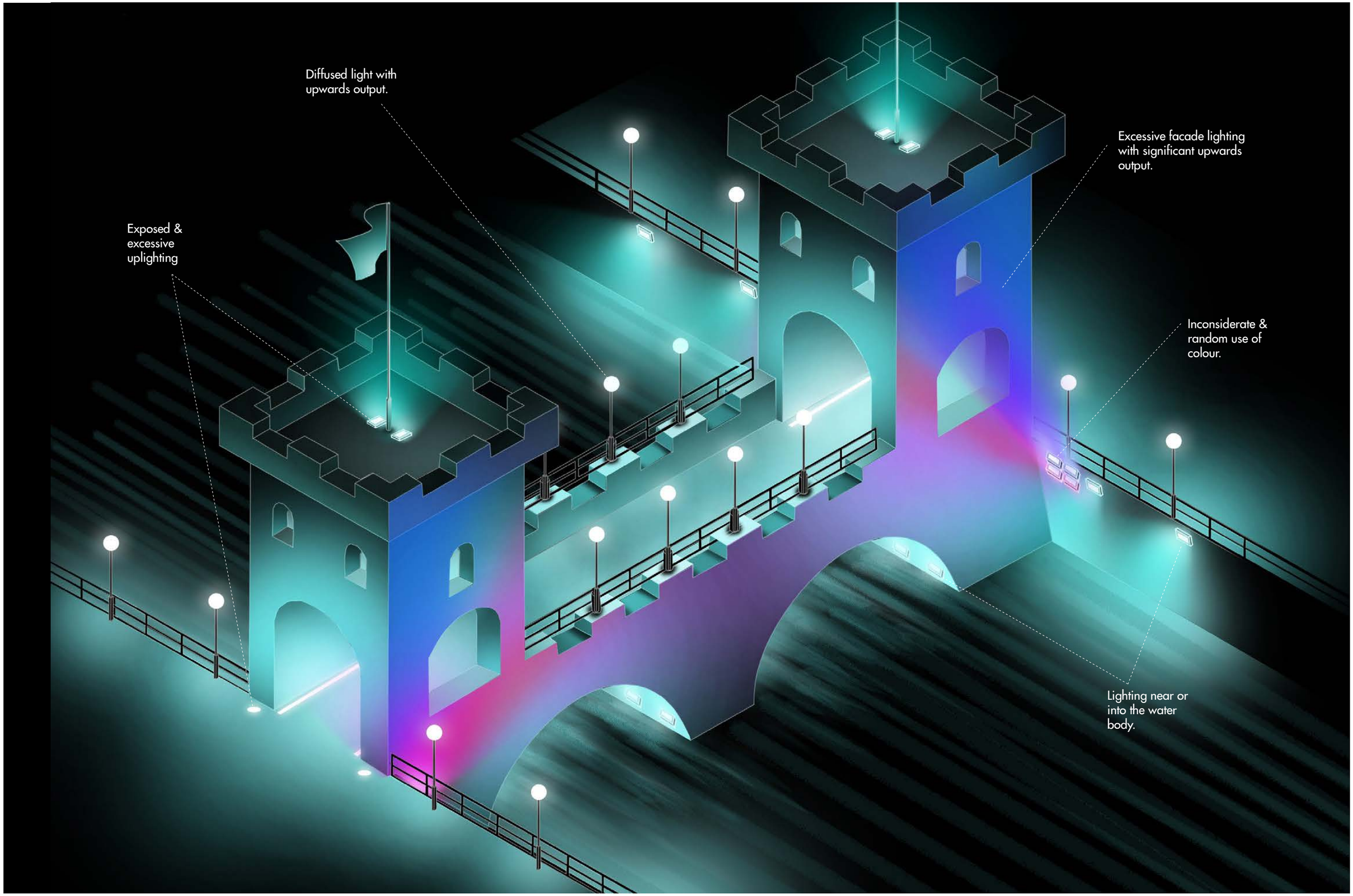

Light spill is contained within the site.
Light columns are angled downwards. Reduced quantity through efficient & appropriate light distribution.
Structures are not illuminated unless there is a purpose or requirement.
Low level bollard lighting to reduce the need for a large quantity of light columns.
All signage are downlit.
Wall-mounted downlighting.
Curtains, blinds or shutters to contain the interior lighting.
Low-light operating CCTV which don't require additional illumination.
Downlighting instead of bulkheads.
Unilluminated soft landscape & planting.
THE FACTORY
THE FACTORY
• Shield all lights or use luminaires with full cut-off.
• Angle all lights downwards.
• Use warm colour temperature ≤ 2700K.
• Use Photocell, PIR (movement) sensors or timers.
• Avoid unnecessary decorative & vertical illumination.
• Turn off exterior lighting when not required.
• Don't use excessively bright light for any purpose.
• Use curtain, blinds or shutters.

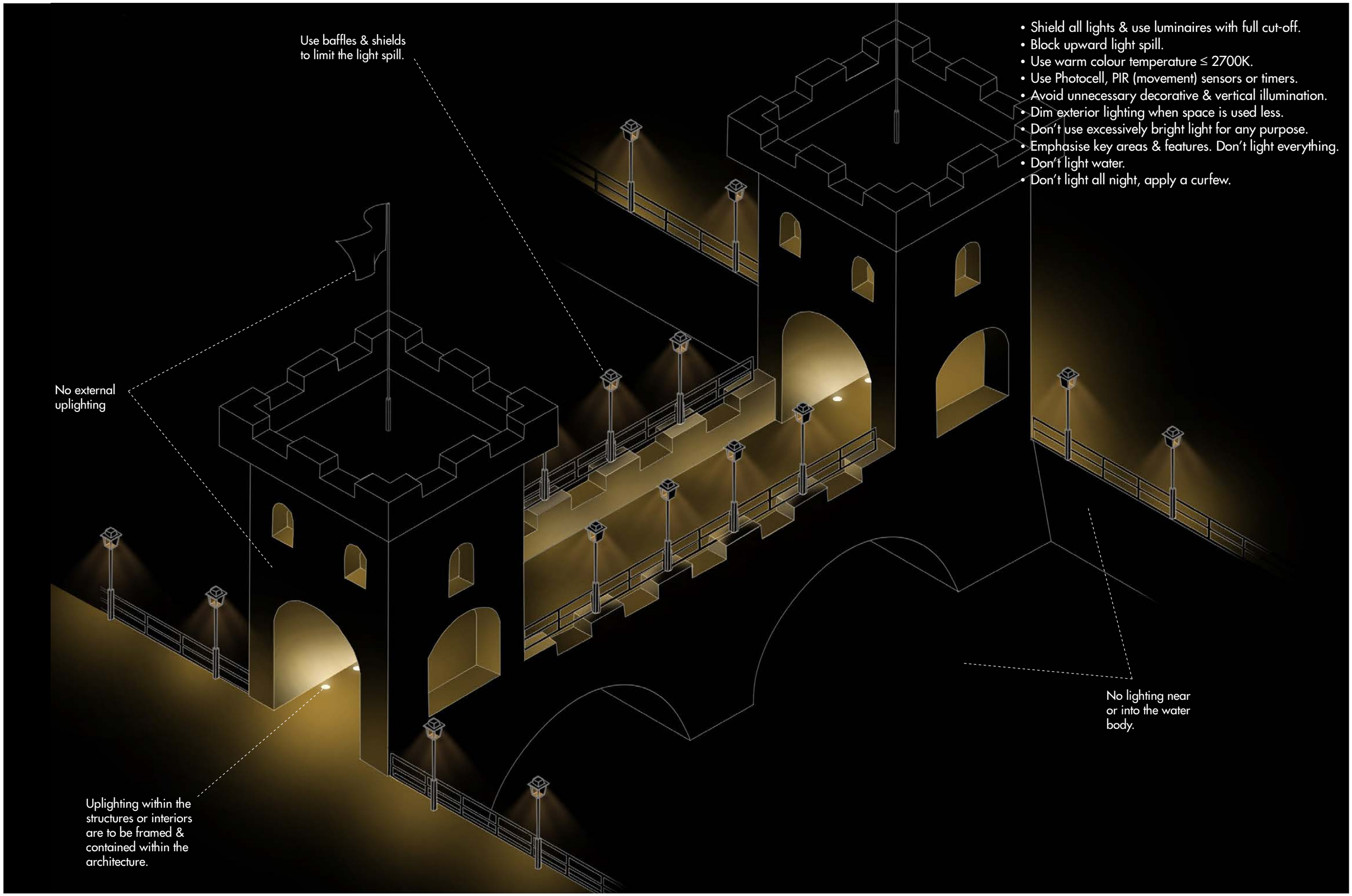

Excessive interior lighting spilling from the skylights.
Unnecessarily illuminated structures.
Floodlights angled outwards.
Uncontrolled light spilling from the greenhouses.
FARM
Uncontrolled light spilling out of the site.
Uplit signage.
Nearby water body is illuminated.


Structures are not illuminated unless there is a purpose or requirement.
Considerate interior lighting which limits the light spill.
All lights are angled downwards with full cut-off.
• Shield all lights & use luminaires with full cut-off.
• Angle all lights downwards.
• Use warm colour temperature ≤ 2700K.
• Use Photocell, PIR (movement) sensors or timers.
• Avoid unnecessary decorative & vertical illumination.
• Turn off exterior lighting when not required.
• Don't use excessively bright light for any purpose.
• Block upwards & exterior light spill.
• Don't light water.
Greenhouse lighting is contained within the structure.
FARM
Light spill is contained within the site.
Downlit signage.
Light spill into the water is avoided.


High quantity of unshielded, cool coloured luminaires angled above 70 degrees.


• Use baffles & shields to limit the light spill.
• Use gels/ filters to warm the colour temperature up.
• Angle the lights down.
• Reduce the quantity if possible.
• OR use the latest LED luminaires which can offer all of the above with less quantity.
• Shield all lights & use luminaires with full cut-off.
• Use warm colour temperature ≤ 3000K.
• Design the lighting per field independent from the others.
• Avoid over-performing light levels. Only aim for the required level of light.
• Switch the lights off when the field is not used.


Diffused light with upwards output.
Excessive facade lighting with significant upwards output.
Exposed & excessive uplighting
Inconsiderate & random use of colour.
Lighting near or into the water body.

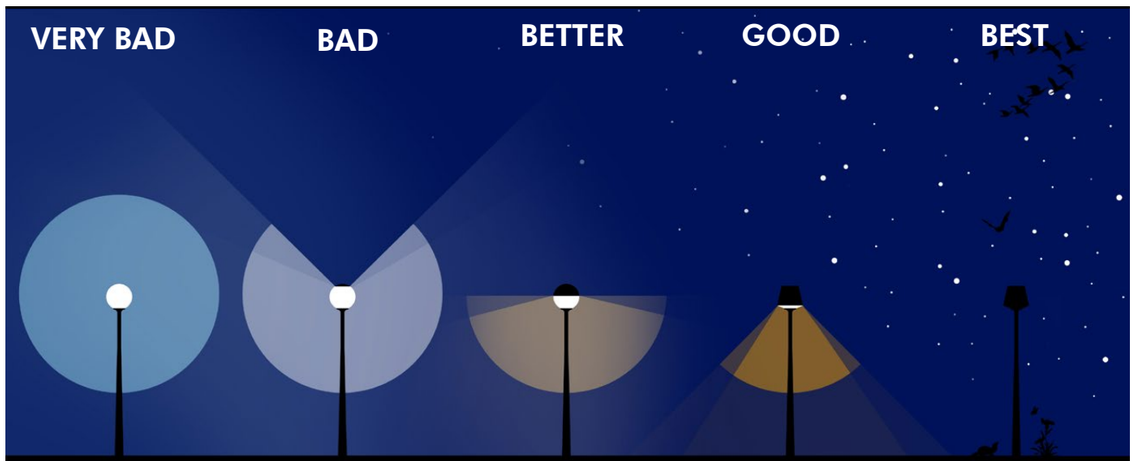

Use baffles & shields to limit the light spill.
• Shield all lights & use luminaires with full cut-off.
• Block upward light spill.
• Use warm colour temperature ≤ 2700K.
• Use Photocell, PIR (movement) sensors or timers.
• Avoid unnecessary decorative & vertical illumination.
• Dim exterior lighting when space is used less.
• Don't use excessively bright light for any purpose.
• Emphasise key areas & features. Don't light everything.
• Don't light water.
• Don't light all night, apply a curfew.
No external uplighting
No lighting near or into the water body.
Uplighting within the structures or interiors are to be framed & contained within the architecture.

Luminaire Selection
There is a wide range of luminaires available for the domestic, commercial and professional market. There are a couple of key features to bear in mind when choosing luminaires: Warm colour temperature, suitable power and intensity, acceptable beam distribution, mounting height and tilt angle employed with a dimming or switch-off strategy.

Domestic
Any luminaire that is: ≤ 2700K, ≤ 10W, ≤ 1000 lumens with ≤ 80° beam mounted at ≤ 3m, angled downwards, ideally with baffle & PIR sensor is acceptable.

Industrial
Any luminaire that is: ≤ 2700K, ≤ 40W, ≤ 4000 lumens with ≤ 80° beam mounted at ≤ 8m, angled downwards with baffle & PIR sensor would be acceptable.

Luminaire & Source
Luminaire is a term which refers to the entire light fitting: the housing and the light source. Most domestic luminaires house interchangeable bulbs which are easy to replace. In most cases, modern LED luminaires that are meant for architectural, commercial & industrial purposes have integral sources which cannot be removed or replaced. If changing the source is an option, environmentally friendly options are widely available.



Warm colour temperature, suitable power and intensity, acceptable beam distribution, mounting height and tilt angle employed with a dimming or switch-off strategy.

Extract from Dark Sky Assessment Guide by the DarkSky International Illustration by Bob Crelin.