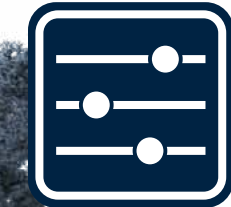


# THORN

LIGHTING



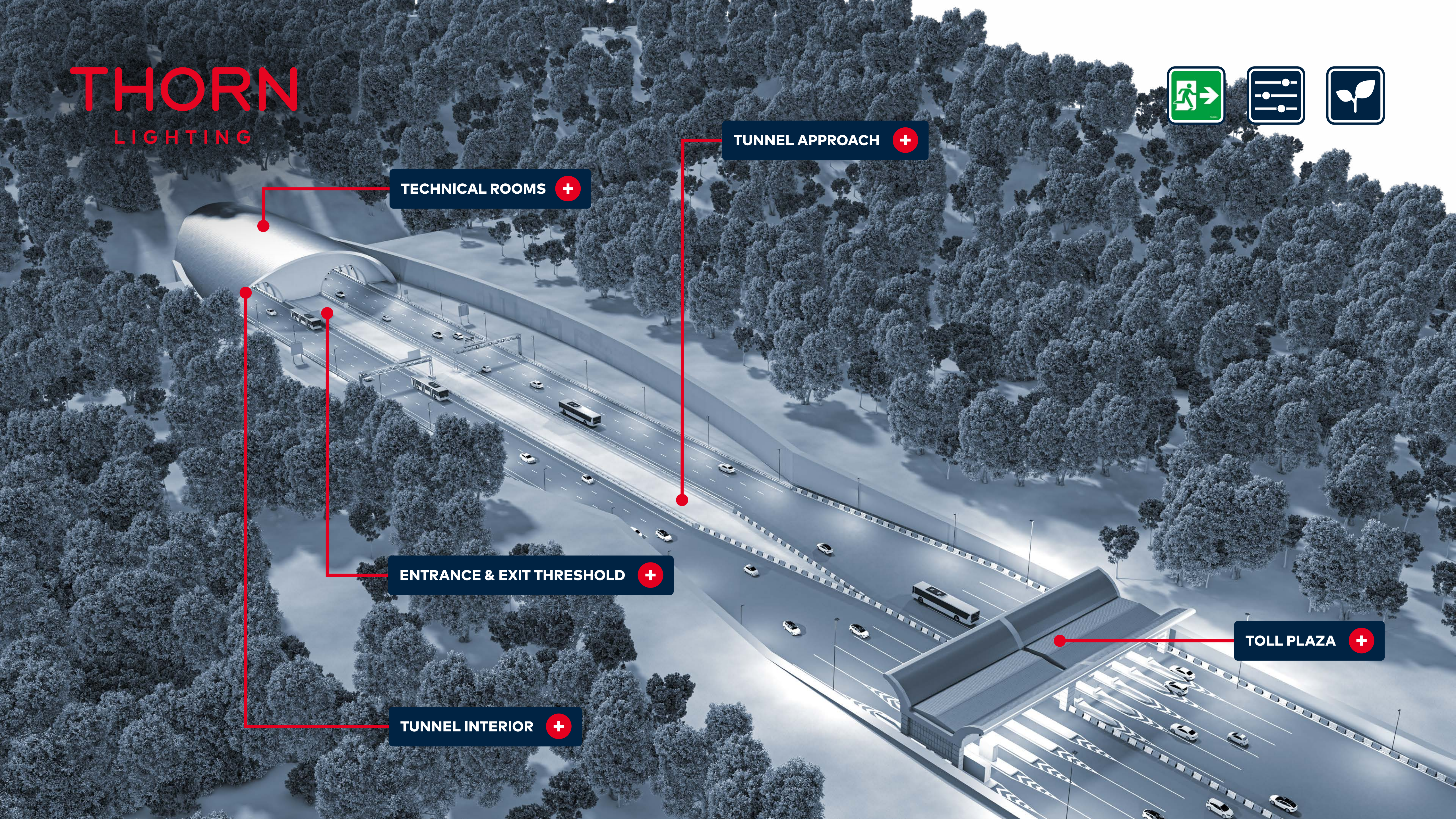
TUNNEL APPROACH +

TECHNICAL ROOMS +

ENTRANCE & EXIT THRESHOLD +

TUNNEL INTERIOR +

TOLL PLAZA +





# THORN

LIGHTING



## TOLL PLAZA

### KEEPING TRAFFIC MOVING

**SAFE SUBTERRANEAN JOURNEYS** – Great lighting at the point of the toll plaza can really enhance both digital and manned environments. Where people are present to take payments and check safe passage of vehicles, we can supply a range of optics that enhance facial and vehicle recognition as well as offering a low glare option to ensure workers in this space do not experience discomfort, including eye strain, during their shift.

### KEY CONSIDERATIONS

- 1 Lighting here serves as a critical safety measure, ensuring drivers can clearly see the upcoming lane merges and traffic filtering requirements.
- 2 Where a toll plaza is not manned, adequate illumination helps cameras capture clear images, essential for accurate character recognition. Insufficient lighting can lead to blurred or distorted images, hindering the algorithm's ability to interpret characters correctly.



TOLL PLAZA



# THORN

LIGHTING

## TUNNEL APPROACH



## TUNNEL APPROACH

### OVERGROUND TO UNDERGROUND

**SAFER ROADWAYS** – Safe roadway lighting is essential for supporting safe transport from the toll plaza to the tunnel entrance. The roadway lighting should support optimal visibility by illuminating the road surface, signs, and potential hazards. Additionally, proper lighting levels and distribution prevent glare and shadowing.

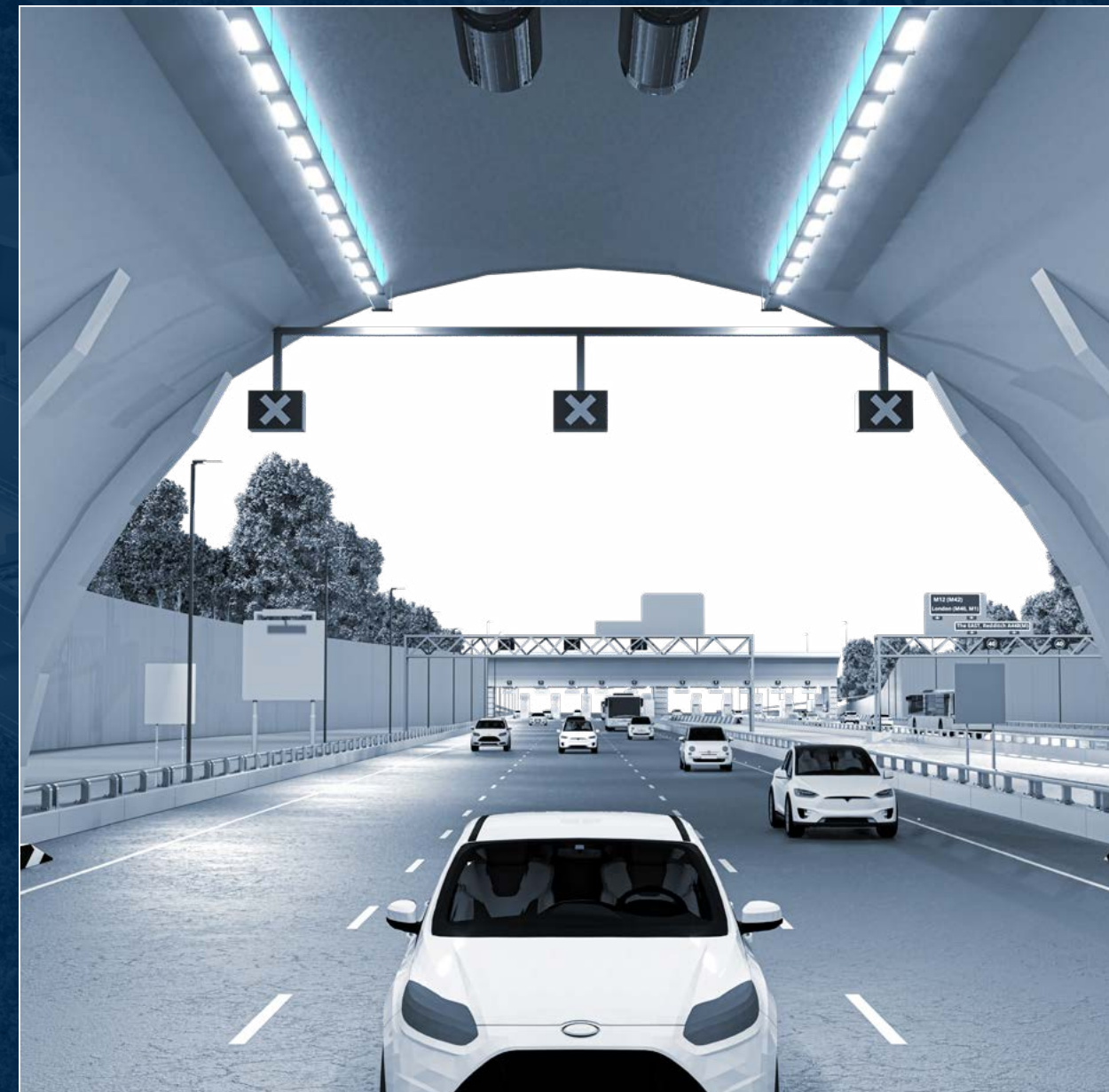
To responsibly illuminate the roadway approaching a tunnel entrance we must consider environmental conditions and employ energy-efficient solutions to minimise light pollution. By prioritising safe roadway lighting, we enhance traffic safety, improve flow, and create environments that are considerate of the well-being of all road users.





# THORN

LIGHTING



## ENTRANCE & EXIT THRESHOLD

### SUPPORTING DRIVER SAFETY

**VISUAL ADJUSTMENT** – When both exiting and entering a tunnel, visual adjustment is crucial as drivers transition from high to low or low to high luminance levels. This adjustment isn't immediate due to two disability phenomena: spatial and temporal adaptation.

### KEY CONSIDERATIONS

- 1** Spatially, the stark contrast in luminance impedes vision, creating a "Black Hole" effect at the point in which our eyesight needs to adapt.
- 2** Temporally, the human eye takes time to adapt from both brightness to darkness and darkness to brightness, with distance travelled playing a critical role during this adjustment period.
- 3** During the day, depending on the project requirements, the final section of the tunnel may need to offer much higher luminance levels to ensure that drivers aren't blinded by the higher brightness of daylight when exiting the tunnel.
- 4** Thorn's tunnel lighting solutions are designed to minimise the effects of these two phenomena, enhancing driver comfort and safety.



GTLED PRO



GTLED RS



AREAFLLOOD PRO

ENTRANCE & EXIT THRESHOLD





# THORN

LIGHTING



## TUNNEL INTERIOR

### COMPLEX INFRASTRUCTURE EFFECTIVELY ILLUMINATED

**SPECIALISED SOLUTIONS** – Each and every tunnel project is entirely unique and requires a nuanced approach. One thing remains, however. The fixtures illuminating the tunnel interior must be highly durable and specifically developed for use in these environments.

#### KEY CONSIDERATIONS

- 1** GTLED Pro and GTLED RS are specifically crafted to provide uniform and consistent lighting throughout the tunnel, thus minimising shadows, glare, and visual distractions.
- 2** By creating a well-lit environment, these fixtures enhance driver awareness and reduce the risk of accidents. Additionally, they play a vital role in shaping the psychological experience of drivers, promoting a sense of comfort and confidence as they navigate through the tunnel, creating a positive and secure driving environment.
- 3** Solutions like Mystrid Flex can add a splash of colour that helps break up a potentially monotone environment whilst improving driver alertness.
- 4** Our GTLED Pro fixture can also be fitted with green LEDs and asymmetric optics to clearly highlight emergency exits.



GTLED PRO



GTLED RS



MYSTRID FLEX



AREAFLOOD PRO

TUNNEL INTERIOR





# THORN

LIGHTING

## TECHNICAL ROOMS



## TECHNICAL ROOMS

### RELIABLE, SAFE AND ESSENTIAL

**CRITICAL, SAFE ILLUMINATION** – Technical rooms are used for tunnel maintenance, planned works and emergency scenarios. These spaces can be intensive environments and solutions like our ForceLED product offer simple installation, long life and built with reliability as it's core focus. Paired with a simple control solution, you can be sure that you achieve perfect lighting uniformity when illumination is required and maximum energy saving when it's not.

### KEY CONSIDERATIONS

- 1 DURABILITY**  
High IK and IP ratings on our solutions such as ForceLED and Aquaforce Pro are essential in technical rooms.
- 2 UNIFORMITY**  
Lighting here needs to effectively aid maintenance and ensure that users of mobile technology are protected from glare.
- 3 ENERGY SAVING**  
It's essential that we control the light in these areas so that when they are unoccupied, the lighting is automatically switched off.
- 4 EMERGENCY**  
The lighting here must assist with peoples' safe evacuation from both the technical room and all areas of a tunnel until they are able to reach a point of safety.



AQUAFORCE PRO



FORCELED



EYEKON



KATONA





## EMERGENCY LIGHTING

### CRITICAL, SAFE EMERGENCY EXITS

#### DEPENDABLE EMERGENCY SOLUTIONS –

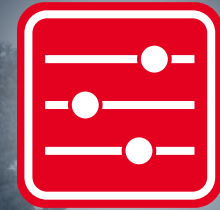
Essential in emergencies, tunnel emergency exit lighting guides occupants to safety during power outages, fires, or other crises. Positioned strategically, these lights illuminate exits, evacuation routes, and safety equipment, prioritising orderly evacuation.

#### KEY CONSIDERATIONS

- 1** Compliance with safety standards, regular maintenance, and backup power sources are crucial for functionality. By prioritising reliable emergency preparedness and response capabilities, reducing risks and safeguarding lives.
- 2** It's critical to ensure compliance with safety regulations, adequate coverage, and visibility through thoughtful placement, and reliable backup power sources for uninterrupted illumination until normality is restored.
- 3** We offer a unique version of our GTLED Pro fixture with asymmetric green LEDs to massively enhance the visibility of emergency exits throughout the length of a tunnel.
- 4** Luminaires that are connected to an uninterrupted lighting supply to light an escape path must adhere to EN 60598-2-22.







## CONTROL SYSTEMS

### OPTIMISED, CONTROLLED LIGHT

**ENABLING LIGHTING FLEXIBILITY AND INTELLIGENCE** – Enabling a light point to communicate to widely utilised control systems is key when implementing a lighting control system throughout the infrastructure of a tunnel. Proprietary lighting control systems can be less than ideal due to their limited compatibility, vendor lock-in, and potential difficulty in sourcing spare parts or obtaining support from a single provider.

### KEY CONSIDERATIONS

- 1 COMPATIBILITY WITH OPEN STANDARDS**  
Implementation of DALI D4i lighting control systems based on open standards ensures interoperability with a wide range of lighting fixtures, promoting flexibility and future-proofing investments.
- 2 SCALABILITY AND FLEXIBILITY**  
Tailored solutions for different tunnel sections are possible through flexible programming, accommodating varying traffic flows and time-of-day lighting requirements.
- 3 LUMINANCE CAMERA INTEGRATION**  
Real-time adjustment of illumination levels enhances driver comfort and safety by monitoring natural light levels and adapting internal lighting accordingly. Individual or group control further optimises visibility along the adaptation curve of the eye.
- 4 FAULT REPORTING**  
Our solutions offer comprehensive fault reporting at both individual luminaire and group levels, enabling proactive maintenance and minimising downtime.
- 5 ENERGY EFFICIENCY**  
Dynamic lighting adjustments based on real-time conditions, facilitated by integration with sensors and occupancy detection technology, optimise energy usage and contribute to your sustainability goals.
- 6 MONITORING AND MAINTENANCE**  
Robust monitoring capabilities empower operators to remotely diagnose and address issues promptly, ensuring continuous operation and maximising system reliability.







## WE CARE

### SUSTAINABLE TUNNEL LIGHTING

In today's world, where sustainability is a top priority, the realm of tunnel lighting holds significant potential for eco-conscious solutions. Tunnels, as crucial transportation arteries, require lighting systems that not only prioritise safety but also embrace sustainability. Solutions that are upgradable, and offer exceptional long life whilst being highly reliable really helps the sustainability credentials of a tunnel project.

Tunnels are relatively heavy energy consumers when compared to other areas of the road network. This interactive PDF sets the stage to explore the critical importance of sustainable tunnel lighting solutions. We hope you enjoy reading more on our balanced approach to illuminating these spaces for both people and the planet.



## SUSTAINABLE DEVELOPMENT GOALS



### GOOD HEALTH AND WELL-BEING

Tunnel lighting plays a pivotal role in advancing SDG 3 by prioritising road safety, promoting well-being, and fostering energy efficiency in infrastructure development. It contributes to creating safer, healthier, and more sustainable communities for everyone.



### SUSTAINABLE CITIES & COMMUNITIES

Tunnels are often used to by-pass towns and cities, ensuring safer spaces for the wider community. Tunnel lighting positively aligns with SDG 11 by enhancing road safety, improves transportation infrastructure, and promotes energy efficiency, encouraging inclusive and resilient urban environments.



### CLIMATE ACTION

Tunnels traditionally have a relatively high energy usage and we need to be more mindful about reducing that footprint. When we adopt energy-efficient and sustainable lighting solutions within a tunnel infrastructure, we can contribute to reducing greenhouse gas emissions and help to reduce emissions, whilst promoting a greener and more sustainable future.

[CLICK HERE TO READ MORE ABOUT OUR SUSTAINABILITY COMMITMENTS](#)