ANNEXURE 23: OVERALL LIGHTING REPORT

14 Cyclonite Street SOMERSET WEST 7130 | Ph: +27218525095 | info@sands.co.za | www.selkirkandselkirk.com

16 September 2026 Reference: CWA\26- v7

Manager (Projects)
WBHO
49–63 Andries Street
Wynberg
Sandton 2090

Attention: Mr. Derek Wallace

Dear Sir

Re: Cape Winelands Airport Site Lighting Framework Report

Contents

Overview of Site Lighting Report 2
Scope of Lighting included in Report 3
General Compliance Requirements & Specifications 5
Lighting Systems Compliance for various Site Lighting Services 6
Lighting Categories 8
Public Road Lighting (outside boundary envelope) 8
Landside Public Road Lighting (inside boundary envelope) 12
Boundary Security Lighting, including Airside and Landside Fencelines 15
Landside Gatehouse Entrance/Exit Lighting 17
Landside Open Parking Area Lighting 21
Landscape Lighting 23
Illuminated Signage, Billboards & Wayfinding 25
Landside Building External/Façade Lighting 26
Airside Apron Lighting 31
Airside Runway, Taxiway and Heliport Lighting 35
Annexures 36
Closing 37

Overview of Site Lighting Report

The purpose of this report is to:

- Provide information in support of the Town Planning Application.
- Review the General Compliance Requirements with respect to the Approved EIA.
- Confirm the Technical Specifications and Standards required for compliance.
- To breakdown the various lighting systems and areas defined above into various categories of lighting systems planned.
- Provide supporting technical information and drawings/diagrams illustrating and confirming how compliance with the above requirements and specifications is to be achieved.

Scope of Lighting included in Report

We wish to advise that the following categories of Site Lighting have been identified and are included below:

- **Public Road Lighting** (outside boundary envelope)

  This primarily includes streetlighting to the new Mellish Road on the western side of the proposed CWA entrance.

- **Landside Public Road Lighting**

  These comprise streetlighting to all the roadways inside the CWA boundary fence envelope.

- **Boundary Security Lighting, including Airside and Landside**

  The CWA site will be defined with a Secure Fence Enclosure restricting access to the site. In addition, a boundary fence will be established restricting access to the runway/taxiway areas from the public facing side of the airport facility. These fence lines require pole mounted floodlighting to maintain visibility to security staff during nighttime hours.

- **Landside Gatehouse Entrance/Exit Lighting**

  Given the requirements for restricting unauthorised persons to portions of CWA, plus allowing public access to the landside of the airport facility, gatehouses are designed to manage the flow of people and vehicular traffic accordingly. These gatehouses will require lighting to the underside of their canopies plus enhanced lighting for at points of entry/egress for people and vehicles.

- **Landside Open Parking Area Lighting**

  Landside Open Parking will be provided for the public and/or Facilities Staff. The parking area may in future be provided with either photo-voltaic panel shaded “carport” covering or other forms of shaded parking covers. In either case, lighting under these canopies will be provided together with necessary roadway streetlighting.

- **Landscape Lighting**

  Landscaped areas in the airport precinct including public entrance areas will be illuminated to enhance the experience of staff and the public and illuminate pedestrian walkways and prominent landscape features.

- **Illuminated Signage, Billboards & Wayfinding**

  Limited signs and billboards in the airport precinct will be illuminated primarily to highlight commercial properties and outdoor advertising.

- **Landside Building External/Façade Lighting**

  The various buildings planned will include a multitude of uses, including airport movements, hotels, offices, parking garages, Fire Station, Aircraft Support Facilities, etc. The external lighting needs for each of these types requires different approaches and standards applied, whether for aesthetic, security or safety requirements.

- **Landside Terminal forecourts**

The landside terminal forecourts will comprise open and covered vehicular and pedestrianized entrances and exits. These zones will require lighting to suit for the safe and secure movement of people and vehicles.

- **Landside Drop-Off/Pickup zones**

  The landside drop-off and pickup zones will comprise covered entrances to terminals and other similar facilities. These zones will require lighting to the underside of their canopies plus enhanced lighting at points of entry/egress for the safe and secure movement of people and vehicles.

- **Airside Apron Lighting**

  These areas include the airside aircraft stands and adjoining taxiway areas, plus the supporting serviced areas such as Maintenance Hangers etc.

- **Airside Runway, Taxiway and Heliport Lighting**

  The lighting to these areas is subject to ICAO Standards and Guidelines and are critical for safe operation of the Cape Winelands Airport Air-Traffic Management and Operations Systems and Services.

General Compliance Requirements & Specifications

a. Appendix 14 (Visual Impact Assessment) as contained in the Final EIAR for the Proposed Expansion of the Cape Winelands Airport (DEA&DP In-Process NR: 16/3/3/2/A5/20/2046/24)

b. Appendix 35 (Impact of a proposed development of an Airport in the Cape Winelands on Poultry Biosecurity & Health) (DEA&DP In-Process NR: 16/3/3/2/A5/20/2046/24)

c. SANS 10098-1 (2007) – Public Lighting (Part-1) The lighting of public thoroughfares

d. Apron Lighting: ICAO Annex 14, Volume I, Aerodrome Design and Operations

e. Apron Lighting Glare: EN 12464-2:2014 recommended Glare Rating Limits

f. ICAO Annexure 14 Volume 1 – Aerodromes: Aerodrome Design and Operations

- ICAO Annex 14, Volume I – Aerodromes
- ICAO Doc 9157, Aerodrome Design Manual (ADM) Part 4 – Visual Aids
- ICAO Doc 9157, Aerodrome Design Manual (ADM) Part 5 – Electrical Systems

g. South African Civil Aviation Authority (SACAA)

- SACAA Civil Aviation Regulations (CAR) Part 139
- SACAA Civil Aviation Technical Standards (SA-CATS) Part 139

h. ICAO Annexure 14 Volume 2 – Heliports

i. ICAO Aerodrome Design Manual Part 4 – Visual Aids

Lighting Systems Compliance for various Site Lighting Services

In addition to the above Appendices and Standards, we wish to highlight that this report considers the following:

Extract:

"*Section-7 (Mitigation Measures), Sub-Section 7.3.1 Conditions of Approval (of Appendix-14 above) includes the following statements with respect to lighting guidelines:*

7.3.1 Plans & Guidelines

iv. A detailed Lighting proposal (for all outdoor lighting, façade lighting (if any), street lighting and security lighting – i.e.; all light sources that would be visible from within the Receiving Environment). The lighting proposal must demonstrate that lighting design has been undertaken in such a way that the sensitivities of the adjacent Cultural Landscape and the relevant scenic routes have been (a) taken into consideration, and (b) that design responses have been included in the design proposal in a positive way. The lighting proposal should include:

a. A consolidated lighting layout showing the location of all sources of light.
b. The lighting proposal should include basic technical/specification details for all sources of light.
c. The information provided should enable:
i. the visual specialist to properly scope and model/simulate visible light sources (if necessary);
ii. and the Cultural Advisor and/or the visual specialist to make an informed decision regarding the acceptability of light impacts at night.

It is noted here that a Signage Plan should be developed and submitted to the City of Cape Town for approval under the Outdoor Advertising and Signage Policy and By-law. To ensure continuity with the recommendation of this report as well as responsiveness to visual indicators and sensitivities, the following is recommended:

v. The signage proposal should demonstrate that signage has been designed in such a way that the sensitivities of the adjacent Cultural Landscape and the relevant scenic routes have been (a) taken into consideration, and (b) that design responses have been included in the design proposal in a positive way. It should therefore include:

a. Graphic renderings or 3D models showing the location of proposed signage in context; showing height, mounting details, signage type and proposed content.
b. Please note that the category "signage" should include branding, logos and lettering on building facades and boundary walls.

Section-7 (Mitigation Measures Sub-Section 7.3.2 (c) (of Appendix-14 above) includes the following statements with respect to lighting guidelines:

7.3.2 Guidance for design phase(s)

The following recommendations, management actions and mitigation measures are included here to provide guidance regarding specific aspects of the development proposal that have bearing on visual impact within this Receiving Environment.

d. Lighting

The following recommendations deal with all general and outdoor lighting and sources of light. Light pollution should be kept to an absolute minimum throughout the development, and exterior lighting must be limited to areas where this is necessary for utility, safety and security. The goal should be to keep the ambient light levels within the immediate Receiving Environment low, given the proposed development's proximity to a rural landscape that is a protected area, and the surrounding Cultural Landscapes. Exterior lighting (and therefore any visible light sources) must be carefully directed away from sensitive receptors identified.

In principle, lighting in the development should:

- *Only be on when needed for active use;*
- *Only light the area that needs it;*
- *Be no brighter than necessary;*
- *Minimize blue light emissions;*
- *Be fully shielded (pointing downward) as far as possible.*

In some cases, lighting for safety purposes will necessarily take priority, and lighting impacts may therefore be unavoidable. The negative impacts of night lighting should be mitigated in the following ways:

i. Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the light source, including interior or undercover lighting sources;
ii. Façade lighting to be limited to accents and features, avoiding large parts of the exterior of buildings to be lit from any side, but especially not the facades facing the R312 scenic route, nearby homes and any of the Cultural Landscapes surrounding.
iii. Pedestrian pathways, parking areas and vehicular roads should be lit with low level 'bollard' type lights or post lights (maximum 3m tall) that are fully shielded (pointing downward). Fully shielded fixtures minimize skyglow, glare and light trespass.
iv. Security lighting should be activated on movement as far as possible.
v. The 6m perimeter lighting proposed to encircle the development periphery is not supported.
vi. All future SDP plans must include a lighting proposal (as called for in 7.3.1 (b) iv.).
vii. Light emitting diodes ("LEDs") are appropriate for outdoor lighting. If it is necessary to use white light, low-colour-temperature LED lighting should be used on the condition that the brightness can be dimmed when they aren't needed for active use (for example: to light empty parking lots etc.)
viii. Because blue light brightens the night sky more than any other colour of light (International Dark Sky Association, 2021), it is important to minimize the amount emitted. The proposed development should use warm light sources wherever possible (lower colour temperatures) for outdoor lighting: a maximum of 3000 Kelvins is recommended.

It may not be possible for parts of the proposed development to adhere to the above mitigation measures in every part of the development, given the specialized lighting that would be necessary at an airport.

ix. This risk can be managed through the submission of the detailed Lighting proposal at SDP stage (see 7.3.1 (b) iv). This will allow the Cultural Advisor and/or the visual specialist and/or the electrical engineer preparing the Lighting report to be provided with sufficient information during the future approvals process so that visual impacts associated with the direct and indirect visibility of lighting can be avoided, reduced or mitigated wherever possible when this detailed information becomes available."

End of extract

Lighting Categories

The site lighting has been defined and grouped into the categories below, based on the lighting applications and principles required plus the varying nature of the lighting required to each of these categories:

Public Road Lighting (outside boundary envelope)

The public roads outside the boundary envelope of Cape Winelands Airport will be constructed and delivered compliant with the National Statutory Regulations and Standards, plus in accordance with the City of Cape Town's Byelaws and local requirements. The lighting to these roads is governed by SANS-10098-1, as per the attached Annexure Document. Given that these roads are likely to be classified as "A3" or "A4", it is probable that the profiles for these road/s will comprise one of the cross-sections shown below.

The streetlighting to these roads will consider the following:

- The selected road type based on the table below:

CLASS OF ROAD LIGHTING (SANS 10098-1 CLASS A Roads)

Type of Road	Description of road type	Road Cross Section																						
		Without Median												With Median										
		Maximum traffic Volume during darkness (motor vehicles per hour per lane)																						
		≥ 600				300				100				≥ 900				600				200		
		L_n	U_o	UL	TI	L_n	U_o	UL	TI	L_n	U_o	UL	TI	L_n	U_o	UL	TI	L_n	U_o	UL	TI	L_n	U_o	UL	TI
A1	Freeway and expressway with median, free of level crossings; for speed limits > 90 km/h	2	0,4	0,7	15	1,5	0,4	0,7	20	1	0,4	0,6	20	2	0,4	0,7	15	1,5	0,4	0,7	20	1	0,4	0,6	20
A2	Major roads, for speed limits ≤ 90 km/h	1,5	0,4	0,7	20	1	0,4	0,6	20	0,8	0,4	0,5	20	1,5	0,4	0,7	20	1	0,4	0,6	20	0,8	0,4	0,5	20
A3	Important urban traffic routes for speed limits ≤ 60 km/h	1	0,4	0,6	20	0,6	0,4	0,5	20	0,5	0,4	0,5	20	1	0,4	0,6	20	0,8	0,4	0,5	20	0,5	0,4	0,5	20
A4	Connecting roads, local distributor roads, residential major roads	0,75	0,4	0,5	20	0,5	0,4	0,5	20	0,3	0,3	0,5	25	0,75	0,4	0,5	20	0,5	0,4	0,5	20	0,3	0,3	0,5	25
Notes:		L_n = Minimum luminance cd/m2				U_o = Overall luminance uniformity								UL = Longitudinal luminance uniformity, min				TI = Threshold increment, % maximum							

- The length of the streetlight pole and the luminaire mounting height is based on the compliant illuminance lighting render as shown for each instance.
- The streetlight poles will be positioned such that the luminaire output is directed downwards and toward the adjacent boundary fence of Cape Winelands Airport, thus limiting glare and light spillage away from adjoining properties and compliant with the requirements of App-35 CWA Poultry Bio-Security Assessment Report.
- The streetlights mounted at the top of the poles will be fitted with glare shields, further limiting glare and light spillage away from adjoining properties as above.
- The colour temperature of the LED streetlights will be set as low as possible and in accordance with the Local Authority Streetlight Guidelines and Specifications. If permissible by the Local Authority, the colour temperature for these luminaires will be 3000K, unless Secure and Safe Operations and Monitoring Systems and Services require a higher colour temperature.

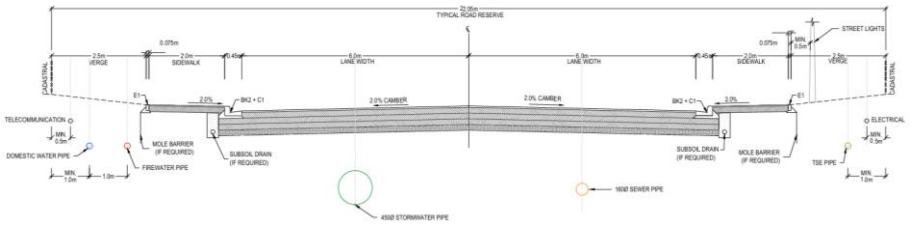
Based on the above, we wish to provide the following supporting information for the public roadways planned for outside the Cape Winelands Airport will typically include the following:

General Notes Applicable to Streetlighting

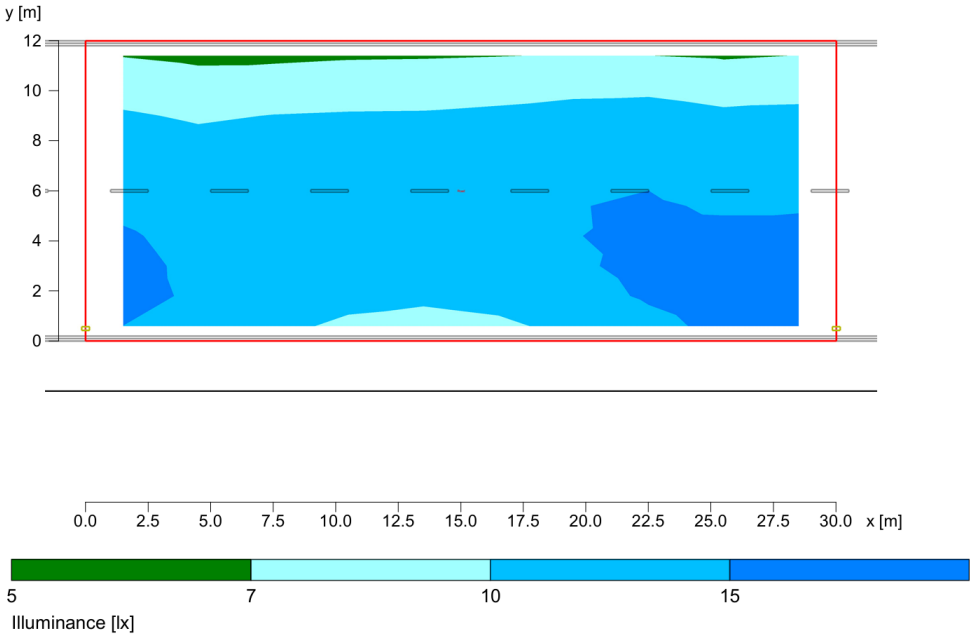
- These are classified as per the above schedule.
- Lighting to be via LED luminaires with 36°cut-off and fitted with glare reducing shields (where required) at off-road side.
- Controls to lighting to be via day/night switch controls
- Lighting to comply with above Compliance and Statutory requirements.

12m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤9000-mm high poles fitted with LED lamps



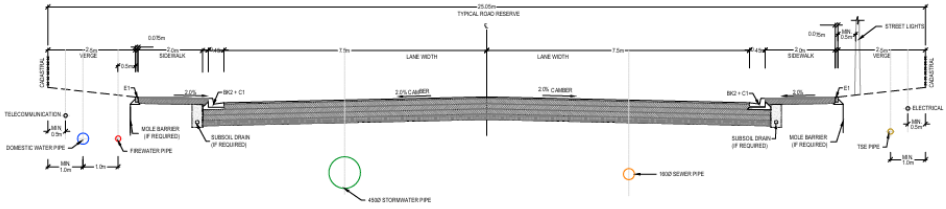
TYPICAL CROSS SECTION DETAIL OF 12m R0AD



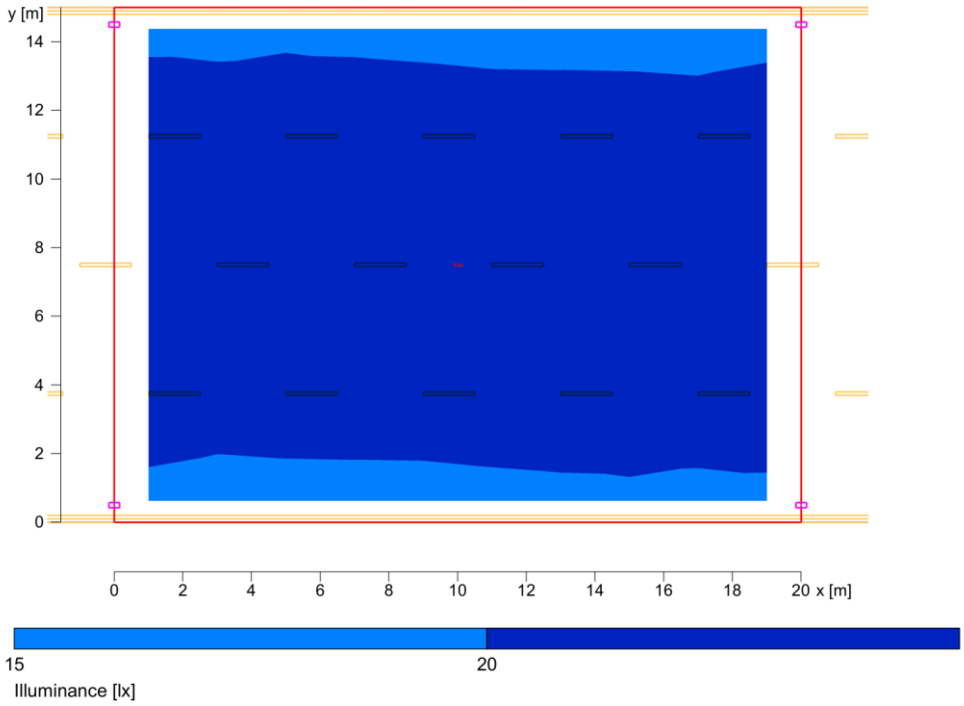
Illuminance Diagram for 12m Roadway

15m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤9000-mm high poles fitted with LED lamps



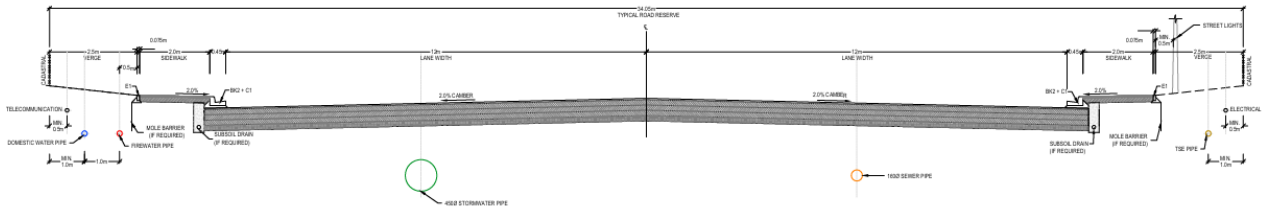
TYPICAL CROSS SECTION DETAIL OF 15m R0AD



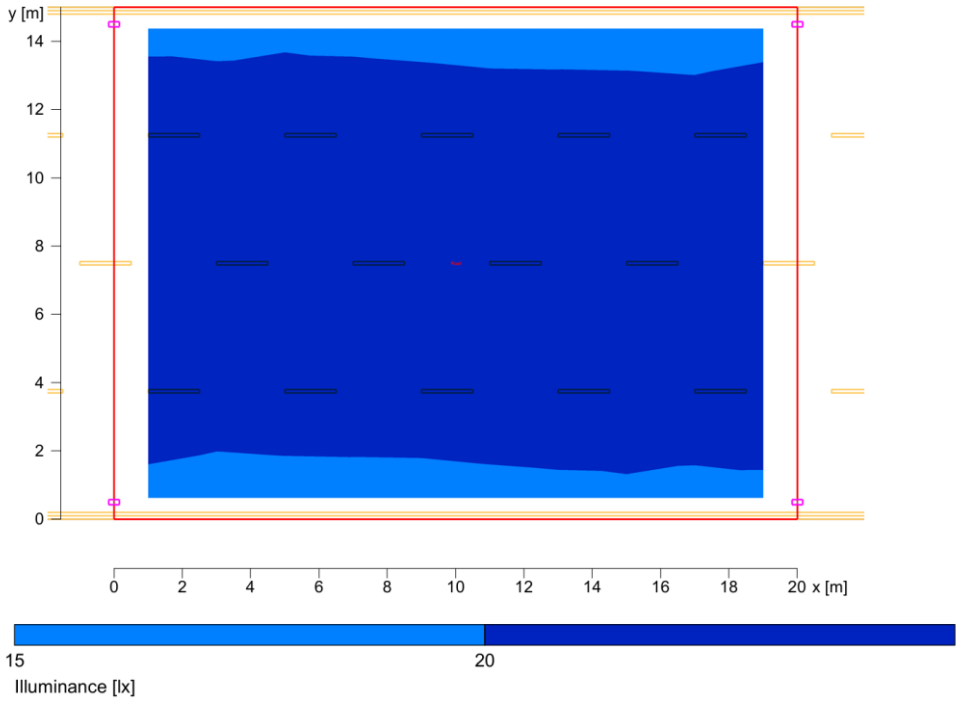
Illuminance Diagram for 15m Wide Road

24m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤9000-mm high poles fitted with LED lamps



TYPICAL CROSS SECTION DETAIL OF 24m R0AD



Illuminance Diagram for 24m Wide Road

The final design submission for the roadway lighting systems for public road/s outside the boundary of Cape Winelands Airport will be completed in coordination and conjunction with the Civil Engineers and the Specialist Accredited Streetlighting Consultants and submitted to the Roads Department for Approval.

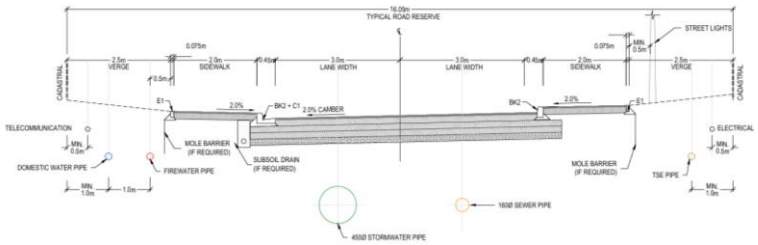
Landside Public Road Lighting (inside boundary envelope)

General Notes Applicable to Streetlighting inside boundary envelope

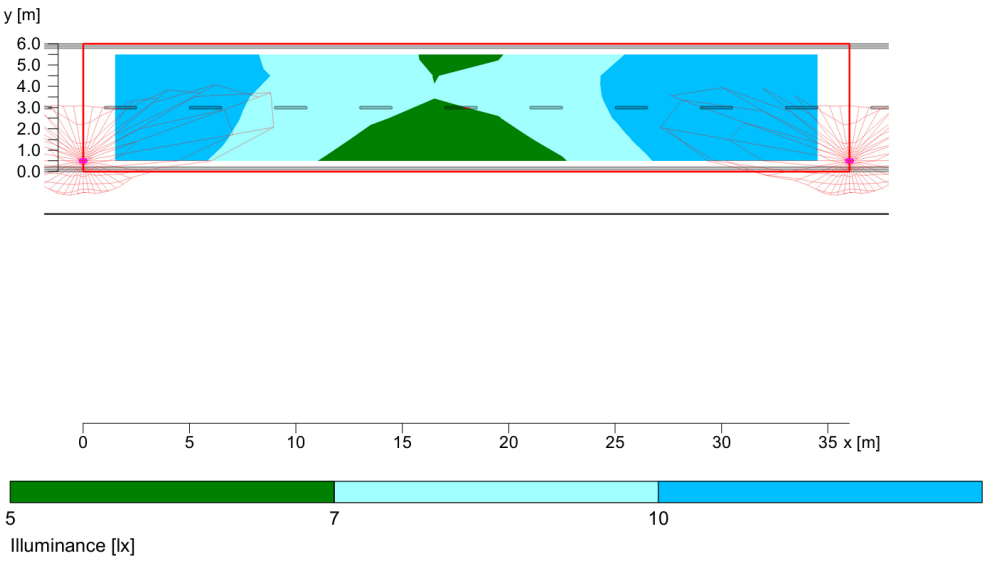
- These are likely to be classified as “A3” or “A4” as per the above schedule.
- Lighting to be via LED luminaires with 36°cut-off and fitted with glare reducing shields (where required) at off-road side.
- Controls to lighting to be via day/night switch controls combined with automatic dimming timer controls
- Lighting to comply with above Compliance and Statutory requirements.
- Where Landside Public Road widths (inside the boundary envelope) are ≥ 6m ≤ 24m, the lighting levels and illuminance achieved will be in accordance with the same lighting as illustrated above, with the only difference being the look and type of lighting pole and streetlight luminaire, plus the final spacing.

6m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤8000-mm high poles fitted with LED lamps



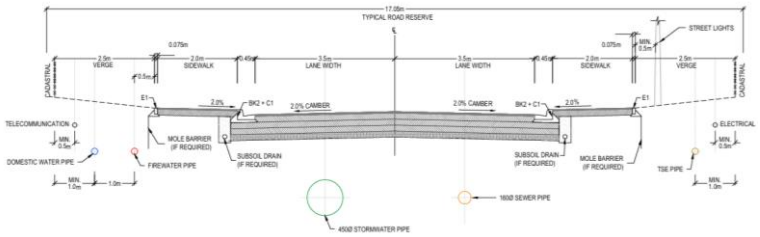
TYPICAL CROSS SECTION DETAIL OF 6m R0AD



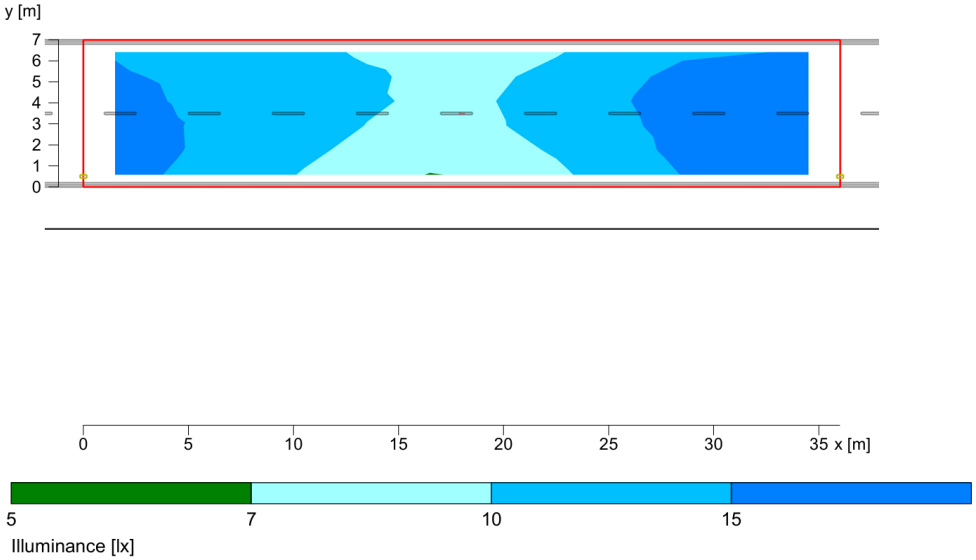
Illuminance Diagram

7m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤8000-mm high poles fitted with LED lamps



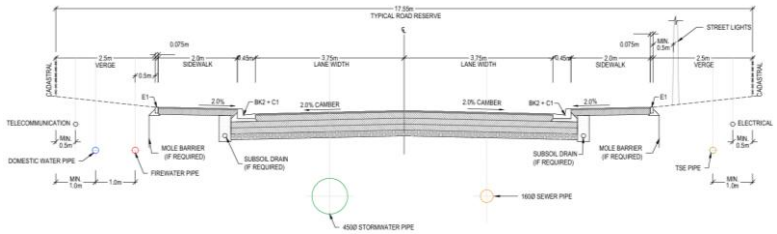
TYPICAL CROSS SECTION DETAIL OF 7m R0AD



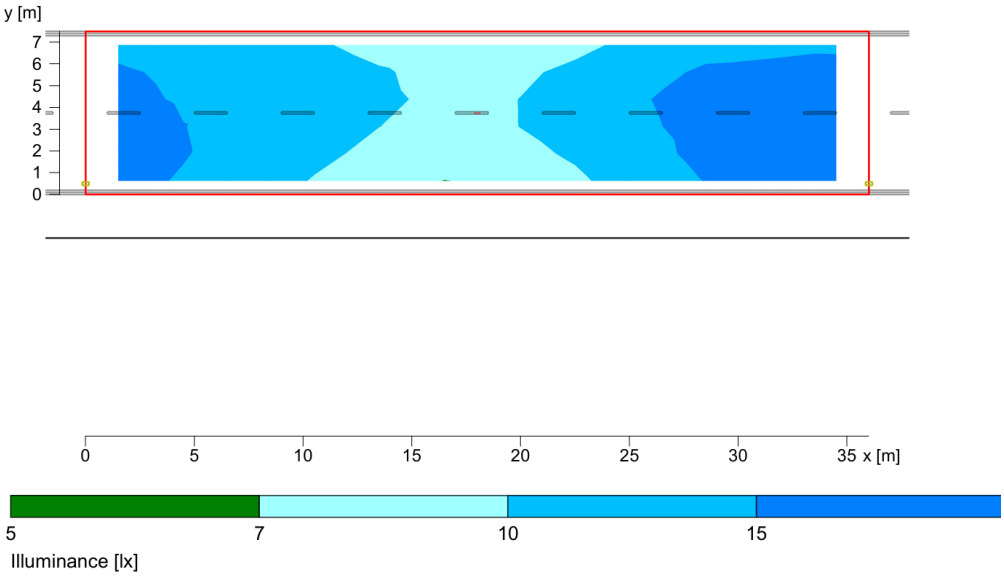
Illuminance Diagram

7.5m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤8000-mm high poles fitted with LED lamps



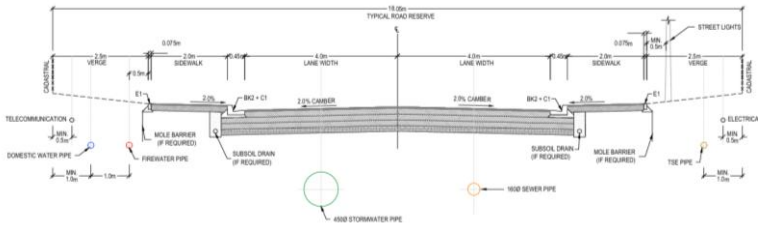
TYPICAL CROSS SECTION DETAIL OF 7.5m R0AD



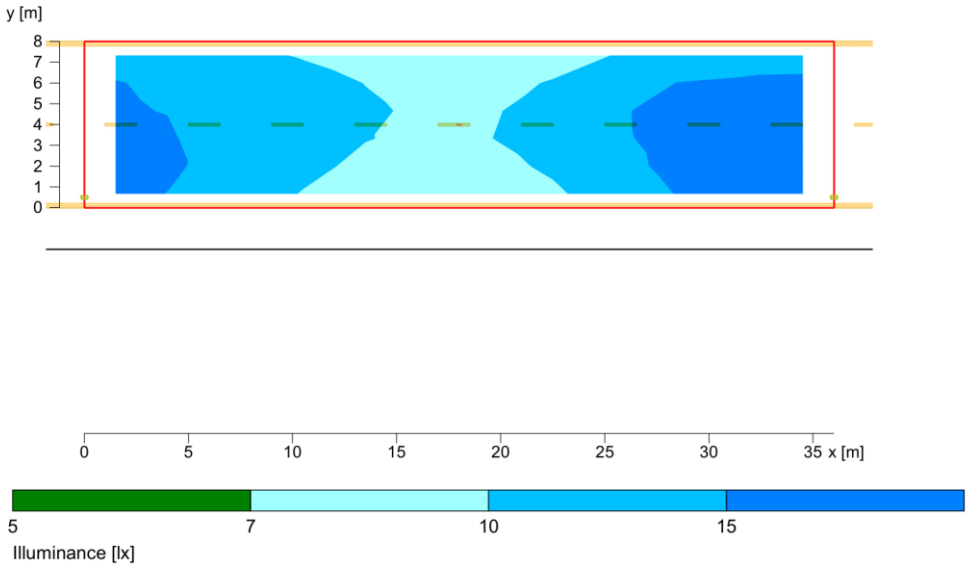
Illuminance Diagram

8m wide roadway

- Lighting poles to be positioned at 20-m+ spacing
- Lighting poles shown comprise ≥6000mm ≤8000-mm high poles fitted with LED lamps



TYPICAL CROSS SECTION DETAIL OF 8m R0AD



Illuminance Diagram

Boundary Security Lighting, including Airside and Landside Fencelines

The external and internal fenced boundaries planned for Cape Winelands Airport are intended to secure and manage and control the flow of vehicular traffic plus pedestrian access to the (a) greater airport area, including airport passenger and cargo facilities, offices, hotels, retail, warehouse and aircraft movement and hanger areas, and (b) the airside areas of the airport ensuring only approved, trained and accredited personnel have access to these areas.

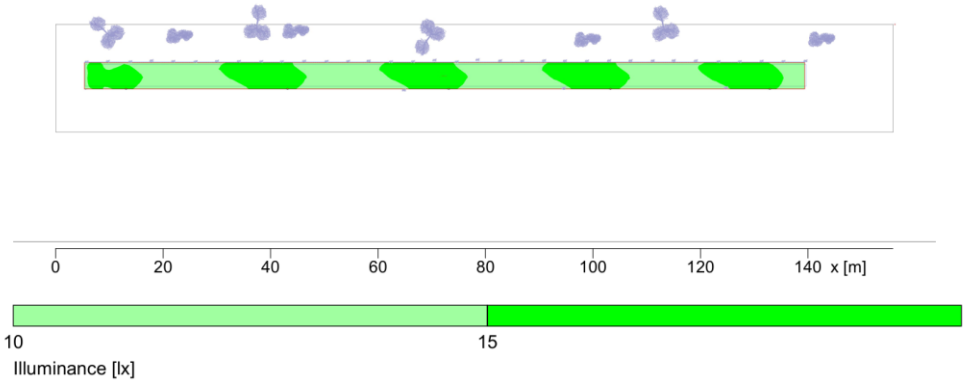
The fence lines will be regularly patrolled by Security Personnel, both on foot and per vehicle; the lighting to the fence lines will be set back from these fences such that the path for patrols is clearly visible and unauthorized intruders quickly identified and placed for safe air-movement and secure service operations.

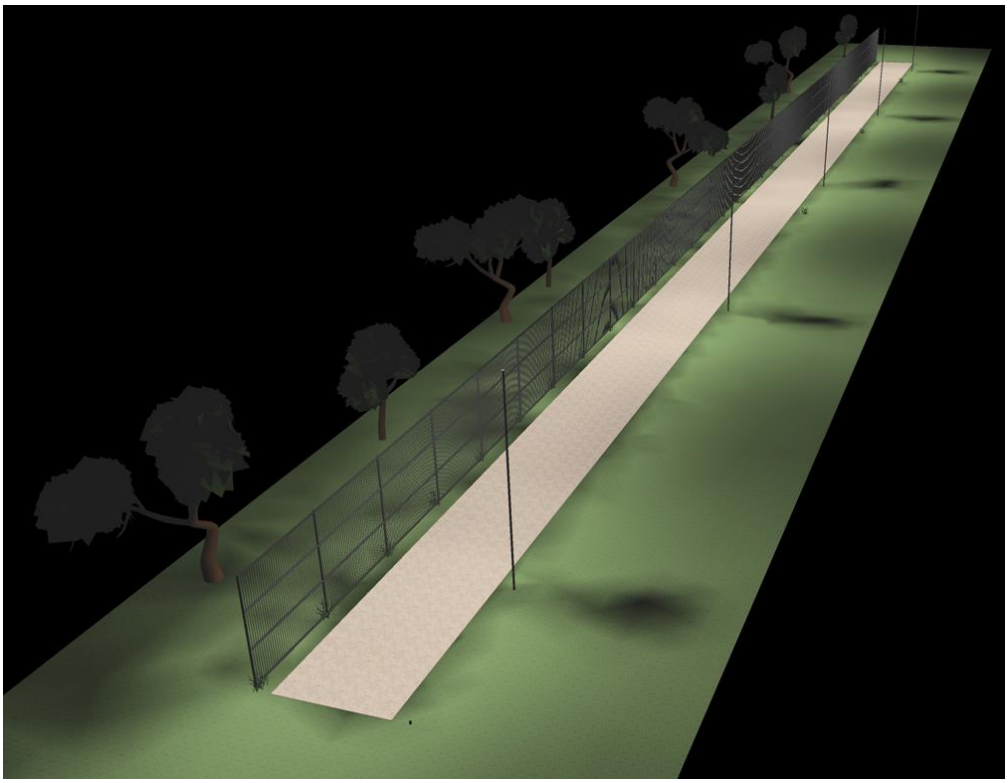
These fence lines require a good level of functional lighting to ensure safety and security as described.

The secure monitoring of these facilities by means of local CCTV systems and cameras which can operate and function to a high level of protection is also required in terms of the various Compliance Requirements and Specifications identified above.

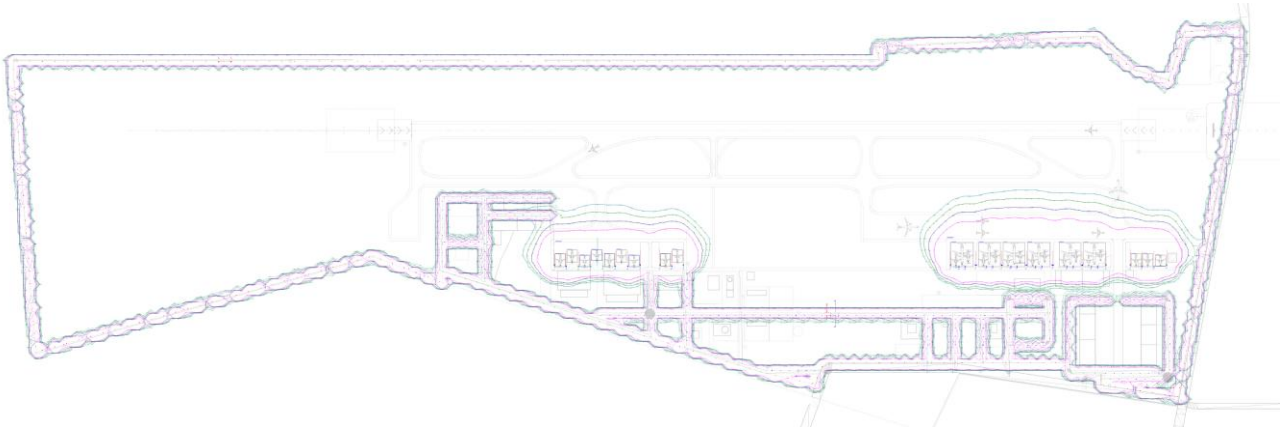
The general lighting considerations for security fence lighting will incorporate the following:

- The design lighting level to the security fence lines will be 10-Lux achieved using LED luminaires fixed to the underside of the canopy, with a maximum contrast ratio of 4:1.
- Based on the vehicle/pedestrian/security risk profile of these facilities, the use of 5000K LED lamps is required to ensure optimal visibility and contrast (for people and CCTV cameras).
- The controls to the security fence lighting will include a mix of day/night switching controls together with timer restrictions for off-peak night hours operation, plus enhanced remote control switching via the Security Systems where deemed necessary.
- The lighting poles will be ≥6000-mm and ≤ 8000-mm tall and placed at ± 30m centres.
- Lighting to be via LED luminaires with 36°cut-off.
- Lighting to comply with above Compliance and Statutory requirements.





3D Illuminance View



Extent of Perimeter, Apron & Street Lighting

Landside Gatehouse Entrance/Exit Lighting

The gatehouses planned for Cape Winelands Airport are intended to manage and control the flow of vehicular traffic plus pedestrian access to the greater airport area, including airport passenger and cargo facilities, offices, hotels, retail, warehouse and aircraft movement and hanger areas.

The gatehouses require a good level of functional lighting to ensure safe and secure movement of traffic and pedestrians within the airport facility for Security Staff to oversee and manage access as required. This is especially important as there will be traffic, pedestrians and Security Personnel working in these environs where visibility and contrast is important.

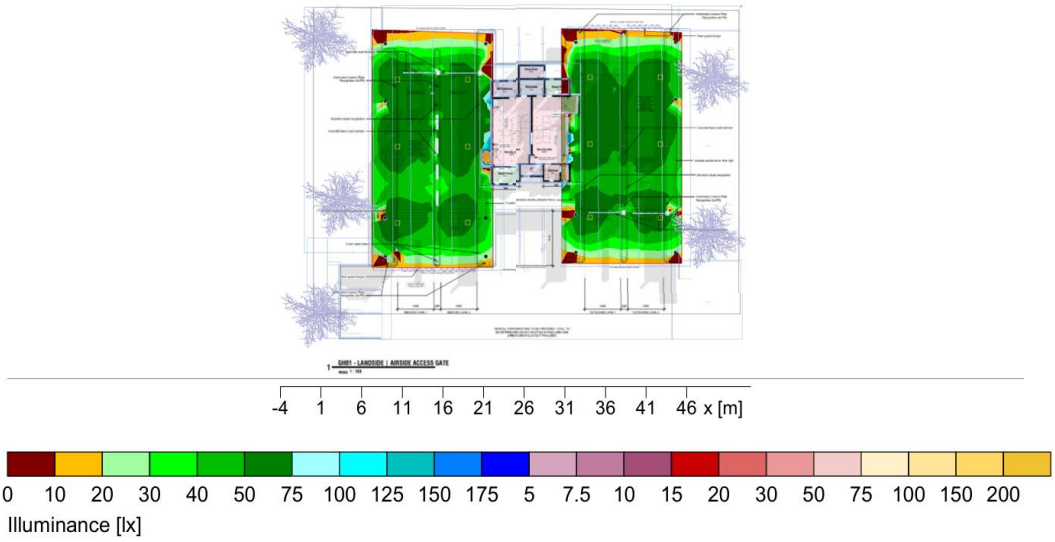
The secure monitoring of these facilities by means of local CCTV systems and cameras which can operate and function to a high level of protection is also required in terms of the various Compliance Requirements and Specifications identified above.

The general lighting considerations for gatehouse lighting will incorporate the following:

- The design lighting level to the gatehouse canopies will be 50-Lux achieved using LED luminaires fixed to the underside of the canopy, with a maximum contrast ratio of 6:1.
- Based on the vehicle/pedestrian/security risk profile of these facilities, the use of 5000K LED lamps is required to ensure optimal visibility and contrast (for people and CCTV cameras).
- The controls to the gatehouse lighting will include a mix of day/night switching controls together with timer restrictions for off-peak night hours operation.

The following diagrams represent the under-canopy lighting for the various gatehouses planned, which may be supplemented by streetlighting and landscape lighting where required (for security, wayfinding, aesthetic purposes):

Gatehouse 01 (Landside)

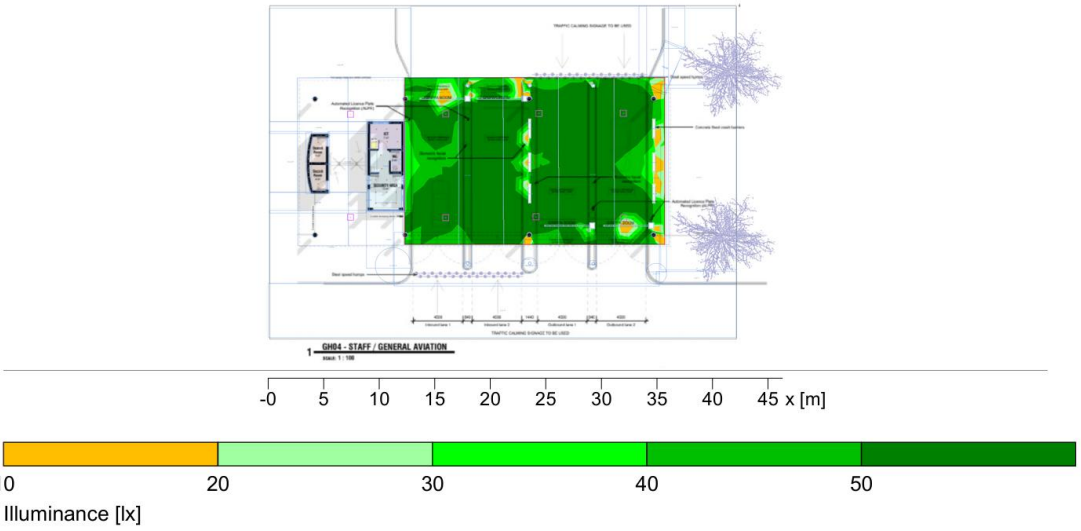


Illuminance Diagram

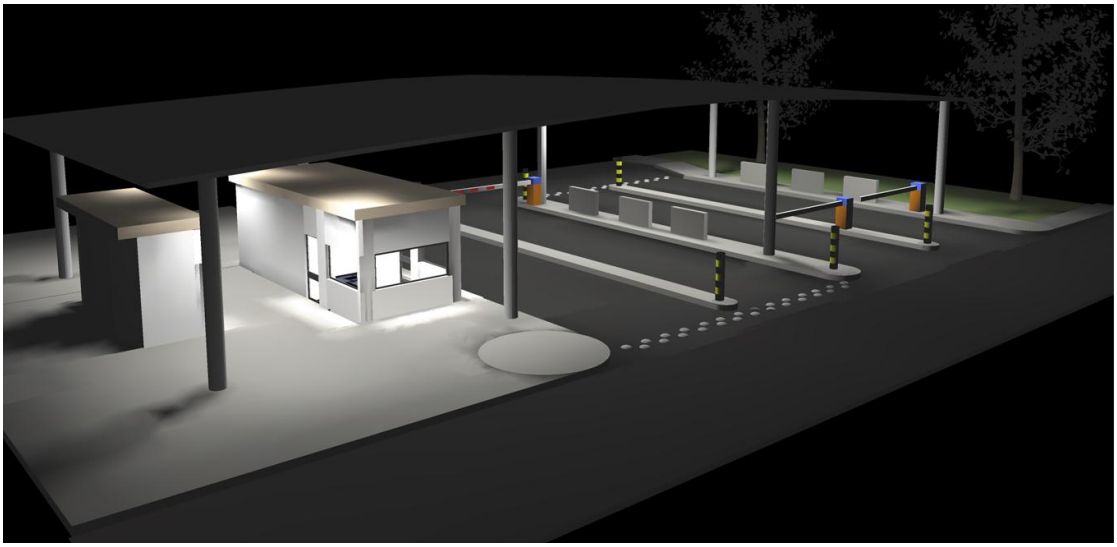


3D Illuminance View

Gatehouse 04 (Staff/General Aviation)

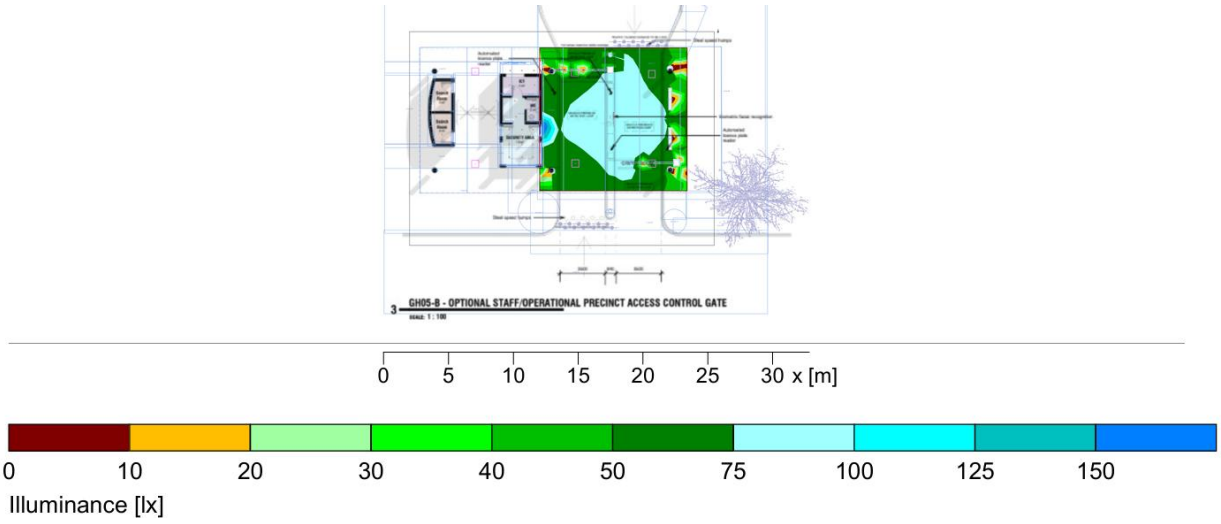


Illuminance Diagram



3D Illuminance View

Gatehouse 05 (Operations Staff & Operational Access Control)

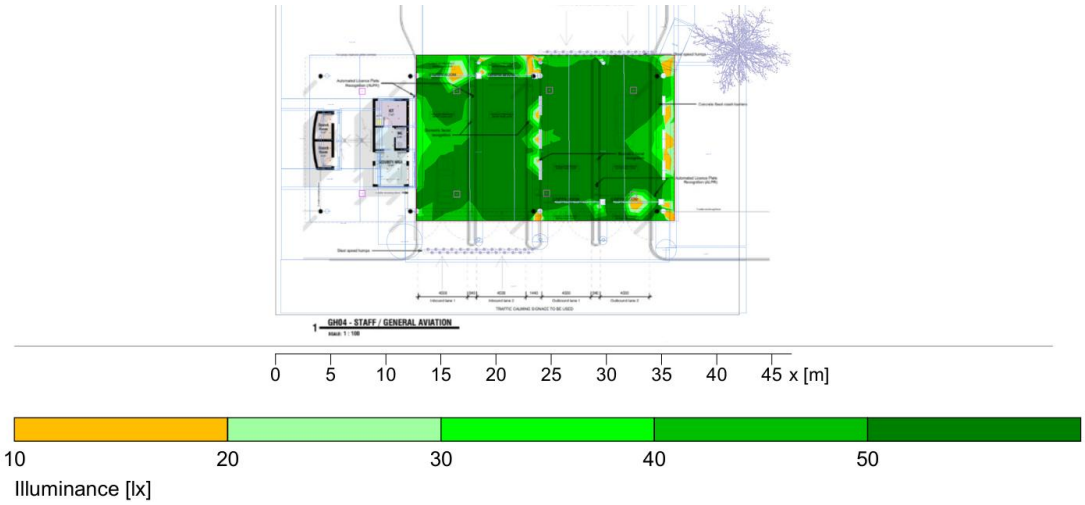


Illuminance Diagram

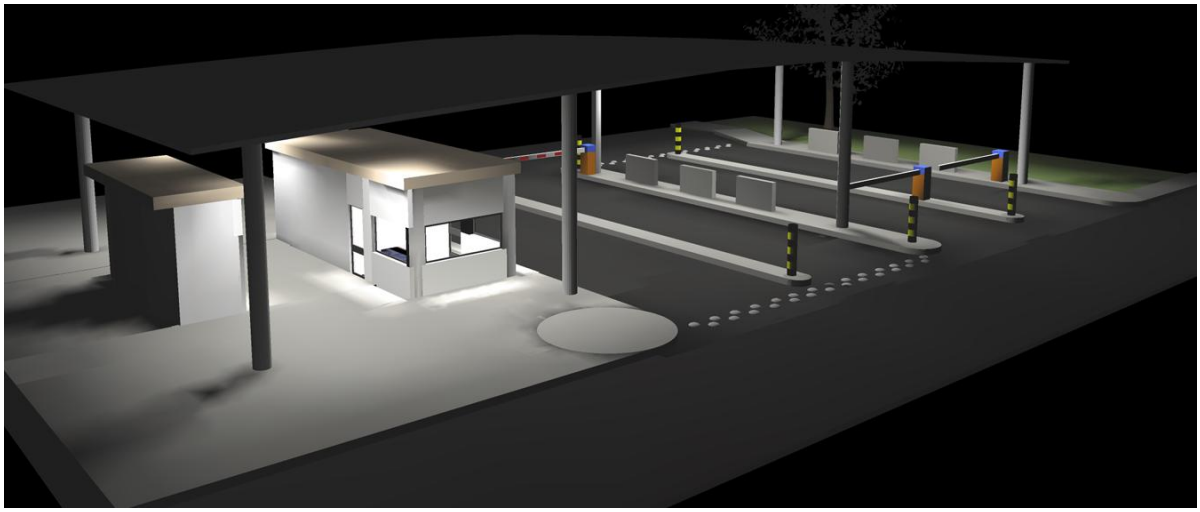


3D Illuminance View

Gatehouse 06 (Critical Support)



Illuminance Diagram



3D Illuminance View

Landside Open Parking Area Lighting

The Overall Cape Winelands Airport Landside areas include spaces for open parking. The design of these areas will include the following lighting services:

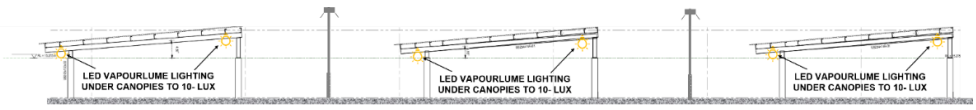
- The car park lighting will be designed in accordance with the Table below (extracted from SANS-10098-1).

CAR PARK LIGHTING		
Traffic	**Type**	**Lux Level**
Light	Parking lots of shops, schools, churches, terraced and apartment houses	5 Lux
Medium	Parking lots of department stores, office buildings, plants, sports and multipurpose building complexes	10 Lux
Heavy	Parking lots of major shopping centres, major sports and multipurpose building complexes	20 Lux

Extract from SANS-10098-1 External Public Lighting

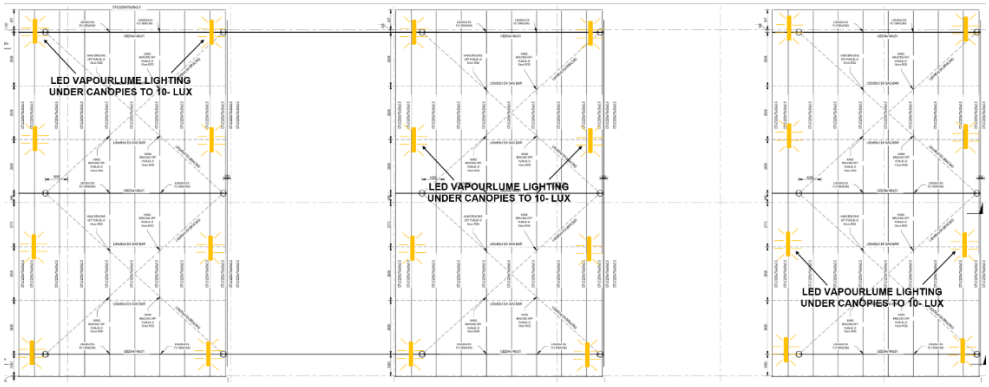
- The lighting to the car parking area will be designed to a 10-Lux lighting level, using LED luminaires fitted with 2700K/3000K lamps, with a designed uniformity of 8:1.
- The streetlights will be fitted on ≥6000-to-≤8000-mm poles, and the LED luminaires will be designed to illuminate downwards with a cut-off angle to the horizontal of 36° to the horizontal plane.
- Where necessary, anti-glare cut-off shields will be provided to the streetlights to minimize light spillage to adjoining areas outside of the car park areas.
- The carparking canopies, when fitted, will include the possibility of fitting photovoltaic panels to generate power for the site.
- The lighting under these canopies will comprise LED vapourlume light fittings, fitted with 2700K/3000K lamps, with a designed uniformity of 8:1. These fittings will further be fitted with individual passive sensors, and controlled such that (a) the fittings are automatically only switched on at dusk (b) that the light fittings will automatically dim to a minimum level (± 30% lighting output) when there is no movement in the area, (c) that the fittings will automatically increase light output to100% once the presence of (localized) vehicular and pedestrian traffic is detected; this lighting level will be maintained for a period not exceeding 30-minutes, following which the fittings will automatically dim to the pre-set minimum lighting level.

The section drawing/diagram below illustrates a typical cross section through the parking canopies. Streetlights are located at the ends of the canopy rows, and the LED vapourlume light fittings are fitted near the vehicular entry into the parking.

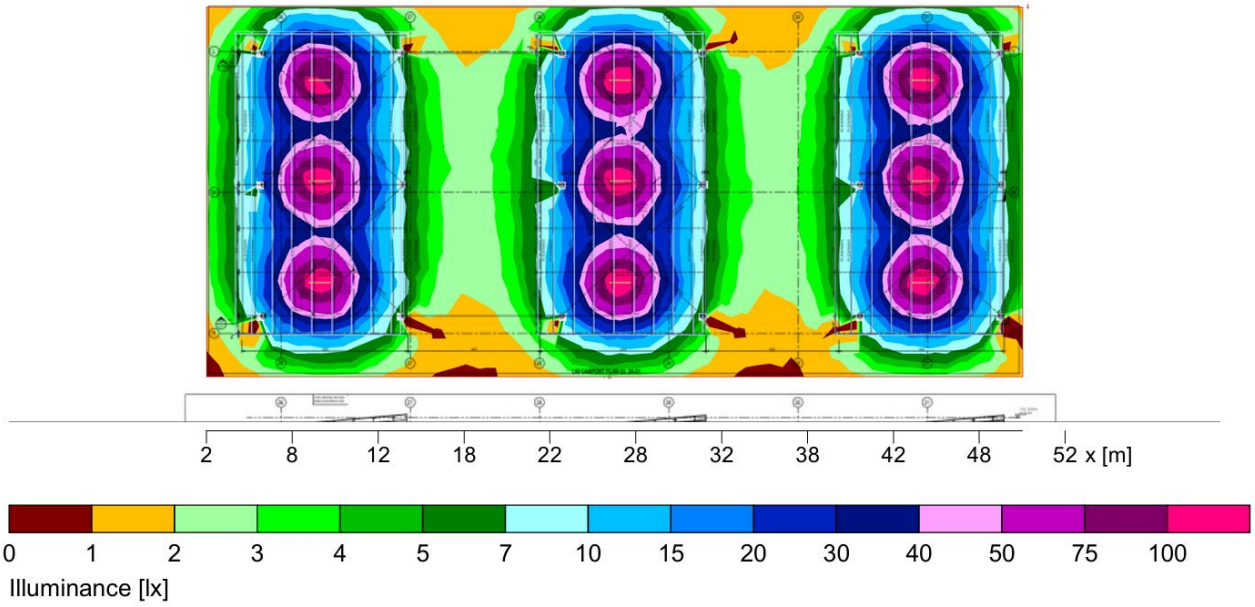


Carport Section Lighting Arrangement Diagram

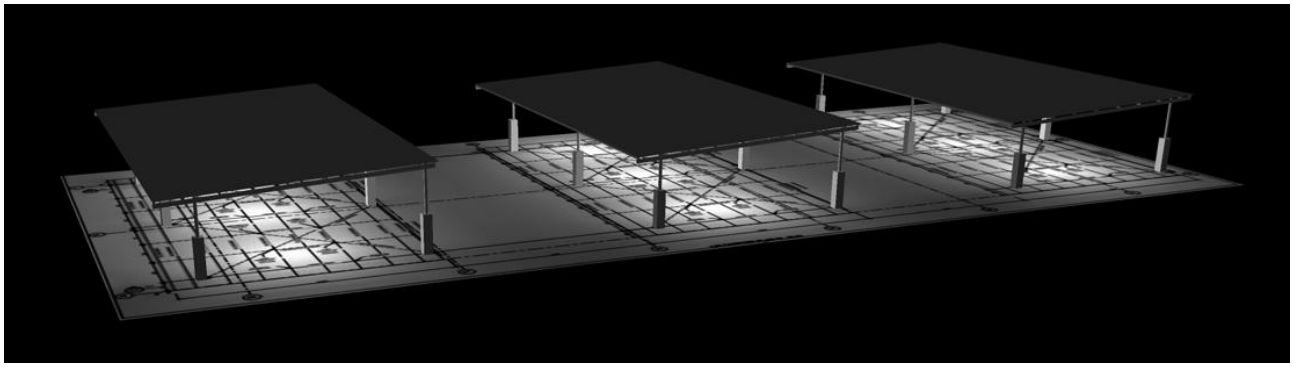
The plan view drawing/diagram below illustrates the concept regarding the overall placement of streetlight poles and the LED vapourlume light fittings under the canopies.



Carport Section Lighting Arrangement Diagram



Illuminance Diagram (within shaded carport areas)



3D Illuminance View (within shaded carport areas)

Landscape Lighting

We wish to provide the following extract from Annexure AHAH01 Cape Winelands Airport – External Lighting Guidelines:

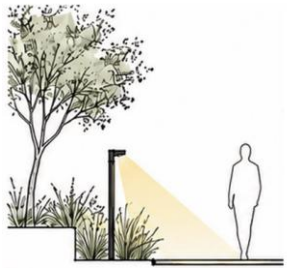
Extract:

"*Landscape Lighting Philosophy & Application*

4.3.1 Lighting Design Intention

The landscape lighting design should be intentional, revealing routes, defining spaces, supporting safety and creating a sense of arrival, whilst adhering to standard airport lighting principles and requirements.

4.3.2 Lighting Design Principles



a. Subtle and Purposeful
Low, warm luminance (3000K)
Avoid light spill
Light only what is needed

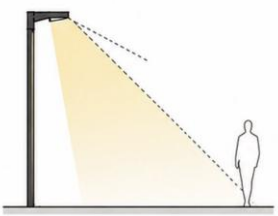


b. Lighting Hierarchy
High level streetlights

Mid-level pedestrian lights
Low level walkway/seating lights



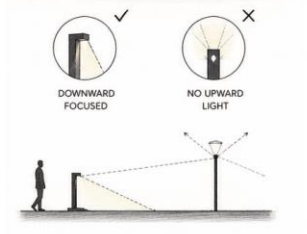
c. Integrated Design
Luminaires hidden in planting
Follow landscape forms
Colours/materials complimentary to design



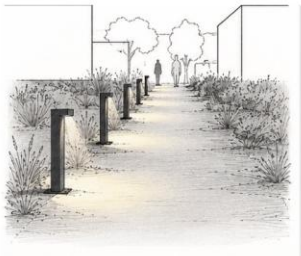
d. Airport Regulations
Adhere to 36° cutoff line

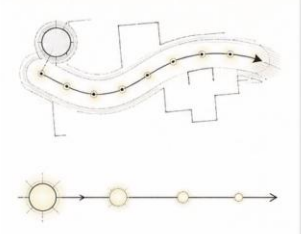
No upward lighting
Avoid sky glow



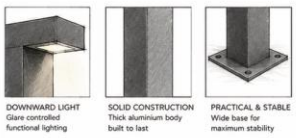


e. Responsible Design
Motion/time controls
Full cut-off luminaires
Protect night sky and wildlife



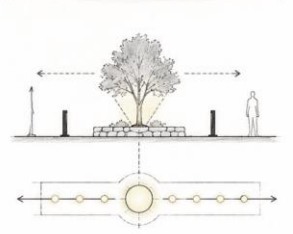


f. Promote Wayfinding
Clear routes
Consistent lighting types
Identify key destinations



g. Practical & Robust
Simple design fixtures
Robust materials/finishes
Robust fixing & placement

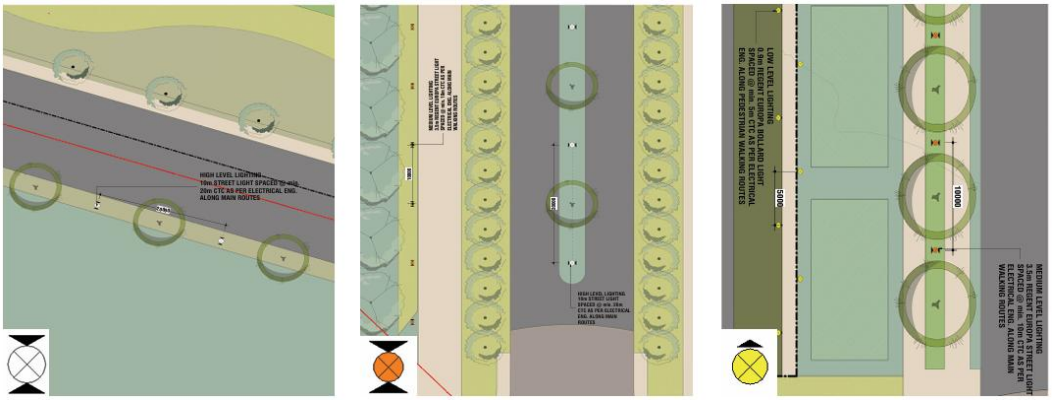




h. Sense of Place
Distinctive arrival feel
Clarity, safety, efficiency
Walm and calm welcoming environment

4.3.3 Lighting Design Typologies

The landscape lighting design should be intentional, revealing routes, defining spaces, supporting safety and creating a sense of arrival, whilst adhering to standard airport lighting principles and requirements."



End of Extract from AHAH01 Cape Winelands Airport – External Lighting Guidelines

Illuminated Signage, Billboards & Wayfinding

Limited signs, billboards and wayfinding signs in the airport precinct will be illuminated primarily to highlight commercial properties and outdoor advertising. The location and final designs of these signs and billboards will be completed in accordance with applicable City of Cape Town's Byelaws and will be subject to a (future) Approval Submission by Specialist Suppliers and Consultants in terms of the Outdoor Advertising Byelaw.

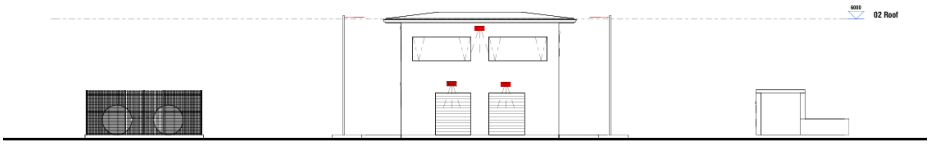
Landside Building External/Façade Lighting

The various buildings planned will include a multitude of uses, including airport movements, hotels, offices, parking garages, Fire Station, Aircraft Support Facilities, etc. The external lighting needs for each of these types requires different approaches and standards applied, whether for aesthetic, security or safety requirements.

- The lighting to the various building façades will be designed to a 10-Lux lighting level, using LED luminaires fitted with 3000K lamps, with a designed uniformity of 8:1.
- The streetlights will be fitted on the various building façades as illustrated in the examples below.
- The LED luminaires will be designed to illuminate with a cut-off angle to the horizontal of 36° to the horizontal plane.
- Controls to lighting to be via day/night switch controls combined with automatic dimming timer controls.
- Lighting to comply with above Compliance and Statutory requirements.

The drawings and diagrams below illustrate examples of the façades and lighting positions planned shown in Elevation and 3D views:

ARFF Facility (Fire Station)

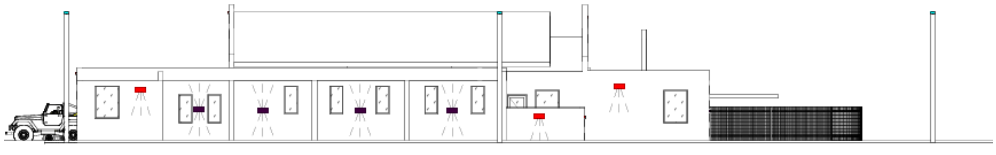


A LIGHTING ELEVATION A/6010



a 3D VIEW a- LIGHTING

Bird Dog & Wildlife Facility

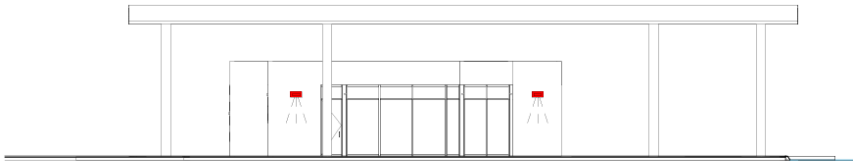


2 | LIGHTING ELEVATION 2/6010

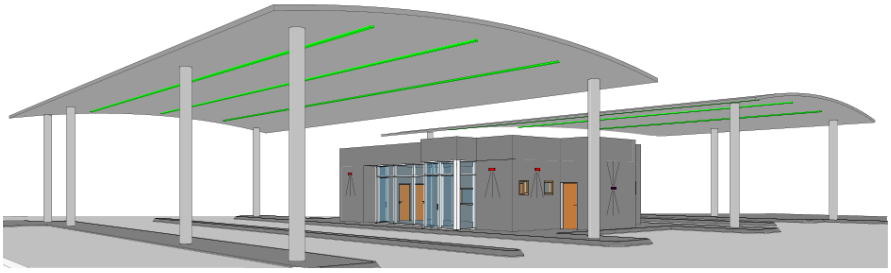


3 | 3D VIEW B - LIGHTING

Landside Airside Gatehouse

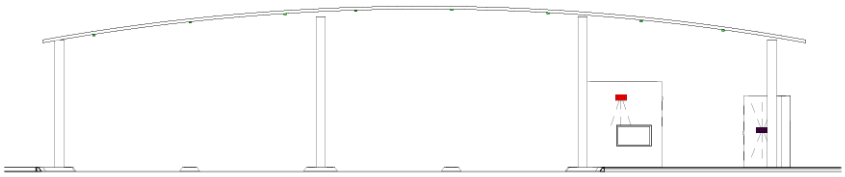


LIGHTING ELEVATION a/6010

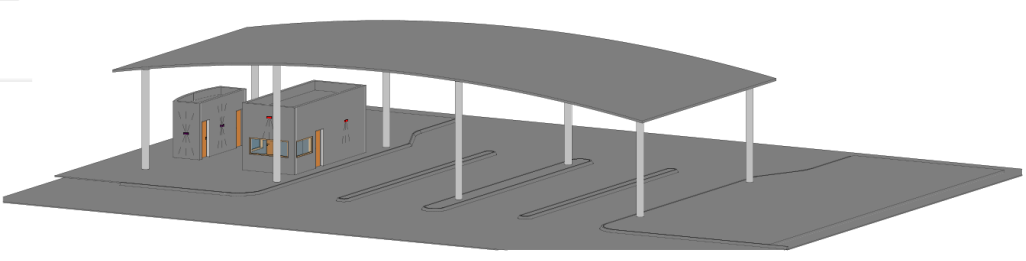


3D VIEW A - LIGHTING

Staff GA Gatehouse

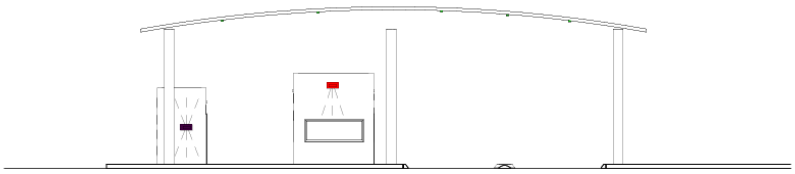


LIGHTING ELEVATION d/6010

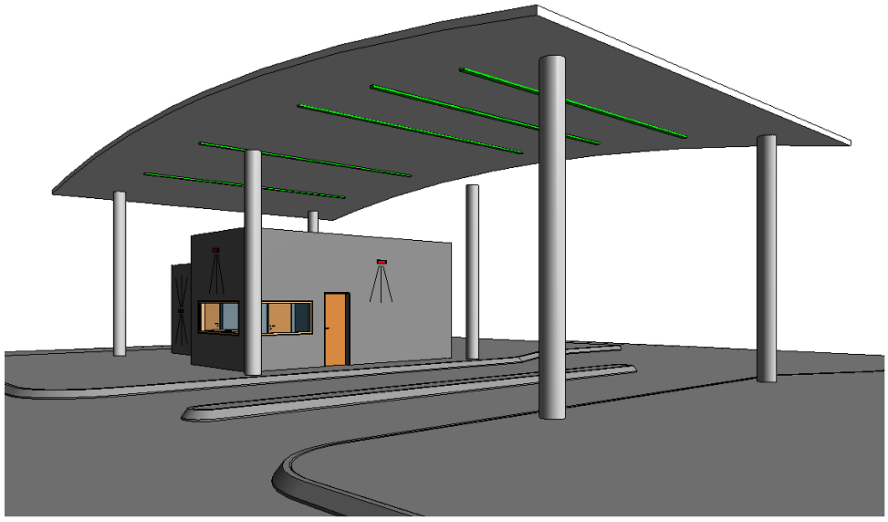


B 3D VIEW B - LIGHTING

Operational Precinct Gatehouse

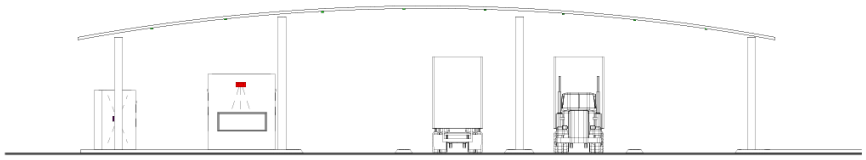


2 LIGHTING ELEVATION 2/6010

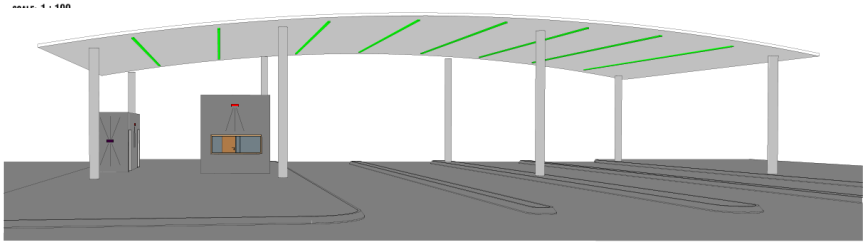


4 3D VIEW - GH05_B - LIGHTING

Critical Support Facilities Gatehouse

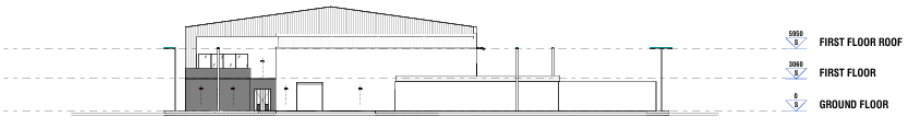


A IIGHTING ELEVATION A/6010



3 3D VIEW - LIGHTING

GSE Ground Staff Maintenance Building



B | LIGHTING - ELEVATIN B/6010

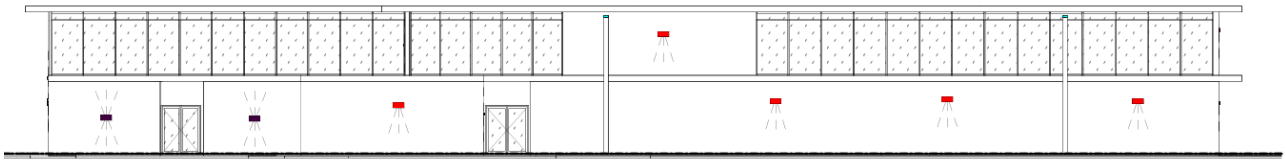


A | LIGHTING ELEVATION A/6010



3 | 3D VIEW 1 - LIGHTING

Ground Staff Building

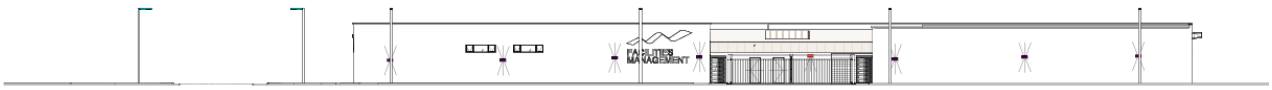


A | LIGHTING ELEVATION A/6010

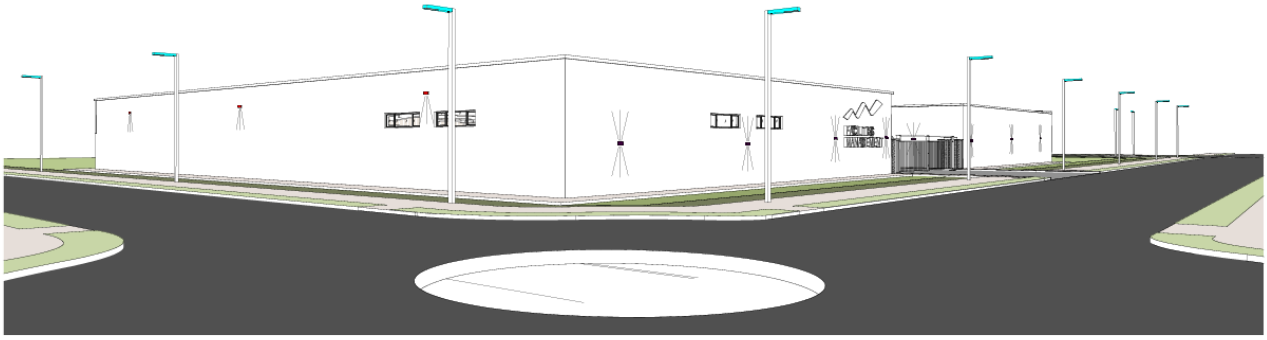


2 | 3D VIEW - LIGHTING

Facilities Management Building



A | LIGHTING ELEVATION A/6010



2 | 3D VIEW - LIGHTING LAYOUT

Airside Apron Lighting

Apron lighting enhances visibility for ground crews, pilots, and maintenance teams. Proper illumination ensures that aircraft movements, refuelling, and baggage handling occur without disruptions. Without adequate lighting, the risk of accidents increases, and operational efficiency declines. Lighting on the apron must comply with established regulations to ensure uniformity and brightness. The design process involves determining the right lux levels, positioning light fixtures correctly, and minimizing glare. A well-lit apron reduces the chances of errors in aircraft servicing, making it easier for personnel to perform their tasks accurately.

The final design of the Apron Lighting will be in accordance with:

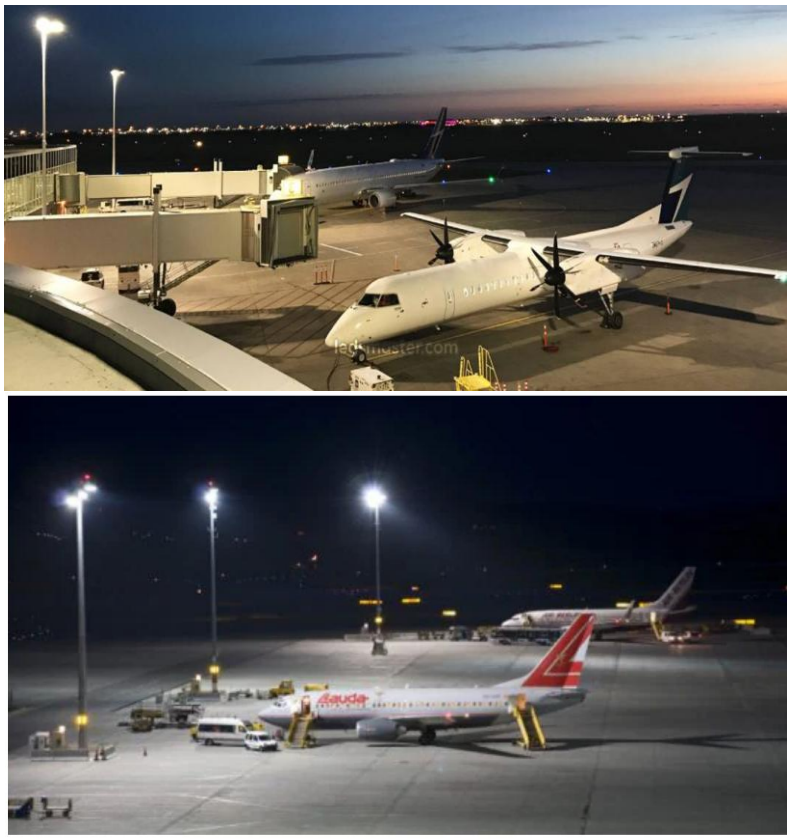
- The International Civil Aviation Organization publishes its recommendations in ICAO Annex 14, Volume I, Aerodrome Design and Operations
- The European Normative EN 12464-2:2014 provides more specific guidance, recommending that the Glare Rating Limit (RGL) remain below 50 for apron areas.
- United Kingdom: CAA CAP 168 covers aerodrome licensing includes apron lighting requirements.
- European Union: EASA CS ADR-DSN.M.750 under Commission Regulation No 139/2014

Other considerations for the Apron Lighting will include:

- The MAP 7 plans will have to be considered for coordination of lighting masts with other surface and underground services.
- The back of the aircraft stand needs to achieve the specified minimum, along with the effect of the shade from the aircraft depending on the light positions.
- A portion of the apron lighting may be positioned on adjoining buildings, and the overall apron lighting design achieve its functional and overall aesthetic requirements.
- The coordination of lighting masts on remote stands to consider Obstacle Limitation Surfaces remains clear.

The pictures below illustrate the type and extent of lighting planned for the aircraft aprons.





Examples of Apron Lighting

Lux Requirements for Apron Lighting lux level requirements

Apron Area	Recommended Lux Level	Purpose
Aircraft Parking Stands	20 Lux	Ensures visibility & parking guidance markings, obstacles & taxi lanes for pilots & ground crew.
Aircraft Servcing Zones (fueling stations, maintenance zones, engine inspection areas)	30 Lux	Provides adequate brightness for refuelling, mechanical inspections, & minor repairs.
Passenger Boarding & Cargo Handling Areas	50 Lux	Supports efficient baggage handling, aircraft catering, and safe passenger movement.
Peripheral Apron Zones (vehicle pathways, storage areas)	10 Lux	Facilitates safe navigate of support vehicles & personnel in non-servicing areas.
High-traffic & maintenance areas (wide-body aircraft handling, night-time inspections)	75-100 Lux	Ensures clear visibility for detailed aircraft inspections & maitenance work.

The recommended values above serve as a general guideline, but adjustments may be necessary based on environmental conditions, regional climate variations, and specific airport operational needs. Airports in regions prone to adverse weather conditions, such as frequent fog, heavy rainfall, or snowfall, may require higher lux levels to compensate for the reduced natural visibility.

In addition to achieving the correct lux levels, uniform lighting distribution, measured in two-axis, is essential for maintaining consistent visibility. Shadows and dark spots can interfere with aircraft servicing and create hazards for ground personnel. To prevent this, the uniformity ratio, which measures the balance between average and minimum illuminance, should be at least 4:1.

In the case of Cape Winelands Airport, the required lighting level for the Aircraft Apron areas has been specified as follows:

- Horizontal illuminance: 20 lux average minimum
- Uniformity ratio: not more than 4:1 (average to minimum)
- Vertical illuminance: 20 lux at a height of 2 metres above the apron in relevant directions (the vertical illuminance requirement ensures that ground crews can see equipment, signage, and potential hazards at eye level, not just on the ground surface).

Other Apron Areas will be illuminated as follows:

- Horizontal illuminance: at least 50% of the aircraft stand average
- Uniformity ratio: not more than 4:1
- This creates a gradual transition from brighter aircraft stands to surrounding areas, avoiding sudden changes that can impair visual adaptation.

In addition to lighting uniformity specifications and requirements for Apron Lighting, colour rendering is to be considered as colour-rendition is essential to safe working conditions on apron working areas. Colour temperature affects both visual performance and operational outcomes. For apron floodlighting, cool white light in the range of 4000K to 5000K will be used for Cape Winelands Airport.

Cool white light supports:

- Alertness: Higher colour temperatures help maintain alertness during night operations
- Colour recognition: Ground crews need to identify safety markings, vehicle colours, and equipment clearly
- Surveillance: CCTV systems perform better with cool white illumination, improving contrast and detail

Colour rendering index considerations:

The Colour Rendering Index (CRI) measures how accurately a light source reveals the true colours of objects compared to natural daylight. For airport aprons, CRI directly affects safety and operational performance. Ground crews rely on colour to:

- Identify safety markings and signage
- Recognise Foreign Object Debris (FOD) on the apron surface
- Distinguish between vehicles and equipment
- Read aircraft livery and registration numbers.
- Cool white light (4000K and 5000K) supports alertness during night operations and improves colour recognition for safety markings and FOD detection.

Most LED apron floodlighting systems offer CRI values of ≥70 ≤ 90. Higher CRI generally improves colour recognition but may affect efficacy. For Cape Winelands Airport, a CRI of 70 or above meets operational needs while maintaining energy efficiency.

Glare Control

Glare occurs when lighting is too bright or improperly directed, causing discomfort or reducing visibility. On airport aprons, uncontrolled glare affects pilots, ground crews, and air traffic controllers. ICAO Annex 14 recommends minimising glare to pilots and ground personnel. European Normative EN 12464-2:2014 recommends keeping the Glare Rating Limit below 50.

To minimize glare, the following guidelines will be adopted:

- Apron floodlights to be located to minimise glare to pilots in flight and on the ground, aerodrome controllers, and personnel on the apron.
- Each aircraft stand receive light from two or more directions to minimise shadows.
- Positioning floodlights at heights at least twice the eye level of the tallest aircraft using the apron.
- Aiming luminaires away from the control tower and approaching aircraft flight paths
- Using asymmetric optics that direct light precisely where needed
- Designing for multi-directional illumination to reduce shadows and contrast

In general, the apron lighting is be placed on 28-to-30-m lighting masts, with the goal to cover the maximum surface area while minimizing glare for pilots and ground personnel. Strategic placement of light fixtures ensuring shadows do not form in areas where ground crews operate, with overlapping light beams from multiple fixtures help eliminate dark zones, ensuring consistent illumination.

Reduced Energy Consumption on apron lighting will incorporate LED luminaires fitted with smart controls adjusting brightness based on activity levels with motion sensors and dimming technology allow lights to operate at full intensity only when needed, reducing unnecessary energy consumption.

The luminaires mounted on the apron lighting poles will be similar in appearance to the luminaire indicated below. Please note that this luminaire is designed to light in a downwards direction only, with a cut-off to the horizontal at ± 36° to the horizontal plane. The lamp temperature will be defined in accordance with Best Practice and in accordance with International Standards and Codes for the uses as defined.



Typical LED floodlight luminaire used for Apron Lighting
(incorporating design features compliant with the above)

Airside Runway, Taxiway and Heliport Lighting

The final design and implementation of the runway plus associated taxiways and heliport lighting systems will be completed in accordance with the ICAO Annexure 14 and other Standards and Guidelines defined above. Given these standards and guidelines are provided to ensure safe aircraft movements, there is virtually no leeway in making changes to these systems.

The Airside Ground Lighting (AGL) system for Cape Winelands Airport shall be designed to support CAT III operations and provide the visual guidance required for the safe landing, take-off and ground movement of aircraft under low-visibility conditions.

The design shall comply with the following International and South African regulatory requirements:

The Airfield Ground Lighting (AGL) intensity shall be adjustable according to the prevailing visibility and Runway Visual Range (RVR) conditions. The required lighting intensity shall be selected through the AGL control system by Air Traffic Control (ATC), in accordance with the approved operating procedures.

Light pollution shall be mitigated using LED fittings, controlled photometric distributions, appropriate aiming and adjustable light intensity. These measures shall minimise unnecessary light spill while maintaining the photometric performance required for CAT III operations and aviation safety.

The AGL system and its certification shall be subject to SACAA regulatory requirements and the applicable aerodrome approval process.

Annexures

Please refer to the documents included below as Annexures to this Report:

a. App-14-CWA-Visual-Impact-Assessment-web-comp
b. Appendix-35 CWA Poultry Biodiversity Addendum of the final EIAR for the proposed expansion of the Cape Winelands Airport DEA&DP in-process Number 16/3/3/2/A5/20/2046/24
c. Extract from SANS 10098-1 (Classes of Road Lighting and Car Park Lighting)
d. AHAH01 Cape Winelands Airport – External Lighting Guidelines
e. Drawing CWA-ZUT-DG-A05-ZZZZZ—TR-0001 Overall Road Layout
f. Drawing CWA-ZUT-DG-A05-ZZZZZ-TR-0002
g. Drawing CWA-ZUT-DG-A05-ZZZZZ-TR-0003
h. Drawing CWA-ZUT-DG-A05-ZZZZZ-TR-0004
i. Drawing 6010-AR02 – Lighting Layout – ARFF Facility (Fire Station)
j. Drawing 6010-AR02 – Lighting Layout – Bird Dog & Wildlife Facility
k. Drawing 6010-GH01 – Lighting Layout – Landside Air Gatehouse
l. Drawing 6010-GH04 - Lighting Layout – Staff/GA Gatehouse
m. Drawing 6010-GH05-A&B - Lighting Layout – Operational Precinct Gatehouse
n. Drawing 6010-GH06 – Lighting Layout – Critical Support Facilities Gatehouse
o. Drawing 6010-GS01 - Lighting Layout – Ground Staff Maintenance
p. Drawing 6010-GS02 - Lighting Layout – GSE Staff Building
q. Drawing 6010 – Lighting Layout – Facilities Management Building

Closing

The information and specifications contained in this report will be used as a guiding template to complete detailed site lighting systems and services, that are compliant with statutory and regulatory requirements, plus in accordance with the Approved Environmental Impact Assessment Report.



Charles Selkirk Pr. Eng.