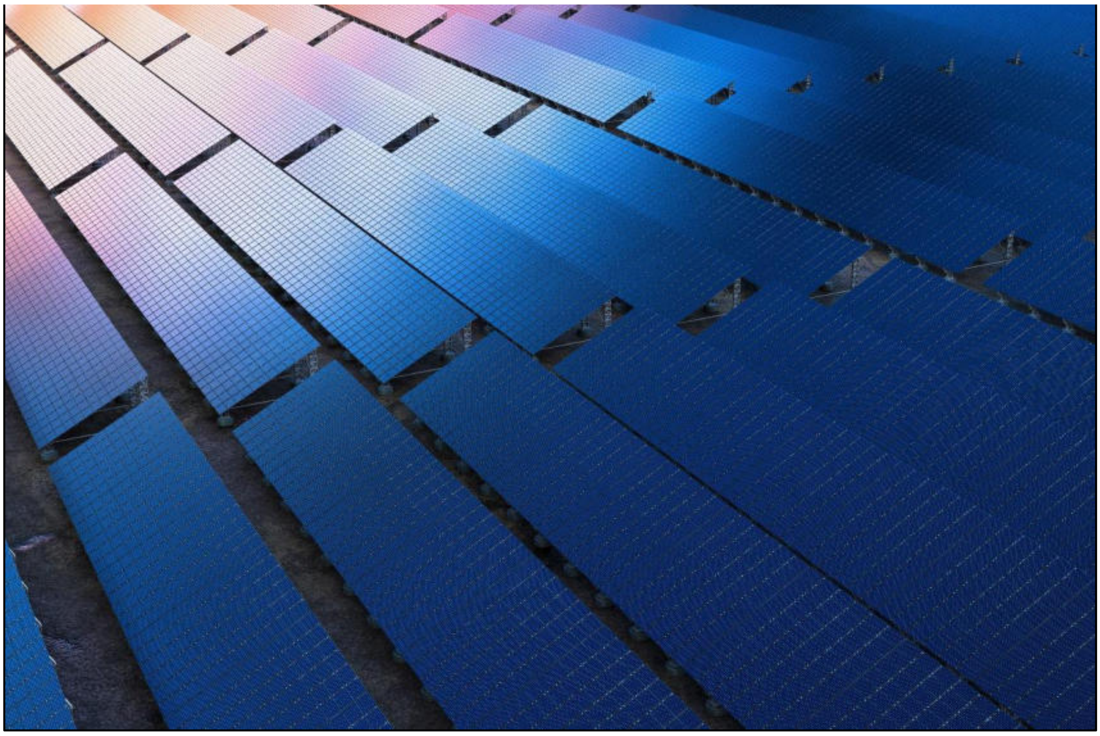
APPENDIX 36

GLINT AND GLARE

NOVEMBER 2024

Aviation Glint and Glare Assessment of the Solar Energy Facility Installation for the Proposed Expansion of the Cape Winelands Airport, Western Cape.



Prepared by:	Future Impact (Pty) Ltd
Specialist Name:	Dr Brett Williams
Prepared for:	PHS Consulting (Pty) Ltd

06 September 2024

Project name	Aviation Glint and Glare Assessment of the Solar Energy Facility Installation for the Proposed Expansion of the Cape Winelands Airport, Western Cape.
Report	Glint and Glare Assessment Report
Report version	Version 1
Client	**PHS Consulting (Pty) Ltd** PO Box 1752 Hermanus 7200 South Africa
Lead Consultant	**Amanda Fritz-Whyte** +27 82 327 2100 amanda@phsconsulting.co.za
Date of release	12 August 2024
Contributors to the report	**Future Impact (Pty) Ltd** Dr Brett Williams & Mr Jason Hutten www.futureimpact.co.za cell: +27 73 151 1937

Amendment History

Version 1	Original	06/09/2024

I hereby declare that I do:

(a) have knowledge of and experience in conducting assessments, including knowledge of the Act, these regulations and guidelines that have relevance to the proposed activity;

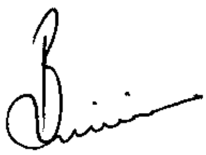
(b) perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

(c) comply with the Act, these regulations, guidelines, and other applicable laws.

I also declare that there is, to my knowledge, no information in my possession that reasonably has or may have the potential of influencing –

(i) any decision to be taken with respect to the application in terms of the Act and the regulations; or

(ii) the objectivity of this report, plan or document prepared in terms of the Act and these regulations.



Dr Brett Williams

Future Impact (Pty) Ltd

EXECUTIVE SUMMARY

Future Impact were appointed by PHS Consulting (Pty) Ltd to conduct a desktop review pertaining to glint and glare impacts on aviation receptors as a result of light reflecting off solar PV installations at the proposed expansion of the Cape Winelands Airport (CWA) in the Western Cape.

The aim of this study was to determine the impact that solar glint and glare would have on various aviation receptors. The FAA model considered the 2-mile receptors on the approach to Runway 01/19 and the Air Traffic Control Tower.

The modelling results indicate that the Air Traffic Control Tower will be exposed to green and yellow glare. The aircraft on the approach paths will not be affected by the PV panels.

It is recommended that the south portion of the Services Precinct (see Figure 8) be excluded from the installation of the Solar PV panels to eliminate the exposure to the Air Traffic Control Tower.

The Glint and Glare Impacts will therefore be **Very Low** and acceptable in terms of the United States FAA Regulations if the recommendations are implemented. It is therefore recommended that the project receive authorisation from the Civil Aviation Authority from a glint and glare perspective.

Dr Brett Williams

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND DEFINITIONS

2-Mile Flight Path Receptor: The 2-Mile Flight Path receptor ("FP") simulates an aircraft following a straight-line approach path toward a runway, by default, including a restricted field-of-view to filter unrealistic glare. In addition, it can be modified to represent a worst-case approach and take-off path.

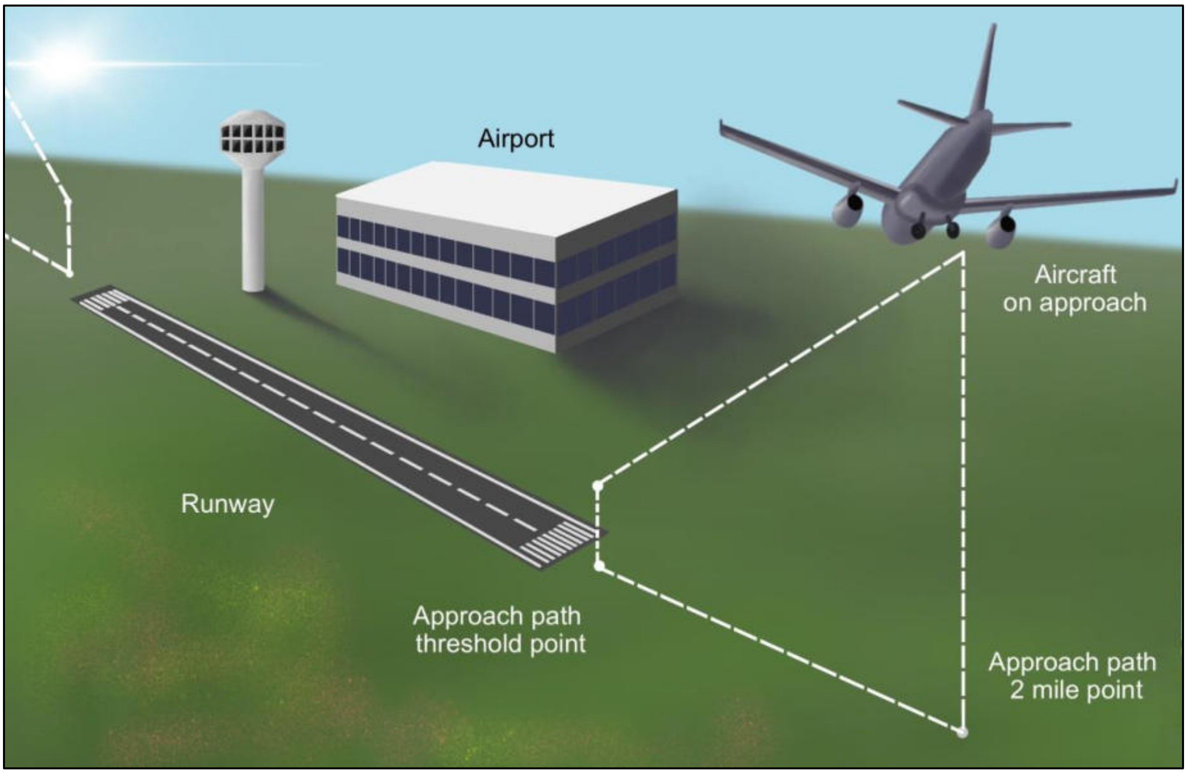


Figure 1: Flight Path

Flight Path Parameters are as follows:

Name: Descriptive alphanumeric label of receptor

Direction (°): Azimuthal angle of approach of aircraft which defines the straight path toward the runway. Measured clockwise from true north.

Glide slope (°): Angle of descent of aircraft toward runway. Default value of 3°.

Threshold crossing height: Height above ground of aircraft when it crosses the runway threshold. (Typically, 50 ft.).

Max downward viewing angle (°): The vertical field-of-view of the pilot, measured positive downward from the XY plane (i.e., flat). A default value of 30° assumes glare appearing beyond that FOV is not visible to the pilot and is acceptable to FAA. A value of 90° assumes the pilot can see glare appearing directly underneath the aircraft.

Azimuthal viewing angle (°): The left and right field-of-view of the pilot during approach. A view angle of 180° implies the pilot can see glare emanating from behind the plane.

Point coordinates: The threshold and 2-mile point ground elevation parameters can be modified in the FP Advanced dialog. The 2-mile point height is calculated from the point elevations and threshold crossing height to ensure a smooth 2-mile descent path.

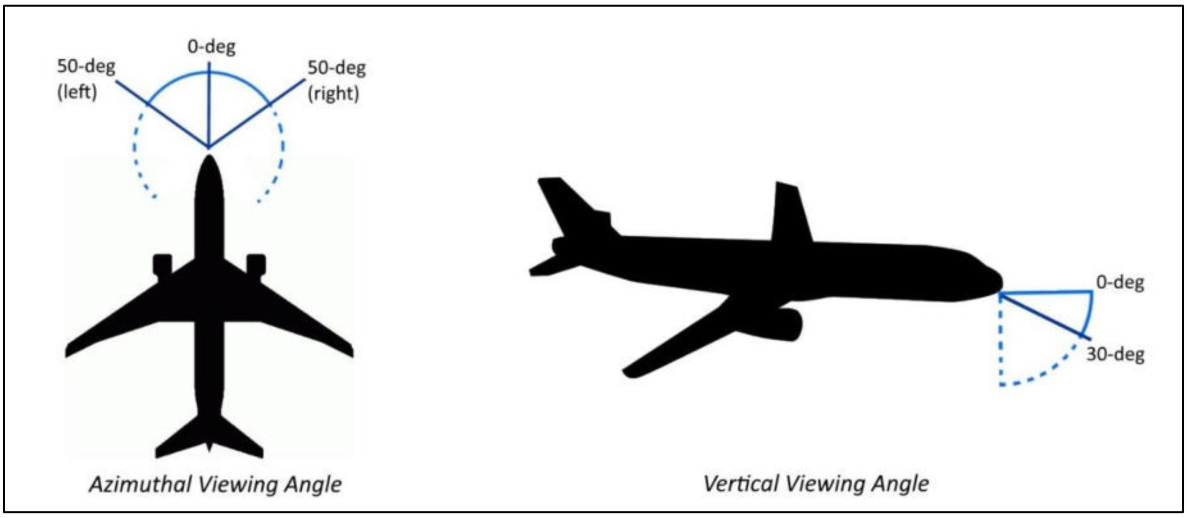


Figure 2: Viewing Angles.

Glint and Glare: Glint is typically defined as a momentary flash of bright light, often caused by a reflection off a moving source. A typical example of glint is a momentary solar reflection from a moving car. Glare is defined as a continuous source of bright light. Glare is generally associated with stationary objects, which, due to the slow relative movement of the sun, reflect sunlight for a longer duration. The difference between glint and glare is duration. Industry-standard glare analysis tools evaluate the occurrence of glare on a minute-by-minute basis; accordingly, they generally refer to solar hazards as 'glare'. Based on figure 3 (below), the ocular impact of solar glare is quantified into three categories:

→Green - low potential to cause after-image (flash blindness)

→Yellow - potential to cause temporary after-image.

→Red - potential to cause retinal burn (permanent eye damage)

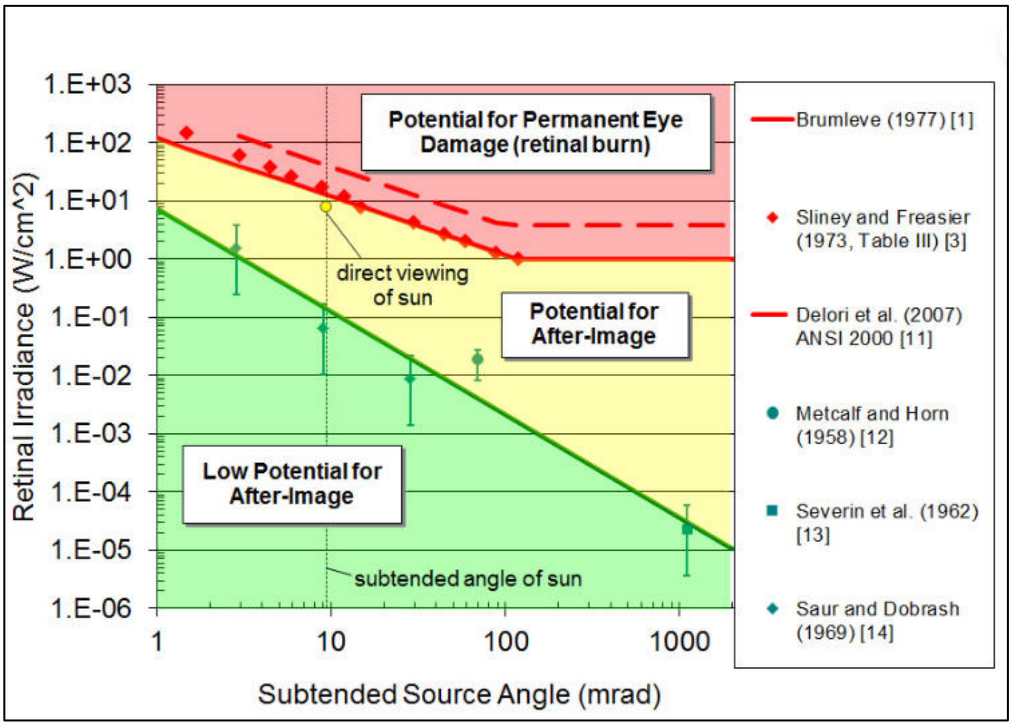


Figure 3: Glare Categories.

mrad: Milliradian, equal to one-thousandth of a radian. A radian is a unit of angular measure equal to the angle subtended at the centre of a circle by an arc equal in length to the radius of the circle, approximately 57°17'44.6".

Peak DNI (W/m2 or Wh/m2): The maximum Direct Normal Irradiance at the given location at solar noon. DNI is the amount of solar radiation received in a collimated beam on a surface normal to the sun during a 60-minute period. On a clear sunny day at solar noon, a typical peak DNI is ~1,000 W/m2.

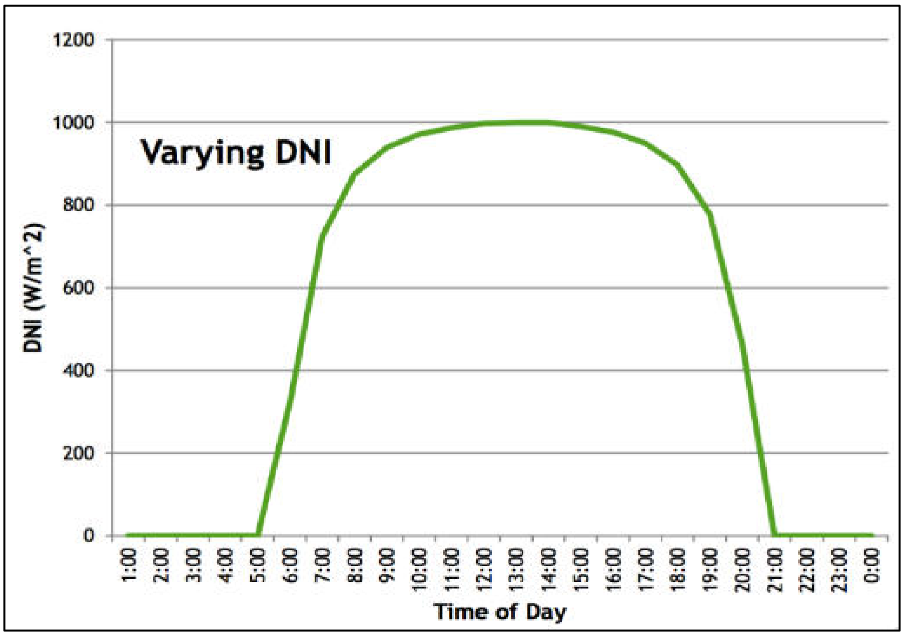


Figure 4: Peak Daily DNI

Slope error (mrad): Specifies the amount of scatter that occurs from the PV module. Mirror-like surfaces that produce specular reflections will have a slope error closer to zero, while rough surfaces that produce more scattered (diffuse) reflections have higher slope errors. Based on observed glare from different PV modules, an RMS slope error of ~10 mrad (which produces a total reflected beam spread of 0.13 rad or 7°) appears to be a reasonable value. Not used if correlate slope error to module surface type is checked. In this report, the worst-case scenario was assumed. Therefore, a light-textured PV panel with an anti-glare coating was selected for modelling. The properties of the selected panel are as follow: 9.16mrad average RMS slope error; 119.00mrad average beam spread; 3.17 standard deviation of slope error; and 38.00 standard deviation of beam error.

Abbreviations used in the report

AP: *Approach Point*

ATCT: *Air Traffic Control Tower*

CWA: *Cape Winelands Airport*

FAA: *Federal Aviation Authority*

FAWN: *ICAO Code for the Cape Winelands Airport*

FoV: *Field of View*

FP: *Flight Path*

mRad: *milliradian*

OP: *Observation Point*

PV: *Photovoltaic*

RMS: *Root Mean Square*

1. INTRODUCTION

This report aims to determine the effect that potential solar PV 'glint and glare' may have on various aviation receptors due to the construction and operation of the solar PV installations at the proposed expansion of the Cape Winelands Airport (ICAO Code: FAWN) in the Western Cape.

The assessment was conducted with the objective of determining how 'glint' and 'glare' will affect aviation receptors such as pilots on final approaches to Runway 01/19 and the air traffic controllers in the air traffic control tower.

The solar PV installations, situated within the project boundary, will be both ground-based and installed on the rooftops of various buildings.

Given the proximity of the solar PV panels to the airport operations and its receptors, a comprehensive glint and glare assessment is necessary to evaluate the potential impacts on aviation safety. This assessment will consider the layout and orientation of the PV panels, the geographical features of the site, and the operational parameters of the airfield to ensure that any potential risks are adequately mitigated.

Other community receptors have not been modelled, such as the nearby suburbs and motor vehicles, as this report's focus is solely on the aviation receptors.

At certain angles, the sun may reflect light in a specular manner off the surface of the Photovoltaic panels which affect the receptors vision, thereby causing an 'after-image' or 'temporary blindness' depending on the strength of the specular reflection.

2. ASSUMPTIONS AND LIMITATIONS

The design specifications of the project were supplied by the client. The final design specifications, layout and configurations of the solar PV panels is not finalized. This report will consider a worst-case scenario of glint and glare exposure due to the installation. This will allow the developer to assess areas of concern and provide the areas within which the development of the solar PV panels will be acceptable to aviation safety, from a glint and glare perspective.

A summary of assumptions and abstractions required by the ForgeSolar analysis methodology is provided below:

- The algorithm does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results. However, the software developers have validated the models against several systems, including a PV array causing glare to the air-traffic control tower at Manchester-Boston Regional Airport and several sites in Albuquerque USA, and the tool accurately predicted the occurrence and intensity of glare at various times and days of the year.
- Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare. This primarily affects analyses of path receptors.
- Random number computations are utilized by various steps of the annual hazard analysis algorithm. Predicted minutes of glare can vary between runs as a result. This limitation primarily affects analyses of Observation Point receptors, including Air Traffic

Control Towers (ATCT's). The ForgeSolar methodology relies on an analytical, qualitative approach to accurately determine the overall hazard (i.e., green vs. yellow) of expected glare on an annual basis.

- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- The algorithm does not consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc.
- The variable direct normal irradiance (DNI) feature scales the user-prescribed peak DNI using a typical clear-day irradiance profile. This profile has a lower DNI in the mornings and evenings and a maximum at solar noon. The scaling uses a clear-day irradiance profile based on a normalized time relative to sunrise, solar noon, and sunset, which are prescribed by a sun-position algorithm and the latitude and longitude obtained from Google maps. The actual DNI on any given day can be affected by cloud cover, atmospheric attenuation, and other environmental factors such as smoke from fire, mist etc.
- The ocular hazard predicted by the tool depends on several environmental, optical, and human factors, which can be uncertain. The developers provide input fields and typical ranges of values for these factors so that the user can vary these parameters to see if they have an impact on the results.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies all year-round.
- Hazard zone boundaries shown in the Glare Hazard plot (based on Figure 3) are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Due to the final design specifications of the proposed developments not yet being finalized, a standard height of 0.5m above ground was used to model the solar PV structures. Other heights above ground were modelled in 0.5m increments up to 2.5m. The results show that the difference in height had a negligible difference in glint and glare impacts. All results in this report pertain to the 0.5m height above ground.

3. LEGAL REQUIREMENTS

In South Africa, there is limited literature and no regulatory framework with regards to the 'glint and glare' effects from solar panels in relation to airspace use. Various efforts to communicate with various authorities have been made to confirm the availability of Obstacle Notices pertaining to Solar Facilities and the Impacts of Glint and Glare.

In the absence of local regulatory requirements, the United States Federal Aviation Administration: Final Policy, Review of Solar Energy System Projects on Federally Obligated Airports of May 2021 was used as the main reference.

Within this guideline are numerous case studies of solar projects similar to this project. The FAA approved ForgeSolar software package was used to predict the effects of the glint and glare from the PV panels.

4. PROJECT DESCRIPTION

The full project description for the proposed airport expansion and auxiliary infrastructure is included in the Environmental Impact Assessment Report compiled by PHS Consulting and not repeated here. The project description in this report only pertains to the components of the project that are relevant to the Civil Aviation Glint and Glare Assessment.

Cape Winelands Airport has been operational since 1943 and currently operates under a Category 1 Aerodrome license. The current operational runways (05/23 and 14/32) are used mostly for flight training, charter, recreational flying and other unscheduled general aviation activities. The flight activity under current conditions is 100 air traffic movements per day on average.

The expansion of the Airport will facilitate commercial flight operations both internationally and domestically. As shown in the simplified layout in Figure 5 below, key components of this development are the construction of the 3.5km primary runway (FAWN Runway 01/19), the Air Traffic Control Tower with a height of 40m above ground level, the solar PV panels on the building roofs within the various precincts and the ground based solar PV installation in the southeast corner of the facility's boundary.

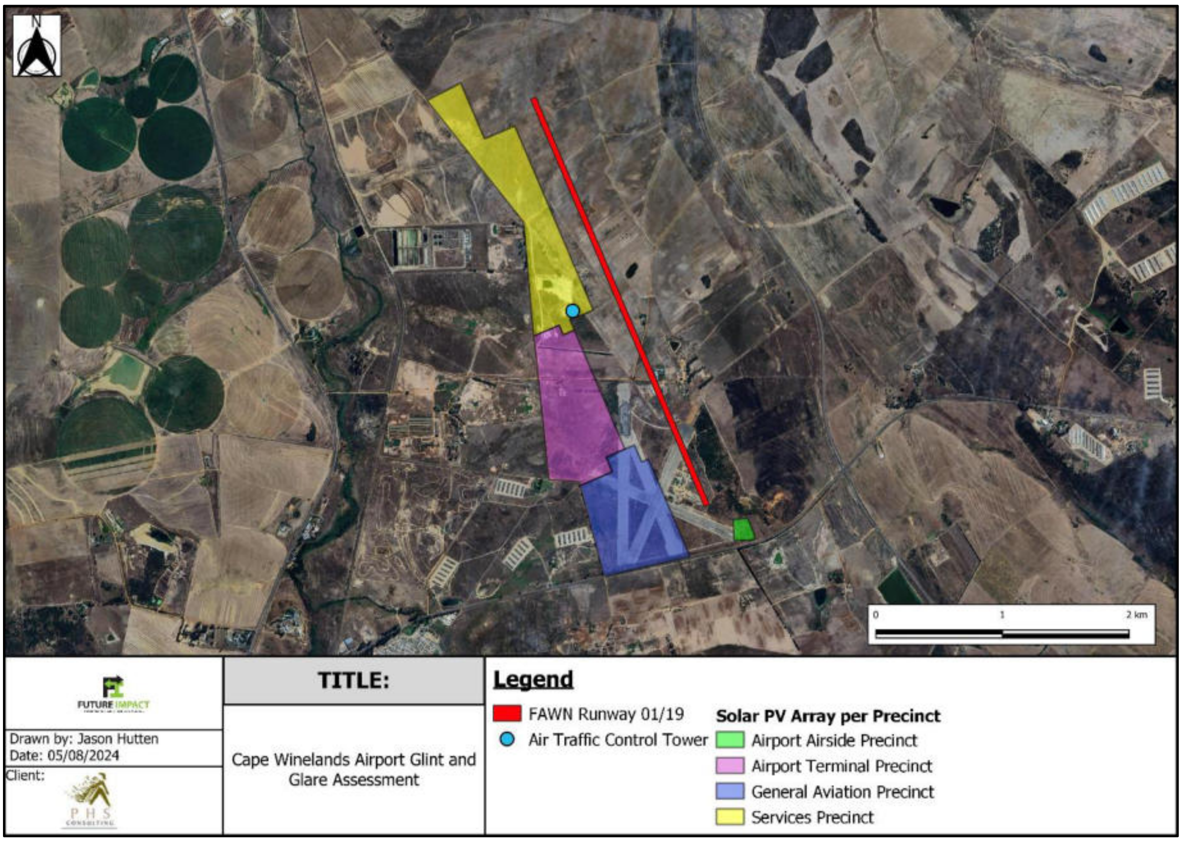


Figure 5: CWA Precinct Layout in relation to FAWN Runway 01/19.

Since the final design and layout of the Solar PV installation have not been finalized, a worst-case scenario approach has been adopted. The layout used in the model represents the maximum potential coverage of the solar PV footprint, considering all possible areas. However, this layout does not account for precise system geometry, including detailed features like gaps between modules, variations in PV array height, and support structures. These elements may influence the actual glare results. In the model, the PV array is treated as a footprint consisting of numerous infinitesimally small panels, reflecting sunlight based on the array's tilt and orientation.

The footprint shown above is based on the information extracted from the layouts supplied in the Electrical Engineering Bulk Services Design Report (Selkirk and Selkirk, 2024) dated 20 August 2024. Annexure A shows the desired layout of the solar PV arrays.

Furthermore, the exact heights above ground of the solar PV panels are not yet finalized. This required an iterative process in the modelling whereby the fixed-tilt configurations described below were modelled "on top" of buildings with heights of 5m, 10m, 15m and 20m. The ground based solar PV panels were set at a standard height of 1.5m (at the midpoint) aboveground. The results of the modelling indicate that the height of these panel has little effect on glint and glare exposure to aviation receptors.

Lastly, the orientation of the tilted solar PV panels will be dependent on the building roof design. Two scenarios were modelled:

- An orientation of 0° (i.e. the panels will face true north and be the optimal solution for energy yields).
- An orientation of 338º (the more likely orientation based on the current building layout which is the direction the building roof lines are oriented).

The fixed parameters for the modelling configurations of the Solar PV panels are as follows:

- **Tracking System**: Fixed Tilt
- **Tilt Angle:** 20º to the horizontal
- **Type of Panel Surface:** Lightly textured glass with Anti-Reflective Coating (this was used as it is the most widely available surface type on the market) with the following reflective properties:
    - Average RMS slope error (mrad) = 9.16
    - Average beam spread (mrad) = 119
    - Standard deviation of slope error = 3.17
    - Standard deviation of beam error = 38.0

5. THE RECEIVING ENVIRONMENT

The proposed project may impact on aviation receptors located in and around proposed Cape Winelands Airport Expansion. This will be a commercial aerodrome with domestic and international flights scheduled. The 3.5km asphalt primary runway 01/19 with two approach paths and 1 Air Traffic Control Tower was considered for the aviation glint and glare receptors. These receptors are labelled as follows:

- 2-Mile Approach Flight Path Receptors
    - FAWN Runway 01
    - FAWN Runway 19
- Air Traffic Control Towers
    - ATCT-1 (40m height above ground)

Note: Only manned ATCT facilities are considered. Digital Camera Towers will be installed but are not assessed in this report.

The above receptors are shown in Figure 6 below.

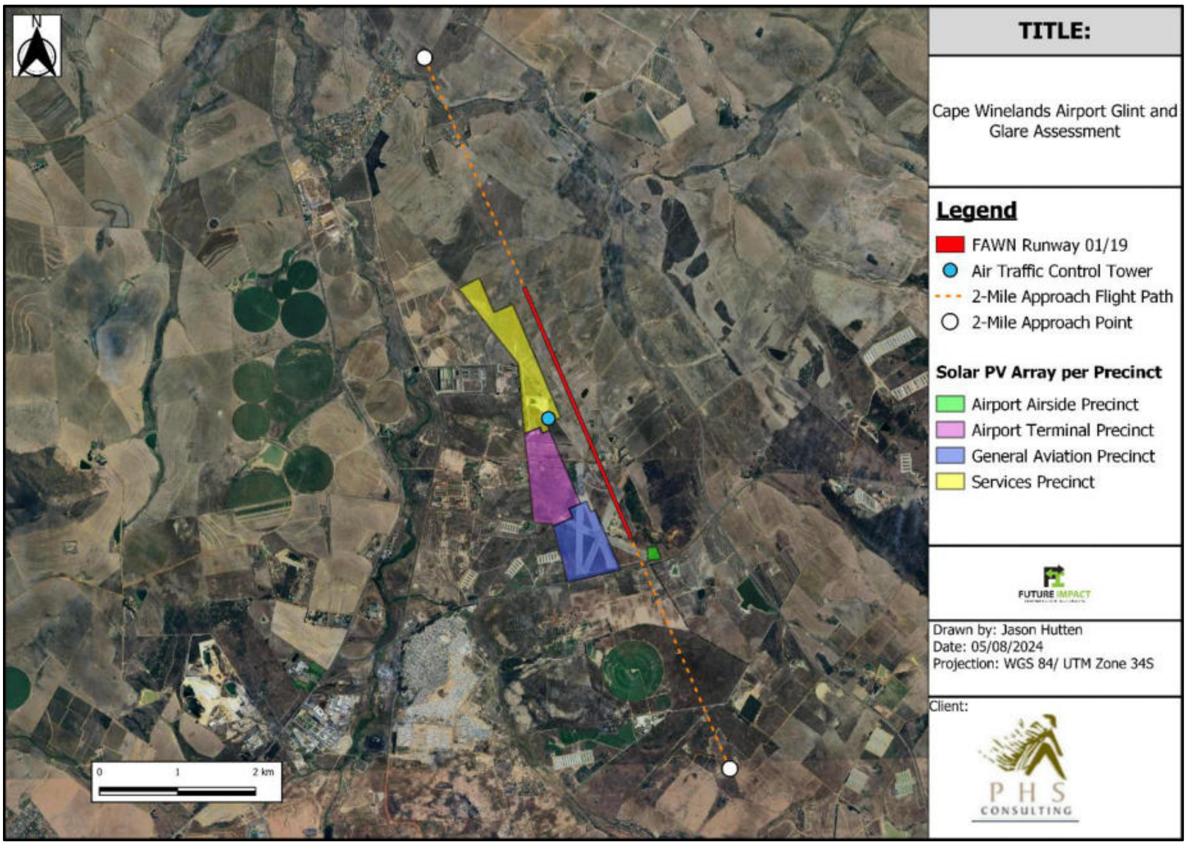


Figure 6: Receiving Environment

6. RESULTS

The modelling results indicate that receptors will experience "Green" and "Yellow" glint and glare exposure for all configurations assessed below.

The analysis parameters and observer eye characteristics were as follows:

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

6.1 Summary of Results: Panels on a Fixed Tilt Axis Orientated 0° (True North)

Table 1 – 4 below shows the annual minutes of glare exposure that can be expected at different building heights on which the solar PV arrays will be installed for panels that are orientated at 0° azimuth (True North).

Table 1: Glint and Glare Yearly Exposure Time - 5m Building Height (0° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	128 484	994	0
Total	**128 484**	**994**	**0**

Table 2: Glint and Glare Yearly Exposure Time - 10m Building Height (0° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	128 484	994	0
Total	**120 363**	**1 724**	**0**

Table 3: Glint and Glare Yearly Exposure Time - 15m Building Height (0° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	110 305	2 630	0
Total	**110 305**	**2 630**	**0**

Table 4: Glint and Glare Yearly Exposure Time - 20m Building Height (0° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	97 907	3 954	0
Total	**97 907**	**3 954**	**0**

6.2 Summary of Results: Panels on a Fixed Tilt Axis Orientated 338°

Table 5 – 8 below shows the minutes of glare exposure that can be expected at different building heights on which the solar PV arrays will be installed for panels that are orientated at 338° to True North.

Table 5: Glint and Glare Yearly Exposure Time - 5m Building Height (338° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	123 301	1 742	0
Total	**123 301**	**1 742**	**0**

Table 6: Glint and Glare Yearly Exposure Time - 10m Building Height (338° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	114 721	2 763	0
Total	**114 721**	**2 763**	**0**

Table 7: Glint and Glare Yearly Exposure Time - 15m Building Height (338° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	105 053	3 468	0
Total	**105 053**	**3 468**	**0**

Table 8: Glint and Glare Yearly Exposure Time - 20m Building Height (338° Orientation)

Receiver Name	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
FAWN Runway Approach 01	0	0	0
FAWN Runway Approach 19	0	0	0
Air Traffic Control Tower (ATCT-1)	93 664	4 065	0
Total	**93 664**	**4 065**	**0**

The modelling of the configurations described in Table 1 – 8 above shows that Green and Yellow Glare exposure will occur to receptors in the Air Traffic Control Tower for all configurations that were modelled. Yellow glare has the potential to cause a temporary after-image and is of more concern than Green Glare. Therefore, although solar panels installed on buildings with lower roof heights may be exposed to green glare for longer periods, lower heights are preferred as exposure to yellow glare is minimized. Further details of the worst-case scenario (Building height at 20m with panels orientated towards True North) are discussed below. The temporal and spatial aspects shown below will be similar to all configurations and are not repeated below so as to avoid redundancy.

Figure 7 below shows that the green glare will occur for the Control Tower (ATCT-1) receptors throughout the year in the morning hours from approximately 07h00 to 10h00. Green glare will be expected in the afternoon and evening hours throughout the year. The periods between January to May and August to November will expose the receptors to Yellow Glare in the evening time when the sun is setting at approximately 18h00.

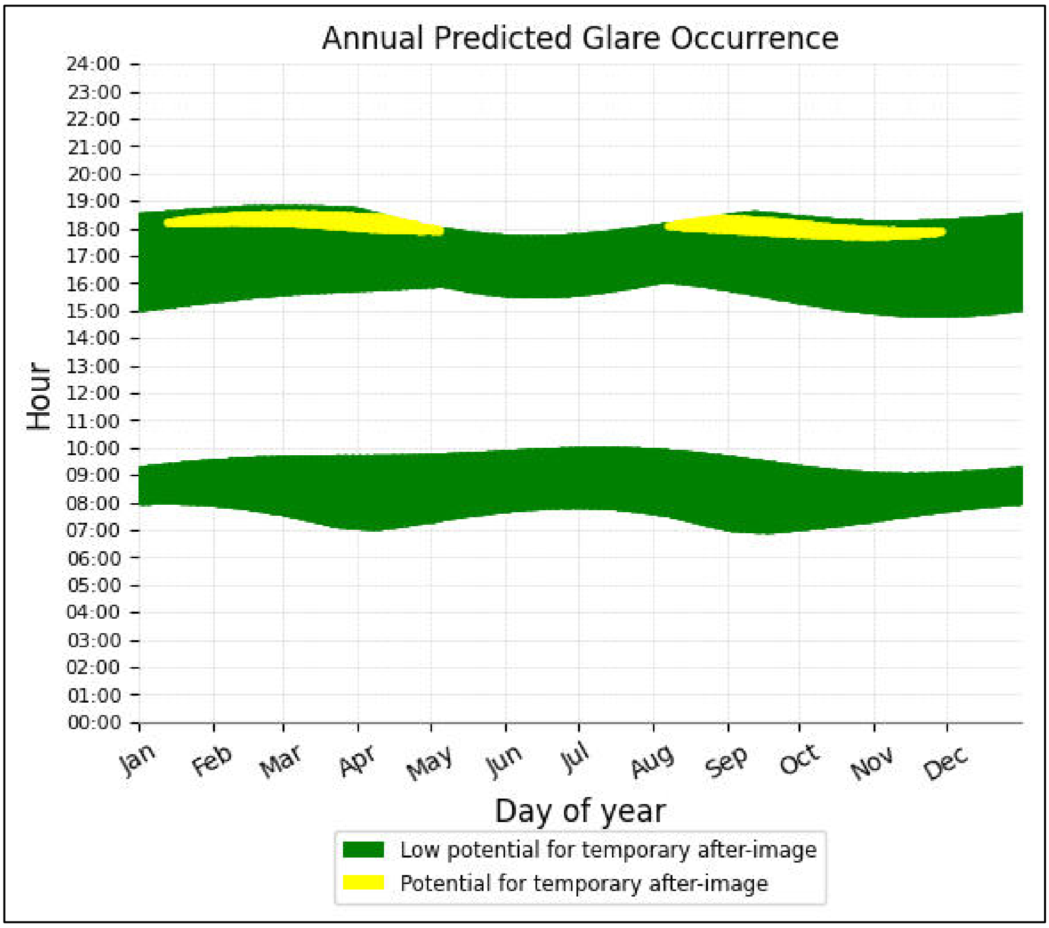


Figure 7: Annual Predicted Glare Occurrence

Figure 8 below shows the areas within the Services Precinct that will cause green and yellow glare when the sun is low on the horizon. The buildings within the area immediately surrounding the Air Traffic Control Tower should be excluded from the installation of the Solar PV panels in order to eliminate any exposure.

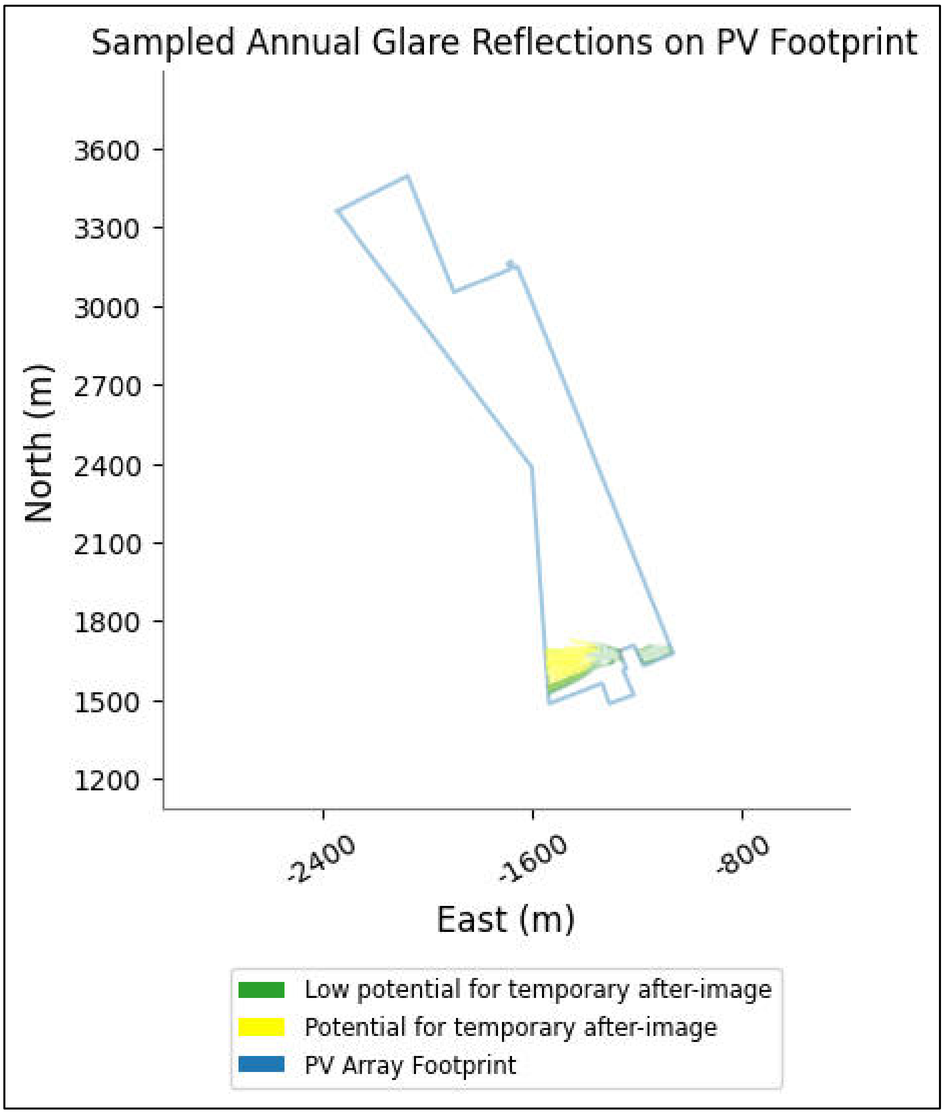


Figure 8: Reflection Areas

7. CONCLUSIONS AND RECOMMENDATIONS

The aim of this study was to determine the impact that solar glint and glare would have on various aviation receptors. The FAA model considered the 2-mile receptors on the approach to Runway 01/19 and The Air Traffic Control Tower.

The modelling results indicate that the Air Traffic Control Tower will be exposed to green and yellow glare. The aircraft on the approach paths will not be affected by the PV panels.

It is recommended that the south portion of the Services Precinct (see Figure 8) be excluded from the installation of the Solar PV panels to eliminate the exposure to the Air Traffic Control Tower.

The Glint and Glare Impacts will therefore be **Very Low** and acceptable in terms of the United States FAA Regulations if the recommendations are implemented. It is therefore recommended that the project receive authorisation from the Civil Aviation Authority from a glint and glare perspective.

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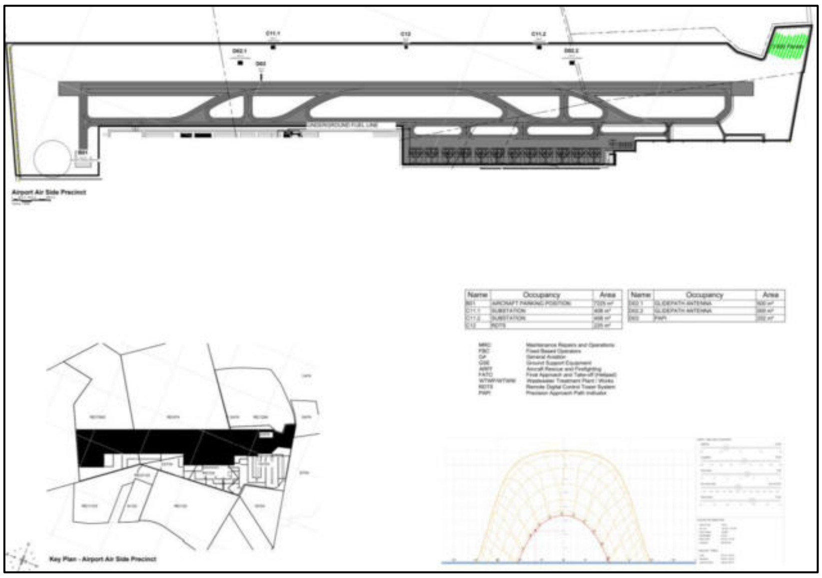
9. ANNEXURES

Annexure A: Proposed Solar PV Facility Designs (Selkirk and Selkirk, 2024)

The figures below show the desired location of the solar PV panels as described in the Electrical Engineering Report (solar PV panels in green). The four figures correspond to the three precincts and the ground-based solar PV array as assessed in this report.

Airport Airside Precinct



Airport Terminal Precinct

Services Precinct

Name	Occupancy	Area
A08	PARKING	33217 m²
B03	MRO HANGER	22981 m²
B06	AIRPORT MAINTENANCE	10041 m²
B07	CATERING BUILDING	6400 m²
B08	GSE MAINTENANCE	5997 m²
B08b	GSE	3998 m²
B10.1	FUEL FARM	6797 m²
B10.2	FUEL FARM	6797 m²
B11.1	CARGO	3500 m²
B13	ARFF	14536 m²
B14.2	OPS	7472 m²
B14a	AIR TRAFFIC CONTROL TOWER	3403 m²
B24.1	SUB STATION	260 m²
B24.2	SUB STATION	460 m²

Name	Occupancy	Area
C01	POTABLE WATER	1250 m²
C02	GROUNDWATER TREATMENT	1000 m²
C04	NON POTABLE WATER	2500 m²
C05	SOLID WASTE	1250 m²
C06	WTWW + LIFT STATION	1250 m²
C07	BIOGAS PLANT	30879 m²
C08	ESKOM INCOMING & LS SUBSTATION	8432 m²
C09	BLUE WATER	7216 m²
C10	FIREFIGHTING WATER PUMP STATION	440 m²
C13	WATER BOOSTER PUMP	1000 m²

Name	Occupancy	Area
E04.14	AIRPORT USE	4620 m²
E04.15	AIRPORT USE	9094 m²
E04.16	AIRPORT USE	10993 m²

MRO	Maintenance Repairs and Operations
FBC	Fixed Based Operators
GA	General Aviation
GSE	Ground Support Equipment
ARFF	Aircraft Rescue and Firefighting
FATO	Final Approach and Take-off (Helipad)
WTWP/WTWW	Wastewater Treatment Plant / Works
RDTS	Remote Digital Control Tower System
PAPI	Precision Approach Path Indicator

General Aviation Precinct

Name	Occupancy	Area
A03	GA/VIP/GOVERNMENT TERMINAL	6419 m²
A08.5	PARKING	10753 m²
A08.6	PARKING	2987 m²
A10.1A	FBO 1	5787 m²
A10.1B	FBO 1	1230 m²
A10.2A	FBO 2	5787 m²
A10.2B	FBO 2	1230 m²
A10.3A	FBO 4	5787 m²
A10.3B	FBO 4	1230 m²
A10.4A	FBO 3	5798 m²
A10.4B	FBO 3	1220 m²
A11.1	GA HANGERS	3200 m²
A11.2	GA HANGERS	3200 m²
A11.3	GA HANGERS	3200 m²
A11.4	GA HANGERS	3200 m²
A11.5	GA HANGERS	3200 m²
A11.6	GA HANGERS	3200 m²
A11.7	GA HANGERS	3200 m²
A11.8	GA HANGERS	3200 m²
A11.9	GA HANGERS	3200 m²
A11.10	GA HANGERS	3200 m²
A11.11	GA HANGERS	4678 m²
A11.12	GA HANGERS	4971 m²
A11.13	GA HANGERS	8512 m²
A16	GA CLUBHOUSE & FUELING	5204 m²

Name	Occupancy	Area
B11	SPECIAL CARGO FACILITY	1575 m²
B14.1	OPS	1500 m²
B17.1	ACCESS CONTROL	102 m²
B17.2	ACCESS CONTROL	100 m²
B17.3	ACCESS CONTROL	100 m²

Name	Occupancy	Area
E04.12	AIRPORT USE	8315 m²
E04.13	AIRPORT USE	4636 m²

Name	Occupancy	Area
PH.1	HELIPORT	6220 m²
PH.2	HELIPORT	6220 m²
PH.3	HELIPORT	992 m²
PH.4	HELIPORT	992 m²
PH.5	HELIPORT	8808 m²

MRO	Maintenance Repairs and Operations
FBC	Fixed Based Operators
GA	General Aviation
GSE	Ground Support Equipment
ARFF	Aircraft Rescue and Firefighting
FATO	Final Approach and Take-off (Helipad)
WTWP/WTWW	Wastewater Treatment Plant / Works
RDTS	Remote Digital Control Tower System
PAPI	Precision Approach Path Indicator