

## Development Considerations



### Why has this land been identified for the solar farm?

When determining the long-term feasibility of the proposed site of a solar farm's operations and management, the following is taken into consideration:

- Intensity and level of solar exposure;
- Proximity and direct connectivity to an existing power grid, such as transmission lines;
- Access to an existing power grid and available capacity;
- Proximity to a road network;
- Level and uniformity of surface topography;
- Proximity to industrial sites;
- Proximity to township and urban areas;
- Availability and willingness of landowner to participate.

### How does the solar farm's life-cycle work, and what happens when it comes to an end?

A solar farm project has a planning, construction, operation and decommissioning stage.

For a medium to large solar development, construction can be between 9 and 18 months.

The operational life of panels is between 25 and 30 years.

At the end of its life-cycle, planning approval may be sought to extend its life, re-fit with new technology, or decommission it.

Decommissioning involves the removal of all surface and most underground infrastructure, and rehabilitation of the footprint to the previous land use.

### What will the solar farm look like, and how will it work?

Most solar farms are single-axis solar arrays, that track the sun in an east to west direction.

Direct current (DC) power is transferred from the solar arrays (photo voltaic/PV panels) to an inverter. The inverter changes the DC power to alternate current (AC) power, and it is then transferred to an electrical sub-station. Electricity is then distributed from the sub-station to the grid via local transmission lines.

### Will the land be purchased or leased by the solar farm developer?

For most solar projects, the subject land is leased from the landowner for the entire project life-cycle, which is usually 25-30 years.

### Who is responsible for management and maintenance of the solar farm, and how will this be guaranteed?

Approval for the solar farm is subject to specific project conditions.

The developer/operator is legally bound to operate within these conditions, and is liable for all land management and operational aspects of the solar farm during the lease period.

The existing landowner may be engaged by the developer to continue land management practices on the developer's behalf.



# Environmental Considerations



## Can solar farms be constructed on agricultural land?

All land in Victoria is subject to a planning zone. Each zone establishes a range of potential land uses.

In most rural areas, renewable energy generation, such as solar energy facilities, can effectively co-exist with agricultural production. Solar energy facilities can contribute to the rural economy and support farm incomes by providing property owners with a diversified revenue stream. Non-agricultural developments may be appropriate in the Farming Zone.

## Are there harmful chemicals in the solar panels, or radiation emitted from the solar farm?

No. Most solar panels are constructed of glass (silicon), with common metals such as aluminium and copper wiring, and don't tend to contain heavy metals or other potentially toxic substances.

As few solar panels contain toxic chemicals, they pose little threat of site contamination.

The electromagnetic radiation produced from transformers and inverters is reduced through strict industry performance standards that apply to standard components.

## How will the visual impact be managed?

Visual impact to neighbouring landholders will be assessed in a visual impact assessment (VIA) undertaken in the proposal phase of a solar project. The VIA considers visibility, distance, landscape character and viewer sensitivity, and the number of receivers proposed.

Once the outcomes of the VIA are known, possible mitigations can include:

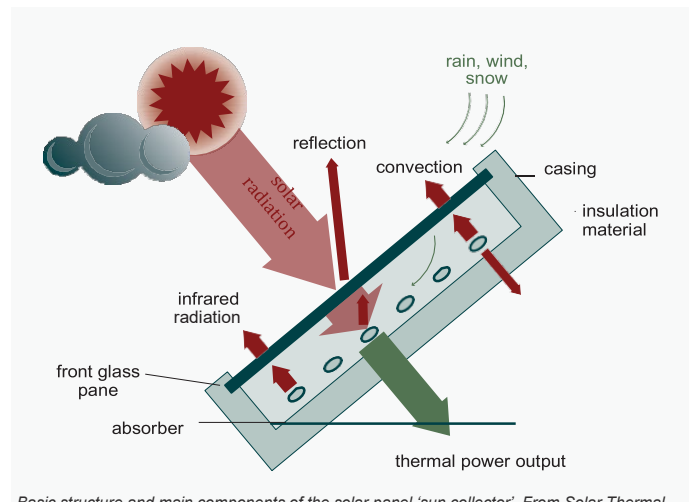
- Screening of the solar farm, using vegetation barriers;
- Using the topography of the site to reduce visibility;
- Optimising the height, siting and layout of the panel arrays and related infrastructure; and/or
- Optimising the design of fencing and other security measures.

## How much glare or reflection will be created by the solar farm?

Solar panels are designed to absorb radiation, not reflect it – they are constructed with dark-coloured materials, are covered with anti-reflective coatings, and have a rough surface texture. Typical solar panels reflect as little as 2% of incoming sunlight.

For single-axis tracking systems, there is an optimal panel tilt for solar radiation absorption (usually between 60 and 70%). This generally prevents reflection onto neighbouring properties under normal operating conditions – for example, when the sun is at the lowest point, any light reflected would be in an upward direction.

(from Solar Photovoltaic Energy Facilities: Assessment of Potential for Impact on Aviation (Spaven Consulting: January 2011, and Solar Farm Planning Expert Witness Report (Guthrie: May 2018))



Basic structure and main components of the solar panel 'sun collector'. From Solar Thermal Technology Update (Matthias et al: 2010)



# Environmental Considerations

## Will there be disturbing night lighting around the solar farm?

The main lighting related to the solar farm will be located around the built structures such as sub-stations and office buildings.

Lighting will comply with *Australian Standard 4282 – Control of Obtrusive Effects of Outdoor Lighting*, including:

- Eliminating upward light spill, directing light downwards and away from sensitive receivers;
- Use of shielded light fixtures; and/or
- Use of asymmetric beams.

## How much noise will be generated during construction and the operational stage?

Construction activities normally result in temporary and short duration increases in the noise and vibration levels at a site from earthworks, piling, site levelling, laying of concrete, installation of services etc.

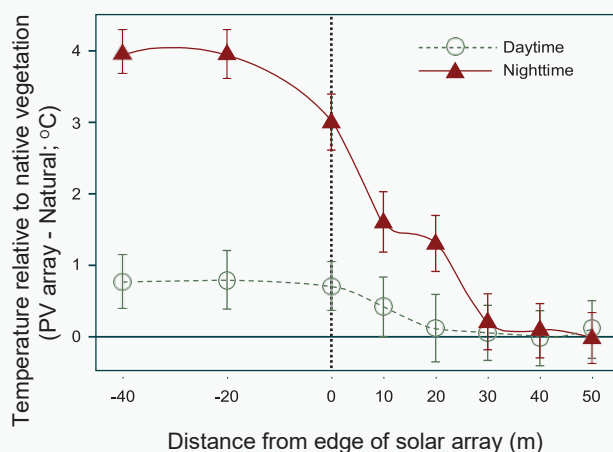
During operation, very low levels of noise are emitted from solar farms. These are usually not perceptible from adjacent land.

Noise-related management and compliance are undertaken in terms of industrial noise requirements, such as the *Australian Standard 2436 – Guide to Noise Control on Construction, Demolition and Maintenance Sites*.

## Do solar farms create a 'photovoltaic heat island effect' (PVHI)?

Several studies have been completed for utility scale solar farms to determine the presence of PVHI. The following is considered important:

- Identified temperature change may be linked to other changes noted in vegetation and moisture level;
- The degree of temperature change appears to be marginal, as well as spatially and temporally limited;
- PVHI effect was indistinguishable from air temperatures over native vegetation when measured at a distance of 30 metres from the edge of the photovoltaic array; and
- A dense vegetation buffer, from ground level to higher than the top of the highest point of the array, helps to mitigate potential PVHI effects.



(from *Statement of Evidence on Solar Heat Islanding Issues* (Barron-Gafford: May 2018))

## What is the water use on solar farms, and how is this managed?

Solar farms use very little water.

During the construction stage, water will be used for dust suppression on and around the main transport routes around the site.

During operation, water will be used to wash the solar panels 1-2 times per year to maintain panel efficiency.

Water will be accessed from the land's existing water use and delivery entitlements.

## Do solar farms create changes to surface runoff?

The framing used to hold the solar arrays has a very small footprint, and so is unlikely to have an impact on surface runoff behaviour.

In flood-prone areas, flood height would need to exceed 1 metre before anything other than the pile is affected by floodwater.

Other infrastructure (inverters/transformer units, site offices, switch room, storage shed) are built on concrete footings, usually 0.3 metres above ground level, on gravel or concrete hardstand areas. These areas are also unlikely to impact on surface runoff behaviour.

## How will the land be managed – fire, pests, animal grazing – and who will be responsible?

The solar farm will be operated and managed in accordance with the needs of similar parcels of land in the surrounding landscape.

The developer will be responsible for implementation of a land management plan throughout the operational stage, which includes at least the following:

- Pest (fauna) control;
- Weed (flora) control;
- Maintenance of vegetation (eg. ecologically sensitive areas);
- Maintenance of access infrastructure (eg. fencing, roads, water resources);
- Fire management (10 metre fire breaks); and/or
- Waste management.

## How will the solar farm's presence affect the value of the neighbouring land?

Due to the relatively new nature of solar farm development in Australia, the impact of the presence of solar farms on neighbouring land value is unclear.

Overseas studies have however indicated only limited impacts to land values.

(from *Property Value Impact Assessment* (Cohn Reznick: May, 2018))

## Will insurance and public liability costs increase on neighbouring land due to the presence of the solar farm?

Two of the main factors affecting the cost of your insurance will be the type of business you run, along with the size of your business.

As with all forms of insurance, public liability is ultimately price based on the perceived risk of your business, and not that of adjacent land uses.

Like neighbouring landholders, the solar farm owners will be required to hold relevant insurance and public liability for the solar farm operations.

## Social Considerations



### How will truck and other construction movements affect day-to-day community activities?

A Traffic Management Plan is a key component of the management of solar farm development.

This plan will include (at a minimum):

- Pre-conditioning survey of relevant sections of the existing road network;
- Designated routes and vehicle access;
- Traffic controls (speed limits, signage, school bus routes, etc.);
- Procedures for informing the public where road access could be restricted;
- Periodic road improvements and land closures, as required;
- Carpooling/shuttle bus arrangements for site workers to minimise vehicle numbers;
- Scheduling of deliveries; and
- Procedures to monitor traffic impacts.

### How will dust from construction activities be managed?

Solar farm development will result in the removal of vegetation and possibly some reshaping of landscapes. This can create land disturbance, making soil vulnerable to erosion. Soil removed by erosion may become airborne as dust or be carried into waterways causing pollution.

Mitigations can include:

- Watering of unsealed roads during periods of heavy truck movement, as well as of temporary soil stockpiles and areas of cleared vegetation; and/or
- Planting of vegetation barrier (a dual visual mitigation function).

### Will there be opportunities for employment, and what are the main job types that will be needed?

Yes, and the main employment opportunities will occur during the construction stage. During the operational stage, 1-3 full-time jobs will be available for solar farm management and maintenance.

The main job types will include:

- Landscape management;
- Fencing;
- Road maintenance/grading;
- Security;
- Electrical and mechanical engineering; and/or
- Hygiene site support.

Use of a local skilled workforce is preferred.

For people interested in possible work opportunities, they are encouraged to make direct contact with the project developer, should the project be approved.

### Will the energy that is generated on the solar farm result in local electricity cost reductions?

No. The energy generated from the solar farm will connect into the State electricity network.

Electricity generated from the solar energy facility will be transported via high voltage transmission lines to large industrial energy users and to low voltage electricity distribution networks in each region, which deliver electricity to homes and businesses.