

Draft Queensland solar farm guidelines: Guidance for local governments

March 2018

© State of Queensland, March 2018. Published by the Department of State Development, Manufacturing, Infrastructure and Planning, 1 William Street, Brisbane Qld 4000, Australia.



Licence: This work is licensed under the Creative Commons CC BY 4.0 Australia Licence. In essence, you are free to copy and distribute this material in any format, as long as you attribute the work to the State of Queensland (Department of State Development, Manufacturing, Infrastructure and Planning) and indicate if any changes have been made. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Attribution: The State of Queensland, Department of State Development, Manufacturing, Infrastructure and Planning.

The Queensland Government supports and encourages the dissemination and exchange of information. However, copyright protects this publication. The State of Queensland has no objection to this material being reproduced, made available online or electronically but only if it is recognised as the owner of the copyright and this material remains unaltered.



The Queensland Government is committed to providing accessible services to Queenslanders of all cultural and linguistic backgrounds. If you have difficulty understanding this publication and need a translator, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone the Queensland Department of State Development, Manufacturing, Infrastructure and Planning on 13 QGOV (13 74 68).

Disclaimer: While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained within. To the best of our knowledge, the content was correct at the time of publishing.

Any references to legislation are not an interpretation of the law. They are to be used as a guide only. The information in this publication is general and does not take into account individual circumstances or situations. Where appropriate, independent legal advice should be sought.

Contents

Contents	3
Introduction	4
1.1 Background	4
1.2 Purpose of the guideline	4
2.0 Solar farms – an overview	4
2.1 Grid connection	5
2.2 Energy storage systems	6
3.0 Local government considerations for solar farms	6
3.1 Research	6
3.2 Meeting the state’s plan-making requirements	7
3.2.1 The state planning instruments	7
3.2.2 Use definitions in the Planning Regulation 2017	7
3.2.3 Strategic framework.....	8
3.2.4 Categories of assessment	9
3.2.5 Zones	9
3.3 Drafting assessment benchmarks	10
3.3.1 Addressing competing land uses	10
3.3.2 Glint and glare	11
3.3.3 Visual amenity	12
3.3.4 Traffic and transport.....	12
3.3.5 Noise	13
3.3.6 Flooding and stormwater	13
3.3.7 Other impacts	14
4.0 Development assessment	14
4.1 Conditions for solar farms	14
4.2 Other approvals and agreements	15
5.0 Supporting information	17

Introduction

1.1 Background

The Queensland Government is committed to a target of growing renewable energy generation to 50 per cent by 2030.

Queensland has a natural advantage in developing its solar industry, given its strong solar resources, particularly in areas located close to existing electricity network infrastructure and major population centres.

The provision of solar energy on a commercial scale is a relatively new industry in Australia. However, Queensland is experiencing significant investment in large-scale solar generation, with over 40 solar farm projects approved as of December 2017, representing over 5000 megawatts (MW) of renewable energy generation.

Local governments can support this emerging industry by identifying suitable areas for these developments and establishing appropriate planning provisions in their planning instruments.

1.2 Purpose of the guideline

This guideline is intended to provide local governments with information on plan-making and development assessment to assist their role as assessment manager for large-scale solar farm applications. For the purposes of this guideline, a large-scale solar farm refers to a solar photovoltaic (PV) facility that generates over five MW of electricity for supply to an electricity grid. Solar PV is the type of technology typically used by solar farms in Queensland.

The guideline is not intended as an extensive resource on solar farm development and operation. Rather, the intention is to provide an overview of the planning issues that a local government may wish to investigate when drafting or amending a planning scheme. As solar farms are a relatively new industry in Queensland, local communities may not yet understand their operation and what are actual and perceived impacts. The guideline may also be used to inform local government advice to communities on solar farm impacts, and how these impacts are considered as a part of planning scheme amendments and the development assessment process.

The Department Natural Resources, Mines and Energy (DNRME) guideline, Queensland Solar Farm Guidelines: practical guidance for communities, landowners and project proponents, provides further advice for solar farm proponents and communities.

This guideline supports the [State Planning Policy](#) (SPP) and associated SPP state interest guidance material for energy and water supply.

2.0 Solar farms – an overview

To provide context for plan-making, a broad overview of the key components of a solar farm are provided. Further details on solar farm components will be available in DNRME guidelines.

Currently, most solar farm developers in Queensland use PV technology, which consists of mounted PV solar panels that convert sunlight into electric current using semi-conducting materials.

The electricity generated must be used as it is generated or converted into another form of energy that can be stored. Unlike traditional power sources that provide a constant supply of electricity, solar power generation may be intermittent as it can be affected by climatic conditions such as cloud cover.

Solar farms are a long-term land use, with a lifespan of 20 years or more depending on the productivity of the PV solar panels and other components, the climatic conditions and ongoing maintenance of the solar farm. While no solar farms have reached decommissioning in Queensland, international literature indicates decommissioning plans typically require the removal of infrastructure and land remediation.

The physical size of a solar farm will depend on the available solar resources, climatic conditions and intended capacity of the solar farm. These factors in turn affect the technology and mounting infrastructure used, the electrical infrastructure used for connection to the grid and/or energy storage.

Solar farms are typically located in rural areas because of the availability of large sites in single ownership, reduced cost of land and increased separation from sensitive urban areas.

A solar farm that connects to an electricity grid generally consists of:

- **PV solar arrays attached to a mounting structure:** Collections of solar panels, known as solar arrays, are attached either to fixed tilt mounts or trackers which are designed to follow the sun's movement to maximise sunlight absorption. The type of system chosen is relevant to the size, scale and co-location opportunities of the solar farm. For example, larger spacing (i.e. more land) is required for tracker systems (which rotate on axes) to account for their movement and to avoid shading as they track the sun
- **electrical infrastructure:** PV solar panels produce a direct current (DC) which must be converted to alternating current (AC) by an inverter system and fed through a transformer to increase the voltage to a level suitable to connect to an electricity grid. Electrical infrastructure for a solar farm typically includes an inverter system, transformer, substation, overhead transmission lines and/or underground cables
- **other infrastructure and activities:** These typically include maintenance activities and infrastructure such as buildings, security (such as security fencing and alarm installations), and access (such as vehicle tracks for the operation and ongoing maintenance of the solar farm). Workers' accommodation and energy storage systems may also form part of the solar farm. Further discussion about these parts is included in this guideline in section 3.1.2 – Use definitions in the Planning Regulation 2017.

2.1 Grid connection

A grid connection is essential for ensuring a solar farm's viability. The grid connection process also assists in safeguarding network stability, performance and system security. The process is regulated by the Australian Energy Market Operator (AEMO) and the National Electricity Rules. It requires a separate application to AEMO and is not included in the development application assessed by local government.

It is common for development applications for solar farms to be assessed without a confirmed grid connection, as it may not be possible to specify or finalise grid connections at the time of the assessment. The final design and connection point may change resulting from technical studies and advice provided as part of the grid connection process. Early discussions between the network service provider and the

applicant may assist the applicant in determining the feasibility of a future grid connection and avoid a later change to the application or approval. Local governments should use the pre-lodgement process to encourage applicants to seek this advice.

2.2 Energy storage systems

As electricity must either be consumed as it is generated or stored, solar farm proponents may introduce energy storage capabilities in addition to or instead of connection to an electricity grid.

Anecdotal evidence suggests that electrochemical battery storage is currently favoured due to its modular design which allows a facility to increase its storage. Energy storage systems are advancing with technology, and other current options include mechanical flywheels that harness rotational energy, compressed air energy, thermal energy storage and pumped hydro-power storage systems.

3.0 Local government considerations for solar farms

The growth in solar farm projects provides local governments with an opportunity to consider how they wish to deal with solar farms and renewables in their planning schemes.

3.1 Research

Each local government should consider what information it needs to make an informed decision about solar farms and its community. Research may include an examination of the history of solar developments within the area and discussions with neighbouring local governments to gain insight into their experiences with these developments. Visiting established solar farm sites or solar farms that are currently under construction may be beneficial to help inform an understanding of impacts and benefits. Seeing 'real life' examples should also help the process of understanding whether the standard suite of local government conditions can deal with the impacts of this type of development or whether new conditions will need to be drafted.

There are several mapping resources that provide information on the suitability for land for solar development and can assist in anticipating where there is likely to be greater demand for solar development. These mapping resources factor in land characteristics, proximity to the grid and other supporting infrastructure, current land uses and climatic conditions for example Australian Renewable Energy Mapping Infrastructure (AREMI) mapping, electricity generation mapping, and the State Planning Policy state interest mapping. Links to these resources are provided in section 5.0 of this guideline (Supporting Information).

Mapping may also assist local governments wishing to attract solar development to their areas as they can help identify where solar farms can be supported on a local government scale. Suitable sites or areas can then be assessed further for their suitability and if approved, can be identified in the planning scheme to assist in attracting investment and provide greater certainty about these developments.

The types of factors a local government should consider when undertaking a solar farm site/area suitability assessment are:

- **land characteristics:** relatively flat land, low flooding risk, low hazard risk (natural hazards or otherwise)

- **competing land uses:** e.g. avoiding Agricultural Land Classification (ALC) Class A and Class B land, Important Agricultural Areas, and land with other constraints such as biodiversity
- **distance to the grid:** typically a five kilometre distance to the electricity grid is needed for a solar farm to be economically viable. Discussions with network service providers may assist in determining proximity to future transmission and distribution corridors
- **efficient, effective and innovative infrastructure use:** consider opportunities for infrastructure integration, co-location or use of existing infrastructure e.g. the Kidston Renewable Energy Hub will include wind, solar and pumped hydro technology on the former Kidston gold mine. The Kidston solar project phase one was constructed on the former tailings storage facility. The site also has remaining infrastructure such as existing transmission line, substation, access road, storage facility and airport strip
- **climatic conditions:** high solar irradiation levels, low annual rainfall and low cloud coverage

Local government may also consider brownfield sites, contaminated land, land fill or less productive agricultural land as areas for solar farm investigation.

Alternatively, innovative approaches and co-location may reduce the need for significant land areas. For example, the Jamestown solar farm in South Australia 'floats' on a wastewater treatment facility. This arrangement addresses water quality issues for treated wastewater as it prevents water evaporation and outbreaks of blue-green algae.

3.2 Meeting the state's plan-making requirements

3.2.1 The state planning instruments

Under the *Planning Act 2016*, a local government must consider the state's land use planning interests defined in the state planning instruments when making or amending its planning scheme. The state planning instruments are the SPP and any regional plan relevant to the local government area.

The energy and water supply state interest in the SPP July 2017 includes a policy that local government is to enable the development and supply of renewable energy (such as solar farms) at the regional, local and individual scale in appropriate locations. A regional plan provides the regional context for the state interest policies. There are likely to be other relevant state interests in the local government area that will need to be balanced against this interest, such as agriculture, biodiversity, and cultural heritage.

The SPP does not prioritise one state interest over another, so solar farms should not necessarily be prioritised over other land uses. Local government plan-making should balance the merits of supporting solar farms and any potential impacts against the economic, environmental and community aspirations for the local government area.

3.2.2 Use definitions in the Planning Regulation 2017

The Planning Regulation 2017 provides the use terms that must be included in local government planning schemes. These use terms apply to the extent of any inconsistency with the planning scheme. Solar farms fall under the use term 'renewable energy facility', being:

- a) the use of premises for the generation of electricity or energy from a renewable

- energy source, including, for example, sources of bioenergy, geothermal energy, hydropower, ocean energy, solar energy or wind energy; but
- b) does not include the use of premises to generate electricity or energy to be used mainly on the premises.

Workers' accommodation and energy storage systems may also form part of the solar farm but are not included in the definition of renewable energy facility. It is for a local government to determine if these uses are ancillary to the use of the solar farm or require separate development applications.

The electricity infrastructure required to connect renewable energy facilities to the network will be separately defined and the impacts of this infrastructure will also need to be assessed by a local government. The infrastructure is generally defined under the Planning Regulation 2017 use term 'major electricity infrastructure', being:

- a) the use of premises for—
 - (i) a transmission grid or supply network; or
 - (ii) a telecommunication facility, if the use is ancillary to the use in subparagraph (i); but
- b) does not include the use of premises for a supply network or private electricity works stated in schedule 6, section 26(5), unless the use involves—
 - (i) a new zone substation or bulk supply substation; or
 - (ii) the augmentation of a zone substation or bulk supply substation that significantly increases the input or output standard voltage.

There may be instances where the infrastructure required to connect to renewable energy facilities to the network is considered 'minor electricity infrastructure'. This use term is defined under the Planning Regulation as:

Development for a supply network or for private electricity works that form an extension of, or provide service connections to, properties from the network, if the network operates at standard voltages up to and including 66kV, other than development for—

- (a) a new zone substation or bulk supply substation; or
- (b) the augmentation of a zone substation or bulk supply substation that significantly increases the input or output standard voltage.

Minor electricity infrastructure is development that a local planning scheme is prohibited from stating is assessable development.

3.2.3 Strategic framework

The strategic framework of the planning scheme sets the policy direction and provides a basis for ensuring appropriate development occurs at the right time and in the right location in the local government area. Local governments should review what the strategic statement currently says about renewable energy in the local area and if it reflects current community needs and sentiment.

The strategic framework may be amended to reflect the local government's policy position on renewable energy development. For example, renewable energy could be encouraged through renewable energy hubs that support the co-location of industries or identifying renewable energy opportunities during the master planning of new communities, such as solar generated electricity at the building scale or ensuring large-scale renewable energy facilities.

Note that the *Planning Act 2016* allows for policy positions in a strategic framework to be a consideration in development assessment where solar farms are impact

assessable development. The strategic framework cannot be used to assess code assessable development applications as this assessment is bounded by the assessment benchmarks and any matters prescribed by regulation. Also, policy positions in the strategic framework cannot prohibit development—this is the role of the Planning Regulation 2017.

3.2.4 Categories of assessment

Local planning schemes should prescribe both a category of development and a category of assessment for all components of solar farms. This enables the community and proponents to have certainty about the type of assessment process and level of public consultation that will occur when a development application is lodged. If a category of assessment is not prescribed, or if a renewable energy facility is an undefined use (such as in an older planning scheme), the planning scheme may default to accepted development and could proceed without requiring a development application, unless the planning scheme states otherwise.

In determining what category of assessment is appropriate for solar farms, local governments should consider the strategic intent of the planning scheme, together with the expected level of impact and community sentiment towards solar farms. While formal feedback on solar farms and solar farm development will be gained through consultation on an amendment to the planning scheme or a development application, a local government may wish to consider other forums or ways to gauge the community's views on solar farms earlier in the process and in a less formal way.

As for all uses in a planning scheme, the category of assessment for solar farms can vary within a local government area. Code assessment may be applied in areas that the local government has identified as appropriate for solar farms (as per section 3.1 of this guideline) for example, co-location with similarly large-scale utility infrastructure. Impact assessment may be applied in areas where a local government prefers an increased level of assessment and public notification, as the use is contrary to the intent of the zone or is unforeseen in that locality.

3.2.5 Zones

Renewable energy facilities such as solar farms are typically located in rural zones. The Planning Regulation 2017 provides the zones and zone purpose statements that must be used in planning schemes.

The purpose of the rural zone is to:

- (a) provide for rural uses and activities; and
- (b) provide for other uses and activities that are compatible with:
 - (i) existing and future rural uses and activities; and
 - (ii) the character and environmental features of the zone; and
- (c) maintain the capacity of the land for rural uses and activities by protecting and managing significant natural resources and processes.

Local government may also include zone overall outcomes to provide more detail about the development outcomes local government is seeking. While the zone overall outcomes must be consistent with the purpose statement of the zone, this is an opportunity to clarify whether solar farms or other renewable energy facilities are supported in the rural zone. This may include, for example, explaining how other uses and activities may be compatible with a rural use and activity or specifying what outcomes should be delivered when protecting significant natural resources.

Alternatively, local government may seek to amend the zone purpose statement when

making or amending a planning scheme according to the process identified in the Minister's Guidelines and Rules. For example, if a solar farm is not supported in rural zones in the local government area.

The rural zone code should provide relevant assessment benchmarks to manage impacts on the agricultural land and other rural uses in that zone. This may include provisions which seek to ensure the solar farm is compatible with the landscape character of the area and that it does not compromise the long-term use of the land for rural purposes.

Things to consider when preparing or amending a local planning instrument:

- What does the strategic framework currently say about renewable energy development, including solar farm development?
- What is known about the possible benefits or impacts of solar farm development on other land uses in the local government area?
- What is known about the possible benefits or impacts of solar farm development on the local economy, environment, community and culture?
- How does this position support the SPP and any relevant regional plan?
- What are the community's views about solar farms?
- What are the community's views about non-rural uses in the rural zone, when these are supported/not supported?
- How do existing categories of assessment reflect the community's expectations as to how solar farms are assessed and consulted on? What may need to change?
- If the local government wishes to support solar farms, how can appropriate sites for solar farm development be identified in the planning scheme?

3.3 Drafting assessment benchmarks

Local government should consider if its existing planning scheme and assessment benchmarks sufficiently address the different aspects of a solar farm. Using the plan-making process avoids strategic land use decisions being determined by individual development applications.

3.3.1 Addressing competing land uses

Local governments will have to balance solar farm development against a number of other existing uses or matters such as agriculture, mining, extractive industry, cultural heritage and biodiversity.

A planning scheme should already contain information about how these matters are supported or not supported in different locations in a local government area, but with the introduction of this new use there may be benefits to revisiting these sections in the planning scheme to ensure the intent reflects current community needs and sentiment.

Agriculture is provided as one example of a land use whose provisions may need to be reviewed by a local government when considering solar development in the area.

Example: Agriculture

- What are the community's views about agricultural uses and their importance in the community?
- How does the planning scheme support the community's view?
- What research do we have or do we need about the contribution of this use to the

community?

- How does the planning scheme identify and protect agricultural land (ALC Class A and B land, Important Agricultural Areas, strategic Cropping Land, Priority Agricultural Areas etc.) from non-rural uses?
- How does the planning scheme consider and protect against non-rural uses that may result in the fragmentation of ALC Class A and B land?
- How does the planning scheme identify and protect existing agriculture-related infrastructure such as drainage, irrigation or stock routes?
- How does the planning scheme support opportunities for coexistence with development that is complementary to agricultural uses?
- How does the planning scheme review operational management practices to reduce impacts on the land and impacts on adjoining agricultural operations (avoiding or limiting chemical use, soil management, overland flow controls)?
- How does the planning scheme ensure construction management practices minimise impacts on soil quality? For example:
 - storage of excavated soils and replacing these as part of decommissioning
 - opting for removable options for foundations for PV solar arrays, such as ground screws instead of buried concrete foundations
 - site configuration and material selection to avoid land fragmentation and to preserve overland flow
- How does the planning scheme require decommissioning activities such as removing infrastructure, appropriate disposal, recycling or reuse of components prior to the cessation of the use?

3.3.2 *Glint and glare*

PV solar panels are designed to have low levels of reflectivity enabling as much light as possible to be absorbed thereby increasing electricity production and efficiency. To limit reflection, PV panels are constructed of dark, light-absorbing materials and covered with an anti-reflective coating. The metal frames and mounting structures for panels may have glint and glare impacts, although these components are usually covered by the solar panel itself or limited to a small surface area.

While glint and glare impacts should be considered on a case-by-case basis, reflectivity assessments, including those assessing potential impacts to state-controlled roads and aviation infrastructure, typically find minimal to no risks. Some planning schemes may already contain code provisions that assess amenity impacts such as those caused by glint and glare, for instance through a rural zone code. Therefore, if the applicable codes are considered sufficient, no changes may be needed to the planning scheme to address this issue.

However, a local government may wish to consider the following to check glint and glare is sufficiently addressed under existing planning scheme provisions:

- Which planning scheme provision deals with glint and glare from a development of this nature and scale?
- How do existing planning scheme provisions address the potential for glint and glare resulting from the types and scales of development relevant to solar farms? What gaps in assessment benchmarks need to be addressed, and how?
- How does the scheme identify the circumstances in which a glint and glare assessment will be required? How can the requirements of what must be covered in a glint and glare assessment be made clearer? What more does the scheme need to address?

- How do mitigation measures in the planning scheme balance the level of risk presented by glint and glare with the viability of the development?
- How flexible is the planning scheme in dealing with applications where mitigation measures are unnecessary, for example where a solar farm is not located near sensitive uses and operational infrastructure (roads, aviation), and can be integrated into the existing landscape?

3.3.3 Visual amenity

In comparison to wind farms, solar farms have a low profile that typically does not exceed two metres above ground level. Visual amenity may be a consideration if the solar farm is to be located close to an area with high scenic amenity. The impact of a solar farm on visual amenity may be caused by the appearance of large-scale site cover, in contrast to an area of high scenic amenity. Given the highly subjective nature of this impact, not every solar farm proposal will require a visual impact assessment.

Landscape mitigation measures typically include:

- establishing a setback distance from boundaries with sensitive receptors or areas of high scenic amenity to allow boundary vegetation
- retention of existing mature boundary vegetation or landscaping boundaries of the solar farm where there is an interface to a sensitive receptor or area of high scenic amenity.

Typically, a planning scheme will already include provisions to ensure new development avoids, minimises or mitigates impacts to areas of identified high scenic amenity. If the planning scheme already includes provisions that address the impact of solar farm impacts on visual amenity, no changes may be required. Local governments should check the planning scheme codes.

However, a local government may wish to consider the following when preparing or amending a local planning instrument to ensure solar farms are appropriately considered:

- How do planning scheme provisions identify and protect areas of high scenic amenity (e.g. through overlays and/or local area plans)? Are these provisions sufficient to mitigate the impacts associated with solar farms?
- How do planning scheme provisions identify any landscape values and characteristics that need to be protected?
- How do planning scheme provisions send clear signals to applicants about when a visual impact assessment would be required to protect these values and characteristics?
- What planning scheme provisions need to be included to ensure development avoids or mitigates impacts to visual amenity?
- How are mitigation measures commensurate with the level of risk/impact on visual amenity for the scale of the project e.g. are there circumstances where mitigation measures are unnecessary?

3.3.4 Traffic and transport

The main impacts from solar farms on transport infrastructure and traffic occur during the construction phase of the project. During the operational phase, the road network is used to transport operational staff and maintenance equipment and plant (i.e. water trucks for cleaning of panels, repair equipment) to the site. Typically, this involves a small amount of daily vehicle movements involving light vehicles.

Planning scheme codes should already include adequate provisions to ensure new development avoids, minimises or mitigates impacts on local roads. Therefore, there may be no changes needed to the planning scheme to address this issue. Local government may also refer to the Department of Transport and Main Roads guideline, *Guide to Traffic Impact Assessment 2017* for further information on how to assess the traffic impacts of a proposed development (see section 5.0 of this guideline – Supporting information for a link the *Guide to Traffic Impact Assessment 2017*).

Things to consider when preparing or amending a local planning instrument:

- Which planning scheme provisions deal with traffic impacts from a development of this nature and scale?
- Can existing planning provisions adequately address any adverse impacts on the safety and efficiency of local transport networks resulting from this type and scale of development?

3.3.5 Noise

Solar farms have relatively low noise emissions resulting from the operation of electrical equipment and maintenance activities. The primary source of noise from solar farms is during the construction phase of the project.

Things to consider when preparing or amending a local planning instrument:

- Can existing planning provisions adequately address any adverse impacts of construction and operation resulting from this type and scale of development?

3.3.6 Flooding and stormwater

Solar panels are impervious structures and at most times of the day will be in a position that allows water to fall or run off directly onto the ground. Due to the increase in impervious area, there is a potential for increased run off on the site and from the site.

Hydrological assessments should be undertaken during the assessment phase to determine site and off-site impacts, influence design and mitigation measures. Typically, local government planning schemes contain well-developed provisions around stormwater management.

Mitigation measures relate to site selection and design, such as maintaining existing contours and overland flow characteristics of the pre-developed site, as well as operational controls such as raising electrical and other susceptible equipment above the modelled flood level for the site. Solar farms can provide beneficial outcomes, for example, the collection of overland flow for the purposes of irrigation or stock watering for neighbouring agricultural uses.

Things to consider when preparing or amending a local planning instrument:

- Which planning scheme provisions deal with flooding and stormwater impacts from a development of this nature and scale?
- How has the proximity of solar farm infrastructure to areas with a potential flooding or stormwater management risk, water resource catchments and water supply buffer areas been considered?
- How do existing planning scheme provisions appropriately avoid or mitigate the risk to people, property and infrastructure from this type and scale of development within a flood hazard area?
- Do existing planning schemes adequately address flooding and storm water issues

for this type and scale of development to avoid or minimise impacts on environmental values?

3.3.7 Other impacts

There are several other potential impacts from solar farms that may be raised as issues in the development assessment process, including whether solar farms cause electromagnetic radiation/interference or whether solar farms create a 'heat island effect'.

There are limited studies on these potential impacts at present, particularly in the context of Queensland. Local governments may wish to conduct their own independent research and consider new research as this emerges. In the interim, the following provides a brief overview on these potential impacts for consideration:

- **Electromagnetic radiation/interference:** electromagnetic radiation (EMR) is a form of energy transfer as a stream of particles or electromagnetic waves. Exposure to EMR can occur on a daily basis as it is generated by a number of common household appliances, such as microwaves, televisions, computers and mobile phones.

In the context of solar farms, EMR has the potential to be generated from infrastructure associated with a solar farm such as grid connection lines, underground network cabling, electrical transformers, inverters and substations.

EMR is classified according to its frequency or wavelength i.e. Extremely Low Frequency (ELF), Very Low Frequency (VLF), Radio Frequency (RF) and Microwave (MW). The majority of infrastructure associated with solar farms fall under the ELF radiation classification with negligible to immeasurable emissions. Due to the negligible electromagnetic radiation produced by solar farms and related infrastructure, no specific mitigation measures are required beyond compliance with normal electrical safety practices and standards.

- **Heat island impact:** there are claims that large-scale solar farms may produce higher than average temperatures when compared to their surrounding environment. This phenomenon is known as the 'heat island effect'. While the heat island effect is known to exist in large urban areas, the same impacts resulting from large-scale solar farms are not currently known in the Queensland context as no studies have been undertaken in Australia or more specifically Queensland. Given the limited evidence-based risks around the heat island effect caused by solar farms, mitigation measures are not considered necessary at this time.

4.0 Development assessment

4.1 Conditions for solar farms

The following section provides guidance to local governments on key matters to consider when conditioning development approvals for solar farms. It is acknowledged that most local governments will already have a suite of standard conditions that are applied to development approvals, however it may be worthwhile reviewing these conditions in light of this new type of development. As stated earlier, it would also be beneficial for the local government to undertake its own research by visiting existing facilities or those under construction to better understand the types of impacts of these facilities may have on the community. While every site and solar farm will be different, conditions of approval should typically consider the following key matters:

- 1) **Construction management:** The management of construction impacts is a fundamental matter to be considered when imposing conditions. Where the scale of construction activities is likely to result in adverse impacts to amenity, the integrity of infrastructure, or road safety and efficiency, conditions relating to construction management may be warranted. Conditions relating to construction impacts generally cover erosion and sediment control, hours of construction, noise, air quality, access and traffic, roadworks and earthworks. The submission of a construction environmental management plan may also be requested by a local government as part of an operational works application to demonstrate compliance with local government standards relating to construction of the facility.
- 2) **Access, car parking and traffic management:** Vehicle access is an important consideration for any development. Conditions relating to the provision of access and car parking on the site should clearly set out applicable design specifications and locations by referencing approved plans and standards.
- 3) **Stormwater management:** Stormwater impacts have the potential to adversely affect adjoining properties and catchments. Consequently, local government should consider imposing conditions to ensure that solar farms do not adversely interfere with the existing hydrological regime of adjoining properties or catchments. Conditions for stormwater management typically require stormwater run-off from roof and impervious surfaces to be collected internally and directed to a lawful point of discharge and may require compliance with an approved stormwater management plan.
- 4) **Erosion and sediment control:** To complement stormwater management conditions, erosion and sediment control conditions typically require prevention of contaminants like sediment and siltation from entering sensitive waterways. This is normally achieved by requiring an erosion and sediment control plan to be prepared by a specialist.
- 5) **Interface landscaping:** Some local governments may require landscape buffers where a solar farm has a direct interface with adjoining sensitive land uses. In these circumstances, it may be appropriate to condition the specifications of a landscape plan and/or specific landscape buffer locations, plant species, planting densities and buffer widths.
- 6) **Bushfire buffers/setbacks:** Where a solar farm adjoins bushfire prone areas, it may be appropriate to impose conditions requiring cleared bushfire buffers/setbacks. A local government should only consider imposing conditions requiring cleared bushfire buffers/setbacks where there is a risk of fire or bushfire impacts due to existing adjoining vegetation or a solar farm facility.
- 7) **Decommissioning and rehabilitation:** A decommissioning and rehabilitation plan identifies the actions that need to be undertaken when operations of a solar farm permanently cease. These actions include the timing for the removal of infrastructure and rehabilitation of the land to a suitable character and/or quality, such as soil stabilisation and re-vegetation works. A local government may also consider including conditions relating to the appropriate disposal, recycling or reuse of components. A decommissioning and rehabilitation plan should be prepared prior to the commencement of decommissioning, rather than during the life of the solar farm.

4.2 Other approvals and agreements

In addition to securing development approval under the *Planning Act 2016*, the solar

farm proponent may require other approvals and agreements outside of the scope of local government. Pre-lodgement meetings with the proponent and relevant agencies may help determine which of the following approvals and agreements are relevant to the development:

- **Confirmation of relevant purpose:** if an application for a solar farm proposes to clear native vegetation, DNRME may require an assessment against section 22A of the *Vegetation Management Act 1999* (Qld) to determine whether the clearing is for a relevant purpose.
- **Environmental approvals:** a permit maybe required for the removal and/or relocation of protected flora and fauna under the *Nature Conservation Act 1992* (Qld).
- **Duty of care:** the proponent may need to exercise due diligence and duty of care to ensure all reasonable and practicable measures are taken to avoid or minimise harm to Aboriginal cultural heritage in relation to the *Aboriginal Cultural Heritage Act 2003* (Qld), the *Torres Strait Islander Cultural Heritage Act 2003* (Qld), and the *Aboriginal and Torres Strait Islander Heritage Protection Act* (C'wlth).
- **Grid connection and associated approvals and agreements under the National Electricity Rules:** connection agreements must be applied for and entered into once a formal connection has been approved by the Network Service Provider.

5.0 Supporting information

Planning framework

- *Planning Act 2016*
<https://www.legislation.qld.gov.au/view/html/asmade/act-2016-025>
- Planning Regulation 2017
<https://www.legislation.qld.gov.au/view/html/asmade/si-2017-0078>
- State Planning Policy (SPP) July 2017
<https://planning.dilgp.qld.gov.au/planning/better-planning/state-planning/state-planning-policy-spp>
- Regional plans
<https://planning.dilgp.qld.gov.au/planning/better-planning/state-planning/regional-plans>

Spatial data

- Australian Renewable Energy Mapping Infrastructure (AREMI)
<http://nationalmap.gov.au/renewables/>
- Department of Natural Resources, Mines and Energy Electricity generation map
www.dews.qld.gov.au/electricity/renewables/tools/solar-maps
- Department of State Development, Manufacturing, Infrastructure and Planning's SPP Interactive Mapping System (IMS) and Development Assessment Mapping system (DAMS) <https://planning.dilgp.qld.gov.au/maps>

Related guidance

- Department of Transport and Main Roads guideline, *Guide to Traffic Impact Assessment 2017* <https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Guide-to-Traffic-Impact-Assessment>

Contacts for further information

- Australian Renewable Energy Agency <https://arena.gov.au/>
- Clean Energy Council <https://www.cleanenergycouncil.org.au/policy-advocacy.html>
- Department of Natural Resources, Mines and Energy <https://www.dnrm.qld.gov.au/>
- Department of State Development, Manufacturing, Infrastructure and Planning – contact the relevant regional office
<https://www.statedevelopment.qld.gov.au/contact-us/regional-contacts.html>