

Tree planting for screening of FNSF's solar farm

Introduction

Far North Solar Farm Limited (FNSF) has gained resource consents to build four solar farms in the North Island of New Zealand, and is currently working on consent for others, spread across different regions of both Islands. This experience and ongoing work allows FNSF to understand the issues and solutions around the visual aspects and possible glint and glare from utility sized solar farms in rural and semi-rural areas. FNSF teams have visited the two currently operating solar farms in NZ and studied the location and screening of these, to check the assumptions used in our designs. FNSF staff have also visited solar farms in Australia and Europe to see how the issue is dealt with in other countries.

This paper discusses the process for selecting the locations for solar farms, the screening proposed and how the screen planting will be implemented and maintained.

Site Selection

FNSF aims to have solar farms on flat land, in rural areas, with suitable nearby electricity infrastructure to connect the solar farm to the electricity grid. While much of this is driven by economics and land availability, it also ensures the sites have fewer neighbours and the landscape already has features such as electricity pylons, substations and roading. For example, the Far North site in Pukenui is adjacent the Top Energy Limited Pukenui substation, on land that is currently cropped and grazed, and is not overlooked by houses (although there are dwellings nearby, they do not see the solar farm due to planting on their land or in the sight lines). The same is true for Waiohahi, where the solar farm wraps around a large Transpower grid point, Foxton, where no houses can see the site, and Edgecumbe, where only the landowners can see the site directly.

The issue can arise where homes have been built in rural areas that are sited to look through rural land to a distant view, or where roads adjacent to the site will have extended viewing of the solar farm.

Screen Planting

At the planning stage, FNSF takes into consideration nearby viewing points of the solar farm. This considers where the desired view is towards (i.e. distant ranges, the sea, the sky) and issues such as setbacks from roads and boundaries, waterways and shading. A large part of this includes consideration of existing screening, the distances and the angle of view. As an example, at Pukenui the nearest home to the site looked towards the west, and was sited north of the solar farm. The entire boundary was planted with 4-6m high bamboo, meaning the entire site was already screened from the house and most of the land. FNSF has proposed maintaining the bamboo to 3m height to avoid shading, and ensure the growth stays dense.

The Landscape and Visual Effects Assessment carried out by the landscape architect makes a study of these issues and proposed solutions. These solutions include the location and species of planting, and these reports have been the starting point for discussions with neighbours of our solar farms, as well as part of our resource consent applications.

In most cases, the planting plan submitted by the landscape architect is part of the approval from the council.

Trees, heights, widths and locations

Solar farms require some security, low shading and easy access around the site. This entails layouts that have low fencing on the boundary, and a higher security fence 3-6m inside that fence, with a 6-10m gap to any solar panels from that inner fence. This provides the ideal location for planting screening trees, and this can be seen in the layouts of FNSF farms and others, such as the Kapuni Solar Farm in Taranaki.



Figure 1. View of Kapuni Solar Farm showing width of planting. FNSF will screen all boundaries on their sites.

This planting area is fully utilised with species recommended by the landscape architect as being suitable for the location and purpose of minimising views of the site and glint or glare effects. The planting does not aim to cover entrances or even distant views of the site, but aims to remove the immediate effect from most viewpoints while being kept low enough to prevent shading and allow for the distant views that are desired.

The species selected, and the density of planting, is provided by the landscape architect based on experience with other projects, and the local environment.

All of FNSF's consented projects require a mix of native species planted in an arrangement to provide depth as well as height. At a new site, the predominant screening plant is not a native, and the area has many plantings of a single species planted in an offset manner of two or three rows. The species is Japanese Cedar (*Cryptomeria Japonica*), which when trimmed and topped provides a dense, good looking shelter belt and visual screen. The planting and maintenance for the first year is contracted to a specialist arborist, and these specialists normally have experience in the area (such as working with Waka Kotahi.) FNSF also includes plans for pest control on the sites, to improve the success rates of new plantings.



Japanese cedar on Moroa Road. (also below at Gun Club, Moroa Road)





Example of maintained japanese cedar

When planted, trees are less than 1m high. It is planned that with proper maintenance, these will reach 3m within 3-5 years, and need ongoing maintenance.

Overseas' experience

Visiting solar farms in other countries revealed that in many cases, no effort was made to obscure the solar panels, except from main highways and airports. In Europe it was noted that housing tended to be clustered, with only occasional farm houses in remote locations. All solar farms visited had no screening apart from the security fence.

At the Melbourne airport, the solar farm has no screening, even though the area is fertile trees are common in the general area.



Melbourne Airport solar farm. Note the absence of screening.

Details of Greytown solar farm screening



The screening plan above shows the site is screened by trees on all sides. There are three types of screening shown:

- Yellow dashed - normal trees from nursery, around 1 year, 1m high
- Red dashed - Trees purchased one year earlier and now 2-2.5m high
- White dashed with yellow or red - existing shelter belt trees, 5-6m to be trimmed to 4m

The trees are expected to grow at 1m per year or more, and to encourage good growth, irrigation has been proposed for the site. This will make use of the onsite water storage tanks which are refilled from the farm's existing bore.

The mix of mature and new trees is aimed to provide a faster screen for neighbours who may see the solar farm from their dwelling, and some road approaches where the viewing time may be extended. An example of this is the approach on Moroa Road from Featherston (West) where the vehicles start to see the solar farm from 300m or more as they clear other trees. The sight lines to the solar farm are planted in the mature trees. Other viewpoints have had similar treatment. Other areas of mature trees are designed to minimise views from dwellings.



Existing trees

The Greytown site has existing pine and macrocarpa shelter belts, plus some gum species planted for firewood/shelter. Where these trees are inside the solar farm area, they will be removed by the landowner before the solar farm is started. Where the trees are on boundaries, they will be either trimmed to 3 or 4m (each row will be considered for its effects on shade, neighbours etc) or removed and replaced with new screening trees. In many cases this will improve the distant views, as these trees are in general over 8m high, in some cases much more. Feedback we have received on this from neighbours is positive as they will gain better outlooks to the ranges, and already have low trees in place for privacy.