Naujaat Solar Project

Site review and assessment

Client: Northern Energy Capital
Reference: Project 20-028
Version 1.0

August 2021

Sakku Investments Corporation
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NORTHERN ENERGY CAPITAL

Report Prepared for:
Northern Energy Capital & Sakku Investment Corporation

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V1.0	27/08/2021	Final for issue

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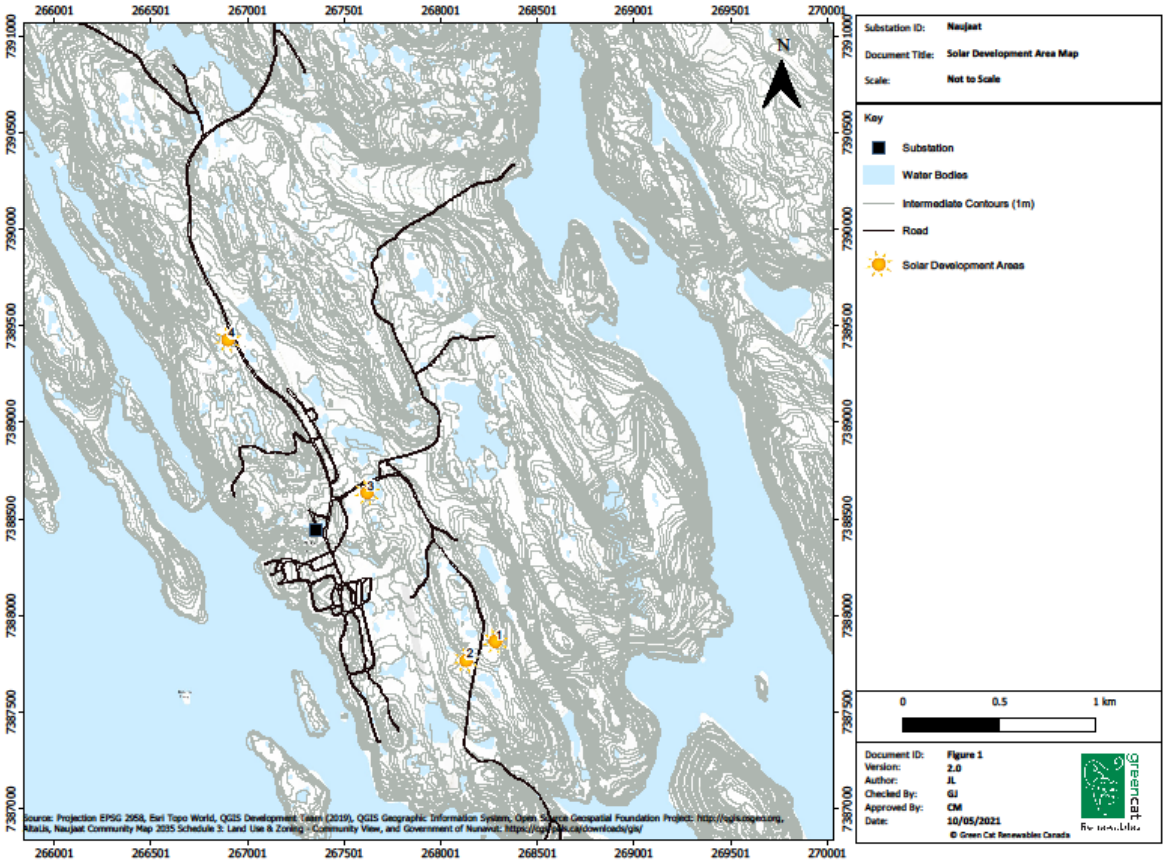
Naujaat

GCR and NEC have proposed four (4) possible sites for consideration for the Naujaat Solar Project (the Project). The current target capacity of the Project is approximately 1 MW_{AC}. Based on preliminary assumptions on site width, solar module model, orientation, and spacing, it is anticipated that the project will require approximately 31,000 m^2 (7.7 acres) to meet the required capacity. This is based on a rectangular plot and is only used for approximation and site feasibility purposes.

Naujaat Solar Projects

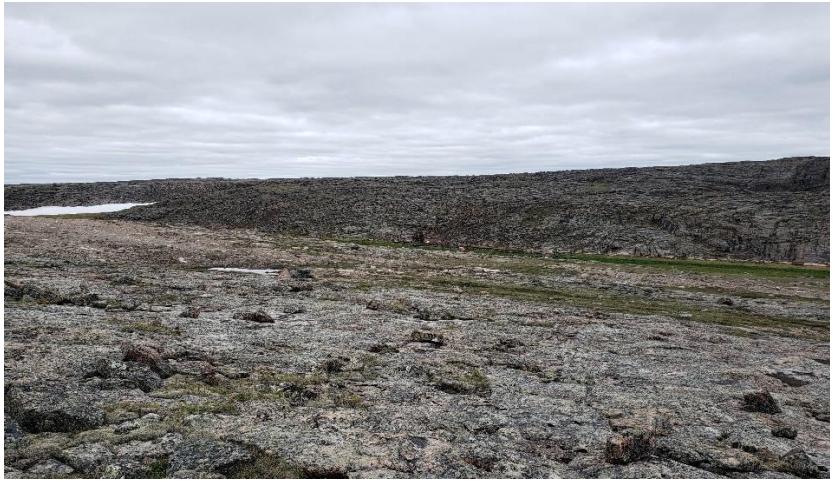


Site 1

A review of Site 1 shows a rocky site with some soil, with a noticeable slope downward toward the river to the east. A detailed Geotechnical report with a focus on rock depth and competency will be required to assess the type & quality of the rock including any fractures and weathering. Given the extreme temperature in the region and the rocky site going through cycles of freeze and thaw, which cause weathering and fracture, it is important to establish the solar foundation on a competent rock layer. Depending on the depth of the competent rock layer, that may require excavating the non-competent rock to a depth reaching a competent layer or drilling the rocks for pile foundation that rest on competent layer. The outcome of this site investigation could result in significant costs. The slope of the site also presents a challenge in leveling the foundations, and/or the varying lengths of the piles needed for various spots on the site.

The site itself is very close to the Naujaat Airport and may result in issues relating to solar glare impacting pilots. There does not appear to be any existing power line infrastructure meaning that connecting the project will require some new line build. Furthermore, new power lines would need to avoid the runway and the flight path of aircraft, thus potentially increasing the length of new line required.

View facing northeast from Site 1



View facing southeast from Site 1

The total site area is estimated at approximately 15,900m^2, with an anticipated capacity of approximately 400kW. As such, Site 1 alone will not be able to meet the required capacity. A high-level overview of the area indicates that further development may be possible to the north and northwest of the site. Based on site photos it appears the area to the north has a similar rocky topography as Site 1.

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View facing the road travelling north with west area on the left

Google Earth Map of Site 1

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Site 2

Site 2 shares similar topographical issues as Site 1. Site 2 is even closer to the Airport than Site 1 which may increase the potential likelihood of solar glare impacting pilots. Additionally, to avoid any issues relating to site proximity to the runway and Transport Canada Guidelines, it is expected that the project site will need to be a minimum of 144m from the center of the Airport runway to the nearest edge of the development. Given the slope of the site, a drainage assessment may need to be undertaken to ensure the project does not result in drainage onto the airport runway. There are no existing power lines in the area, and similarly to Site 1, and the installation of a new power line may pose a challenge.

The total site area is approximately 15,000m^2 with an anticipated capacity of approximately 380 kW. As such, Site 2 alone will not be able to meet the required capacity. A high-level overview of the area indicates that further development may be possible to the north of the site, in the location identified in the Site 1 Photos.

View facing the airport to the west

View facing the road to the north

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Google Earth Map of Site 2

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Site 3

A review of Site 3 shows a relatively flat terrain with less rocks, suggesting that an alternative solar foundation (grading and ballasted) may be suitable. The site is wetter than Sites 1 and 2, which likely indicates a low-point, and may result in a drainage study being required for the site. The site is the closest to the existing substation, indicating that interconnection of the Project could be less costly than other sites. The site is close to the airport but is farther north with a noticeable hill between it and the end of the airport runway, glare impacts to pilots would also need to be considered.

View facing the north of the site

View facing the east of the site

The total Site area is approximately 14,500 m^2, with an anticipated capacity of approximately 370kW. As such, Site 3 alone will not be able to meet the required capacity. There does not appear to be adjacent land that could be used for expansion of the site. However, GCR considers Site 3 a reasonable site to develop, and therefore it could be used as a second site to supplement the capacity of another site.

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View facing southwest towards the airport

Google Earth Map of Site 3

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Site 4

A review of Site 4 shows a less rocky terrain than Sites 1 and 2, with a generally flat area. There were no noticeable constraints in comparison to the other sites identified, and has easy access via a well maintained road. The site is wetter than Sites 1 and 2 but appears less so than Site 3. There is a power line that runs along the adjacent road, which the Project may be able to connect to. However, Site 4 is the smallest site identified at 7,500 m^2 with an expected capacity of 190kW. As such, Site 4 alone will not be able to produce enough energy to be considered viable.

View facing west of the site

View facing south of the site

There is a snow drift area on the opposite side of the access road towards the east, as such GCR does not recommend assessing an expansion of the site to the east. An analysis of the site photos and mapping suggests that a possible expansion and/or relocation to the north of Site 4 should be considered. This option would provide enough space to meet the required capacity, has access to a power line along the road, and carries less risk with proximity to the airport. As a note, the site photos suggest that the site to the north is rocky, however it does not appear as rocky as Sites 1 and 2. Alternative sites further out of the town that follow the existing power line may warrant consideration.

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View facing north of the site

View of the road and transmission lines

Google Earth Map of Site 4

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Recommendation

Looking at the initially identified Naujaat sites, it is evident that additional space is needed to meet the required capacity of $1MW_{AC}$. Understanding the capacity requirements, GCR recommends that one of two expanded sites be considered, possibly in conjunction with the development of Site 3.

A possible option is building on Site 1 and 2, with a potential further expansion of the combined site to the north. However, there are noticeable issues with the combined Site 1 and 2 option including but not limited to; the rocky terrain of the sites, the elevation changes, the limited access to existing power lines, and the proximity to the airport. GCR expects that these factors will increase the construction costs and increase impacts to the community. As such, the combined Site 1 and 2 area is not the preferred option.

GCR considers the best option, based on available information, is to consider moving forward is to expand Site 4 further north to allow for more usable space. Site 4 appears to have a similar area to expand onto as the combined Site 1 and 2 option but has fewer perceivable issues with installation than Sites 1 and 2. If the Site 4 expansion towards the north is not viable or is limited, GCR suggests using Site 3 as an additional generation site, if supplementary capacity is required.

Some of the key reasons for selecting an area north of Site 4 is the adjacent power line and the better terrain. The power line continues along the roadway travelling north, which suggests that an alternate site could be identified farther north from Site 4 along the road if the expanded area is deemed too rocky and constructability issues arise. While GCR acknowledges this is a possible option, it cautions that the further distance from the substation will increase potential powerline upgrade costs. GCR recommends the steps be to re-evaluate and assess an extended version of Site 4.

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