ANNEX1- **FORLANINI HOSPITAL ENERGY ASSESSMENT REPORT MOGADISHU, SOMALIA**

1. General View of Forlanini Hospital

Forlanini Hospital is state owned public hospital located in the Abdelaziz district of Mogadishu firstly established in 1924. Major parties of the hospital suffered heavy damages during civil war and the hospital currently has 4 partially working sections, a secondary COVID-19 center, mental health, TB MDR, and nutrition and Emergency section for Mother and Child. There are six severely damaged blocks in the center and other blocks at northeast and southwest corners, and in the south, there are an IDP settlements. In the west side, NIS foundation is constructing new building that is planned to serve as an emergency operation center.

Figure 1: An aerial view of the hospital

2. Existing Electrical Infrastructure of working sections

There is no interconnected power supply infrastructure of all hospital sections and instead, each section is separately connected to the utility grid in different points. The concerned sections of this assignment are TB MDR and COVID-19 sections only.

TB MDR section: Grid supply line connects to MCCB breaker in patients' ward – refer fig 2- and the feeder line goes to the administration and Laboratory blocks. The critical loads of the administration block are air-conditioning and refrigerators for storing certain drugs while the laboratory block main loads are air exhaust system, air-conditioning, refrigerators, and other laboratory equipment. TB section has no emergency generators or any other power sources except the power grid line.

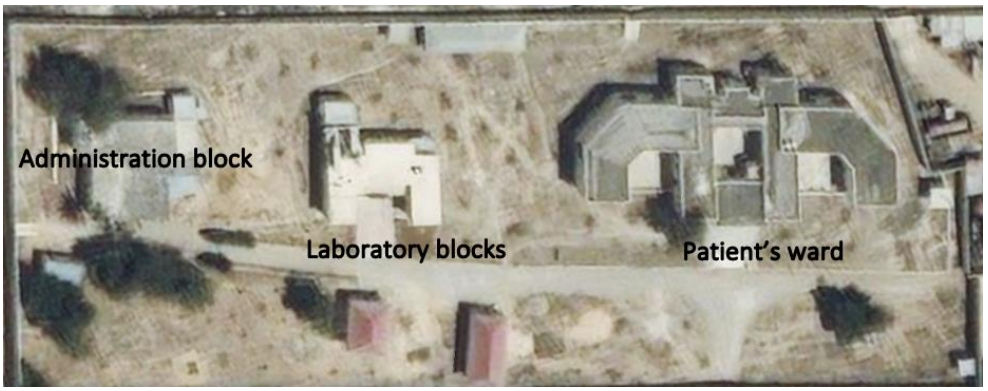


Figure 2: TB MDR Section aerial view

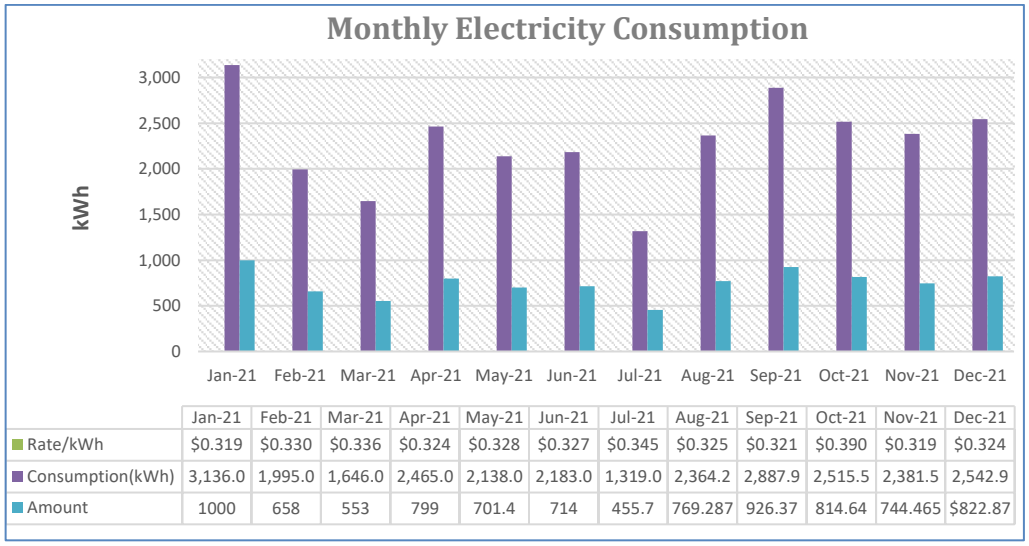
Figure 3:TB MDR section grid connection point at patient's ward

COVID-19 Section: Grid supply line connects to 315 A MCCB breaker - refer figure 3. This section is not yet equipped fully and as of now, portable oxygen machines and 20 air-conditioners are the main electrical appliances connected. This section has no emergency generators or any other power sources except the power grid line.

Figure 4: Covid Center Grid connection point

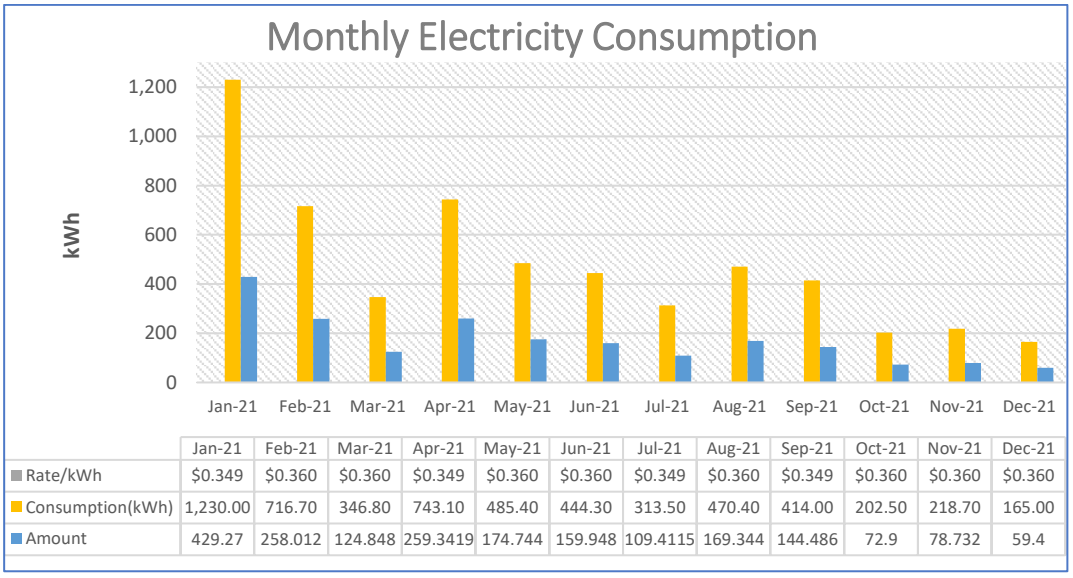
3. Monthly Energy Consumption

TB MDR section director informed technical assessment team that some critical appliances in the laboratory are kept off to reduce energy bills due to budget limitations, and only essential appliances are in operation. An analysis of the entire section energy bills provides an average consumption of 2,297.85 kWh per month with a peak consumption of 2,887.90 kWh. The average monthly energy bills are USD 746.56.



	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Rate/kWh	$0.319	$0.330	$0.336	$0.324	$0.328	$0.327	$0.345	$0.325	$0.321	$0.390	$0.319	$0.324
Consumption(kWh)	3,136.0	1,995.0	1,646.0	2,465.0	2,138.0	2,183.0	1,319.0	2,364.2	2,887.9	2,515.5	2,381.5	2,542.9
Amount	1000	658	553	799	701.4	714	455.7	769.287	926.37	814.64	744.465	$822.87

CPVID-19 section was not in full operation since October 2021. An analysis of the entire section energy bills provides an average consumption of 479.20 kWh per month with a peak consumption of 1,230.00 kWh. The average monthly energy bills are USD 170.04.



	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
Rate/kWh	$0.349	$0.360	$0.360	$0.349	$0.360	$0.360	$0.349	$0.360	$0.349	$0.360	$0.360	$0.360
Consumption(kWh)	1,230.00	716.70	346.80	743.10	485.40	444.30	313.50	470.40	414.00	202.50	218.70	165.00
Amount	429.27	258.012	124.848	259.3419	174.744	159.948	109.4115	169.344	144.486	72.9	78.732	59.4

4. Required PV System Solution

1. The required system is a grid connected PV system of 100 kWp capacity. Solar modules should be of Tier one modules manufacturers with a minimum of 390 Watt of module output.
2. Solar modules will be ground mount type and fixed by an aluminum structure fixed to concrete foundation supports. The proposed area are measures 547, 468, 298 and 481 square meters respectively – refer figure 5 in below. System room dimension is 3x4m.
3. The solar PV system will be coupled with the grid on TB MDR connection point – refer figure 3. The output feeder supplies both administration and laboratory blocks in TB MDR section. The distance from grid connection point and solar PV system room is 100m.
4. Establish interconnection network of TB MDR and COVID-19 sections by installing AC feeder line of 315 m (3 x 95 + 50 mm2 0.6/1 kV XLPE insulated round steel wire armored, multi-core cables with copper conductor).

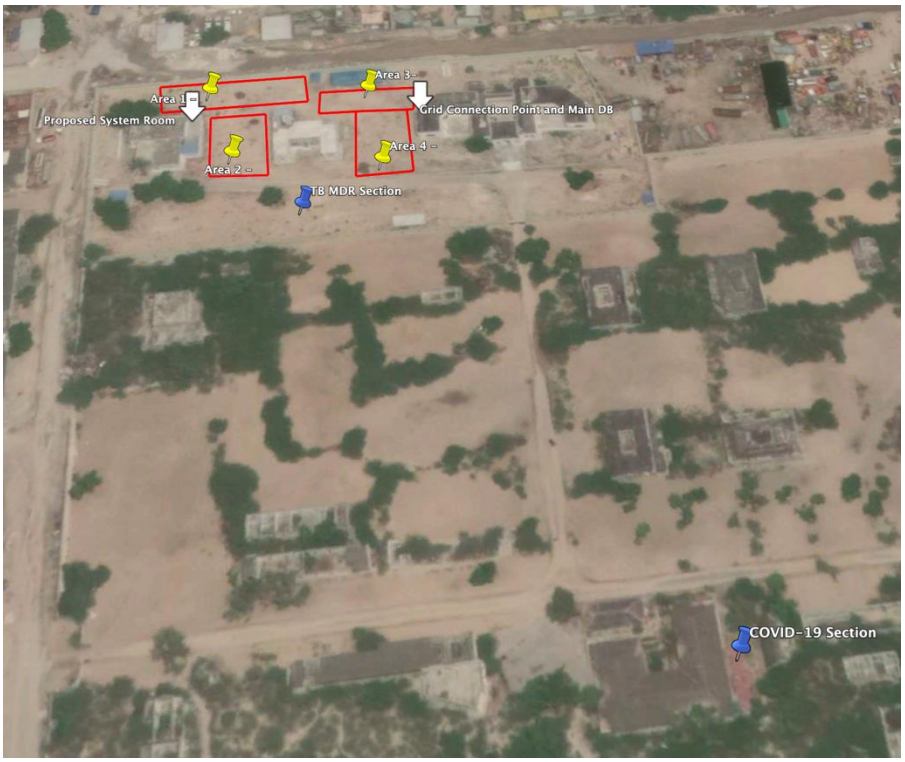


Figure 5: Proposed Area for Solar Mounting (GPS 2.04751° N, 45.35780° E)

Figure 6: Proposed Area for Solar Mounting at TB MDR Section