1. Technical Energy Specifications Sheet, Cluster 5A

This information is compiled for Witchcliffe Ecovillage Cluster 5A lot owners and their builders and electricians.

2. Strata Cluster 5A Microgrid Features

This strata cluster features:

- 22 households
- Energy efficient, passive solar homes with heat pump hot water systems
- Min. 6kW PV panels per household
- Min. 6kW hybrid inverters per household
- 300A - 215kW micro-grid connection to Western Power grid
- Microgrid connecting each home to 75kW EV charger and Western Power grid
- Individual household batteries provided to each lot
- Single point connection to WP grid for sale of energy
- 75kW EV charger in Common Property parking area

A detailed analysis of the Cluster 5A energy budget is provided in Table 1 below.

Cluster 5A	Number of Lots	Min PV (kW)	Allocated Max Inverter size (kW)	Total inverter (kW)	Battery kWh per lot	Total battery (kWh)
Groupies	5	6.6	3 Phase 6kW (min)	30	11kWh	55
Cottage	8	10.9	3 Phase 8kW	64	11kWh	88
Family	9	16.6	3 Phase 12.5kW	112.5	13.8kWh	124.2
Community Shed	1	6.6	3 Phase 5kW	5		
Total	**23**			**211.5**		**267.2**

Table 1. Cluster 5A Energy Budget

Cluster 5A is estimated to collectively:

- **Produce** ~ annual average of 1045kWh / day of renewable energy (based on the maximum allowable installed PVs & inverters)
- **Use** ~211.5 kWh / day (excluding EV charging).

3. Cluster 5A Household Energy Connection Requirements

Phases

All homes at the Ecovillage need to be wired for 3-phase power.

3-phase power allows for a more balanced distribution of loads across the three phases, which means that each phase carries a relative equal amount of power. A balance of power across phases reduces the risk of overloading and helps improve micro-grid power stability. 3-phase power can enable higher power loads than that of single-phase power making 3-phase power more suitable for use in houses with large solar arrays, residential batteries and EV chargers. It is essential that electricians balance loads as much as possible across the 3 phases in each home to enable the support of larger loads in the cluster such as EV chargers.

Meter

Each household must install an NMI certified meter. The National Metering Identifier (NMI) is a unique 10 or 11-digit number used to identify electrical network connection points in Australia. It is a requirement that every connection, including homes, are given their own NMI. It is not legal in Australia to trade energy across meters that are not NMI certified. NMI meters need to be SwitchDin Droplet (see below) compatible. 2 recommended Droplet compatible NMI meters are the SATEC and CET meter.

Droplet

To ensure Western Power approved energy management optimisation within our microgrids, residents are required to have SwitchDin "Droplets" installed at their property. The indicative cost for a Droplet is $200 +GST which (in 5A) is at the cost of the homeowner.

Integrated Electrical Contracting (IEC) has provided competitive 2023 pricing for the install of these Droplets at $191.90 + GST (on solar systems they installed). If you'd like to engage IEC to undertake this work (or quote on an install on a home that they didn't install the solar on) please contact their office at 0488 007 978. Alternatively, please contact your electrician for a quote for installation (they will need to have SwitchDin certification).

The Droplets will also read the household NMI meter and inverter and send this data to the Clusters SwitchDin Stormcloud which enables residents to view their energy use (import and export) and their Strata manager to see the overall cluster energy use and download CSV file to produce energy bills for each household.

By installing the SwitchDin Droplet it saves approximately $500 on a Fronius Smartmeter that would otherwise be required by Western Power. Solar systems cannot be turned on prior to droplets being installed. More information is available in the Energy Handbook.

Inverter

In **Cluster 5A,** the microgrid compatible inverter brand and capacity required is the Fronius Gen24 Symo + (Hybrid) with a minimum 3-phase 6kW inverter capacity. Hybrid inverters are required when installing household batteries, which will ensure homes can supply power from your battery when the Western Power grid goes down. The advantage of using the Fronius Symo is that the size of rooftop PV arrays can be increased considerably while still maintaining eligibility for STCs (Small-Scale Technology Credits)

- 3 phase 6.0kW (Required) for Groupie lots;
- 3 phase 8kW (Max) for Cottage lots, and
- 3 phase 12.5kW (Max) inverters for Family lots.

Internet

All Ecovillage households are required to provide an NBN connection for metering purposes.

Households that specifically do not want to connect to NBN must still provide a suitable microgrid control by either:

- providing an alternative internet connection for the Droplet via a suitable 4G wireless modem (not dongle); or
- purchasing the "Droplet +" and providing an activated Sim card and data plan.

The Droplet hardware requires at least a 4G modem with 2 free ethernet connections. WIFI connectivity via a dongle will not provide reliable enough coverage for accurate metering and monitoring, and for controlling the output of the solar system in peak times (as required by Western Power).

Solar systems

To provide an Ecovillage wide net neutral renewable power supply, all Ecovillage homes require the installation of a minimum of 6 kW solar PV. To maintain peak performance and efficiency of the overall cluster energy system, individual solar PV systems need to be installed and connected evenly across the cluster microgrid and careful consideration has been given to the servicing of each home and its permissible solar PV. The distribution of the systems over the network is critical to create a balanced network.

The maximum size of solar PV system that is connected to each home will depend on the lot type that has been purchased. A breakdown of potential PV size and maximum inverter size is provided per lot type in Table 1, Cluster 5A Energy Budget.

4. Microgrid Connection Information

Connection Process

Green domes have been installed in stage 5. The connection process is the same as a standard subdivision whereby your builder will run a cable from the green dome to your home.

Additional Information / Requirements:

The below information needs to be provided to your builder and home designer.

- Each dwelling requires an externally accessible Western Power approved 450x450mm meter box. The LHS requires a minimum 16pole din kit with 1x 32amp 3 phase breaker.
- 32 Amp 3-Phase connection as per Western Power standard. Changes to the size of this connection are possible but will come at an additional cost.
- 25mm communications conduits need to be extended from the NBN pit on your lot boundary to enter directly into the LHS of the meter box with no more than 270 degrees of long radius sweep bends. This is to enable future microgrid controls.
- During electrical fitout electricians are required to ensure they run a 240v rated cat5e data cable from the internet modem location to the meter box and leave it 'made safe' and coiled behind the LHS panel with a data outlet terminated at the modem. This is to enable internet connectivity for the operation of Energy Management Systems i.e. Microgrid Controls & SwitchDin Droplets.
- Power connection points are at the rear of the lot. NBN connections are at the street side of the lots.

Indicative Connection Costs:

The 2023 indicative costs associated with this connection process are outlined below:

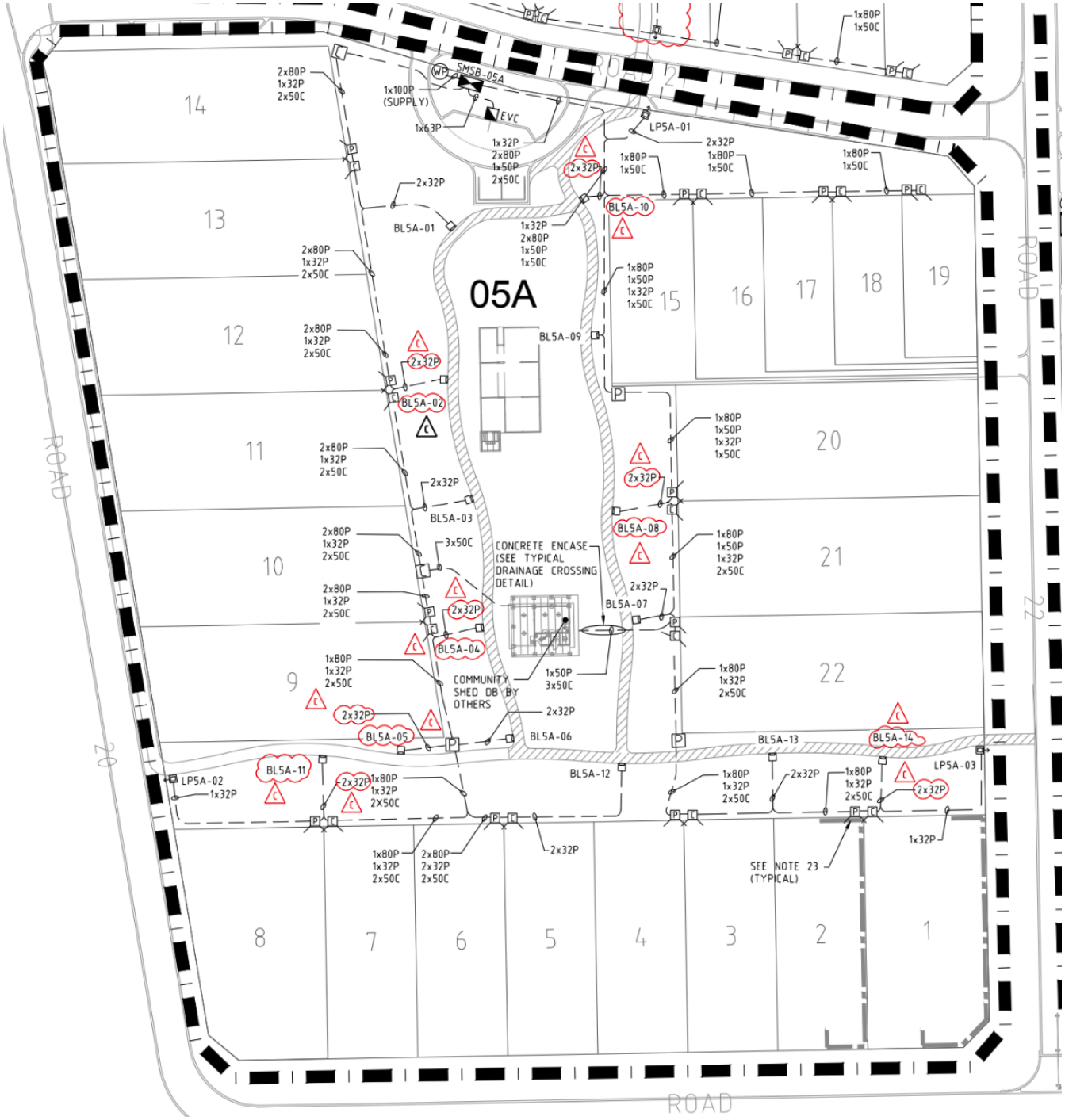
Requirement	Responsibility	Cost
3 phase cable from the micro-grid distribution board to your lot boundary	Developer	Provided
NMI meter (Indicative Cost)	Home Owner	$506.40 + GST (Approx)
NMI meter installation at temporary power board and transfer to your home	Builder's Electrican	$180 + GST (Approx)
SwitchDin Droplet	Home Owner	$200 + GST (Approx)
SwitchDin Droplet installation – Energy Management	Home Owner	$191.90 + GST (Approx)

5. Solar system connection

The application process for solar system connections up to 30kW is as per standard residential applications and is relatively straightforward.

The process for connecting solar to the microgrid in clusters with greater than 30kW of installed solar capacity is as follows:

1. Solar systems are installed on residents' roofs.
2. Qualified Electrician will perform Power Quality Testing (PQT) to confirm stability of the cluster microgrid. During testing cluster microgrid power outages will apply, outage times will be communicated to residents in advance. This is a standard Western Power requirement for large solar systems.
3. Our engineers "Cossill & Webley" will perform "Grid Protection Testing" (GPT) to confirm our switchboard will operate correctly in the event the microgrid needs isolation from the Western Power grid. Depending on availability this step may be done before or after step 2. During testing cluster microgrid power outages will apply, outage times will be communicated to residents in advance.
4. "Grid Protection Testing" and "Power Quality Testing" data will then be consolidated and sent to Western Power for approval, this is our "Approval to Operate".
5. Once our "Approval to Operate" is received we are then able to activate solar systems that were included in that application.



05A
ROAD 2
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WP
EVC
1x100P (SUPPLY)
1x63P
1x32P 2x80P 1x50P 2x50C
LP5A-01
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BL5A-12
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BL5A-14
LP5A-02
LP5A-03
3x50C
CONCRETE ENCASE (SEE TYPICAL DRAINAGE CROSSING DETAIL)
COMMUNITY SHED DB BY OTHERS
1x50P 3x50C
1x80P 1x32P 2X50C
2x80P 2x32P 2x50C
SEE NOTE 23 (TYPICAL)
1x32P
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