1. Technical Energy Specifications Sheet, Cluster 2B

This information is compiled for Witchcliffe Ecovillage Cluster 2B lot owners and their builders and aelectricians.

2. Strata Cluster 2B 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. 5kW inverters per household
- 300A - 215kW micro-grid connection to Western Power grid
- Microgrid connecting each home to battery, 75kW EV charger and Western Power grid
- 232kWh Tesla Powerpack battery
- Single point connection to WP grid for sale of energy
- 75kW EV charger in Common Property parking area

A detailed analysis of the Cluster 2B energy budget is provided in Table 1 below.

Cluster 2B	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 5kW (Required)	25	6.5	32.5
Cottage	9	10.9	3 Phase 8.2kW	73.8	9.5	85.5
Family	8	16.6	3 Phase 12.5kW	100	13.5	108
Community Shed	1	6.6	3 Phase 5kW	5	5	6
Total	**23**			**203.8**		**232**

Table 1. Cluster 2B Energy Budget

Cluster 2B is estimated to collectively:

- **Produce** ~ 1019kWh / day of renewable energy (based on the maximum allowable installed PV & Inverters)
- **Use** ~204kWh / day (excluding EV charging)

3. Cluster 2B 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.

The Developer bulk purchased Satec NMI meters for Stage 2 at the discounted price of $481.40, which are passed on to residents at cost price, and are available through the ecovillage office when their builder is ready to connect power to their lot.

The Witchcliffe Ecovillage developer provides an invoice for the NMI meter at concept approval of the house design, see Sustainable Building Design Guidelines: https://www.ecovillage.net.au/library/document-library/ . NMI meter invoices will need to be paid prior to formal design approvals being issued.

Warranty issues need to be referred directly to Element 47, not the Developer. Meters can be replaced with either SATEC or CET meters if required in the future.

Droplet

To ensure Western Power approved energy management optimisation within our microgrids, residents are required to have SwitchDin "Droplets" installed at their property. We are pleased to inform you that the Witchcliffe Ecovillage developers have agreed to cover the cost of the "Droplet" hardware for all homes in Cluster 2B, as the new Western Power solar export control requirements came into being after their contracts were signed. Homeowners will pay for the installation of the Droplet. 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 2B,** the microgrid compatible inverter brand and capacity required is the Fronius Symo with a minimum 3-phase 5kW inverter required for all homes:

- 3 phase 5.0kW (Required) for Groupie lots;
- 3 phase 8.2kW (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, this however would be the most expensive option as the "Droplet +" supply cost is approximately $500 +GST.

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 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 2B Energy Budget.

4. Microgrid Connection Information

Connection Process

1. When your builder is ready to start works, they need to inform our nominated electrical contractor, Integrated Electrical Contracting (IEC), that they require power within 2 weeks. Your builder will also inform IEC of the cable length required from the boundary of your lot to your home's meter box.
2. IEC will issue an invoice for the cable from your lot boundary to your home. Once paid IEC will then run a three-phase cable from the micro-grid's distribution board to your boundary, with sufficient cable to complete the run to your home when ready. The running of the cable from the boundary to the home is at the home owners' expense.
3. Your Builder/EC will then run a trench with the electrical cable to the location of your temporary power board.
4. Your Builder/EC then notifies IEC that the site is ready for an NMI meter and for IEC to make the connection to the grid.
5. IEC then notifies the affected cluster strata of up to a 1-hour outage (48 hours' notice).
6. IEC return to site, install the NMI meter, make the connection to the microgrid, test and commission. When your home is completed, the NMI meter and meter box will be transferred to your house.
7. Upon completion of internet connection your builder/electrician will organise to have your SwitchDin Droplet installed.

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:

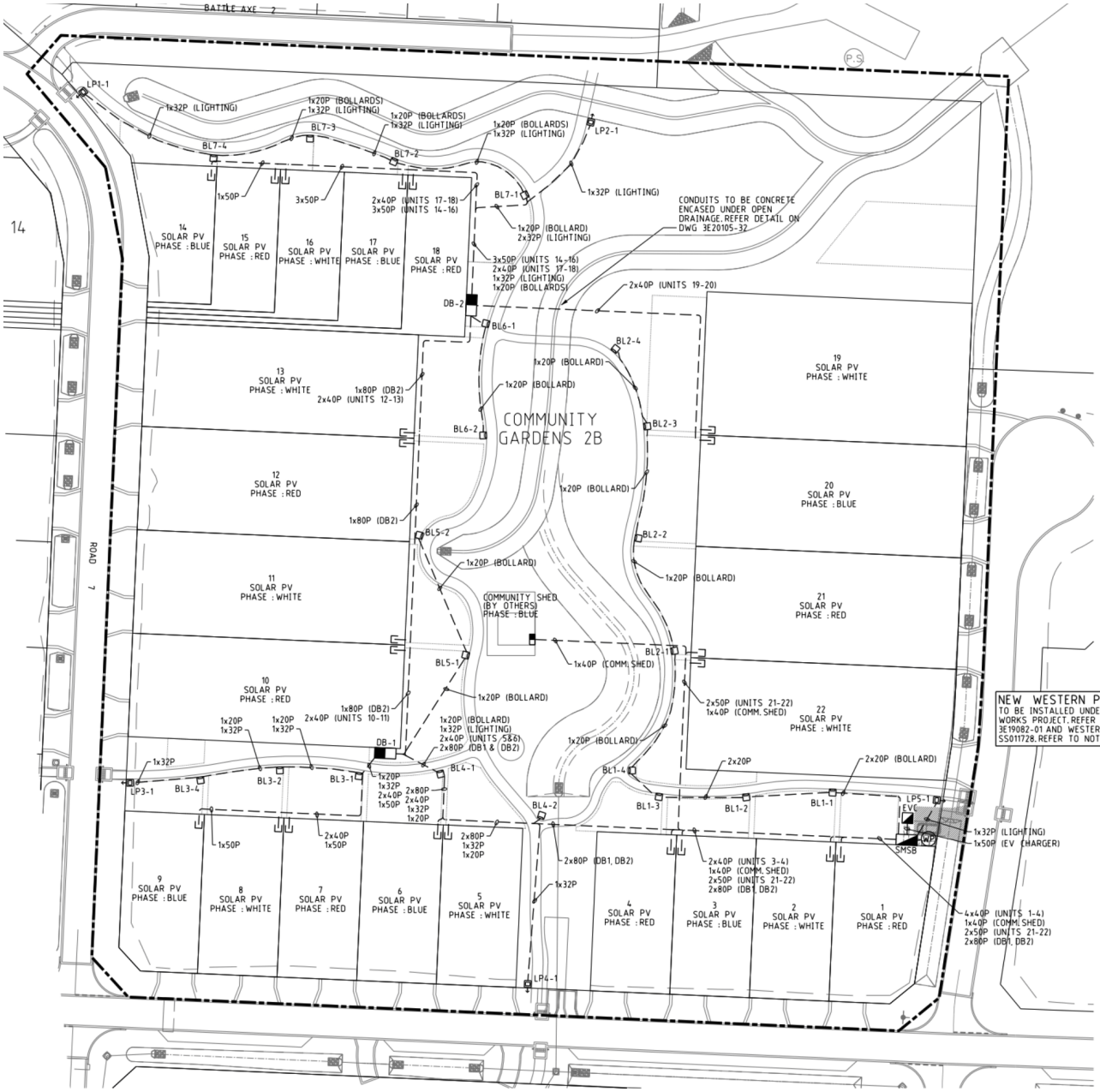
Requirement	Responsibility	Cost
3 phase cable from the micro-grid distribution board to your lot boundary	Developer – Providing homes commenced within contractual commencement date	Provided
NMI meter (SATEC)	Home Owner	$481.40 + GST
NMI meter installation at temporary power board and transfer to your home	Builder's Electrician	$180 + GST (Approx)
SwitchDin Droplet	Developer - Providing homes commenced within contractual commencement date	$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.


BATTLE AXE
P.S
LP1-1
1x32P (LIGHTING)
1x20P (BOLLARDS)
1x32P (LIGHTING)
BL7-3
BL7-4
BL7-2
LP2-1
1x50P
3x50P
2x40P (UNITS 17-18)
3x50P (UNITS 14-16)
BL7-1
1x32P (LIGHTING)
CONDUITS TO BE CONCRETE ENCASED UNDER OPEN DRAINAGE. REFER DETAIL ON DWG 3E20105-32
14
14 SOLAR PV PHASE : BLUE
15 SOLAR PV PHASE : RED
16 SOLAR PV PHASE : WHITE
17 SOLAR PV PHASE : BLUE
18 SOLAR PV PHASE : RED
1x20P (BOLLARD)
2x32P (LIGHTING)
3x50P (UNITS 14-16)
2x40P (UNITS 17-18)
1x32P (LIGHTING)
1x20P (BOLLARDS)
2x40P (UNITS 19-20)
DB-2
BL6-1
BL2-4
1x20P (BOLLARD)
19 SOLAR PV PHASE : WHITE
13 SOLAR PV PHASE : WHITE
1x80P (DB2)
2x40P (UNITS 12-13)
1x20P (BOLLARD)
COMMUNITY GARDENS 2B
BL6-2
BL2-3
12 SOLAR PV PHASE : RED
1x20P (BOLLARD)
20 SOLAR PV PHASE : BLUE
1x80P (DB2)
BL5-2
BL2-2
1x20P (BOLLARD)
1x20P (BOLLARD)
11 SOLAR PV PHASE : WHITE
COMMUNITY SHED (BY OTHERS) PHASE : BLUE
21 SOLAR PV PHASE : RED
BL2-1
BL5-1
1x40P (COMM. SHED)
10 SOLAR PV PHASE : RED
1x80P (DB2)
2x40P (UNITS 10-11)
1x20P (BOLLARD)
2x50P (UNITS 21-22)
1x40P (COMM. SHED)
22 SOLAR PV PHASE : WHITE
1x20P (BOLLARD)
1x20P 1x32P
1x20P 1x32P
DB-1
1x20P (BOLLARD)
1x32P (LIGHTING)
2x40P (UNITS 5&6)
2x80P (DB1 & DB2)
1x20P (BOLLARD)
2x20P
2x20P (BOLLARD)
1x32P
LP3-1
BL3-4
BL3-2
BL3-1
BL4-1
BL1-4
1x20P
1x32P
2x40P
1x50P
2x80P
2x40P
1x32P
1x20P
BL4-2
BL1-3
BL1-2
BL1-1
LP5-1
EV
2x80P
1x32P
1x20P
1x50P
2x40P (UNITS 3-4)
1x40P (COMM. SHED)
2x50P (UNITS 21-22)
2x80P (DB1, DB2)
SMSB
MP
1x32P (LIGHTING)
1x50P (EV CHARGER)
2x80P (DB1, DB2)
1x32P
9 SOLAR PV PHASE : BLUE
8 SOLAR PV PHASE : WHITE
7 SOLAR PV PHASE : RED
6 SOLAR PV PHASE : BLUE
5 SOLAR PV PHASE : WHITE
4 SOLAR PV PHASE : RED
3 SOLAR PV PHASE : BLUE
2 SOLAR PV PHASE : WHITE
1 SOLAR PV PHASE : RED
4x40P (UNITS 1-4)
1x40P (COMM. SHED)
2x50P (UNITS 21-22)
2x80P (DB1, DB2)
LP4-1
ROAD 7
NEW WESTERN POWER UNI PILLAR
TO BE INSTALLED UNDER SEPARATE CIVIL WORKS PROJECT. REFER TO DRAWING 3E19082-01 AND WESTERN POWER PROJECT SS011728. REFER TO NOTES 16-18.