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TO	:	Tempus Village Management Pty Ltd - John Lewis
COPY	:	ECOS Engineering – Julian Oakes
FROM	:	Alan Coote / Arthur Reid
RE	:	Tempus Freycinet - Preliminary Site Infrastructure Services Return Brief

Please find herein and attached preliminary concepts as proposed by ECOS / CES and recently discussed including summaries of the considerations affecting the site, planning, budget and operations.

Attached are Electrical Site Plan, Schematic and Mechanical Services Concept drawings.

ELECTRICAL SERVICES

The following provides a summary of the proposed site power supply arrangement for the Tempus Freycinet development.

Tas Networks Infrastructure

The Aged Care Facility is on a separate title to the remainder of the development. To provide future ownership/ operational flexibility the retirement village and aged care facility will have separate Tas Networks supply points. In addition Tas Networks can interconnect these two supplies in their system so as to provide backup power in the event of substation maintenance or equipment failure. Regulations prevent such interconnections occurring between private installations. Supply capacity has been included in both supplies for electric vehicle charging. In the event that backup power is required from one supply to the other the electric vehicle charging capacity can be made available. This capacity is less than the full demand of each site so some load restriction would be necessary.

A preliminary meeting has been held with Tas Networks and the above arrangement has been agreed in principal. Tas Networks advised that an initial assessment indicated that the distribution infrastructure can support the load increase associated with the development. A formal distribution study to confirm this will be completed when a supply application is made.

Tas Networks will see 100% cost recovery for distribution infrastructure works associated with the development. These costs can only be determined by making a supply application so that Tas Networks will undertake the design and provide a supply offer.

Two pad mounted substations are proposed as indicated in the attached drawings. The substations must maintain adequate fire zone separation from adjacent structures. Tas Networks will require easements for both the substation and underground supply cabling.

Tas Networks advise lead times of 10 weeks for processing an application and 20 weeks for delivery of substation works. An application must be made well in advance to avoid delays during construction.

Power Supply Historical Data

The power supply reliability data since June 2017 is shown below.

Interrupted	Restored	Duration	Outage	Cause
5/05/2019 20:09	5/05/2019 20:38	0.49	Unplanned	Unknown
15/01/2019 8:43	15/01/2019 11:45	3.03	Unplanned	Lightning
22/11/2018 9:20	22/11/2018 15:00	5.67	Planned	Planned - Distribution work
14/10/2018 19:26	14/10/2018 22:02	7.32	Unplanned	Vehicle - Passenger vehicle
9/10/2018 7:18	9/10/2018 7:39	0.36	Unplanned	Unknown
27/08/2018 15:12	27/08/2018 17:50	8.55	Third Party	Vehicle - Passenger vehicle
15/08/2018 0:57	15/08/2018 8:23	11.05	Unplanned	Wind/Windborne debris
14/08/2018 23:15	14/08/2018 23:44	0.49	Unplanned	Unknown
3/08/2018 11:14	3/08/2018 11:30	8.34	Third Party	Vehicle - Passenger vehicle
19/07/2018 12:30	19/07/2018 13:28	0.97	Unplanned	Wind/Windborne debris
19/07/2018 5:49	19/07/2018 5:53	12.83	Unplanned	Vegetation - Outside Clearance
20/01/2018 0:10	20/01/2018 8:48	8.63	Unplanned Outage	FIRE
13/01/2018 13:53	13/01/2018 14:09	0.27	Transmission Outage	Transmission Fault
27/09/2017 10:28	27/09/2017 13:08	2.67	Unplanned Outage	Connector FailureX
4/06/2017 8:15	4/06/2017 8:30	0.25	Planned Outage	Planned Outage for System Work

There have been numerous lengthy outages making backup generators essential to ensure continued occupation of the facilities during any future power outages.

Aged Care Facility

The maximum demand of the Aged Care Facility power supply has been determined on an area basis for the general building services with additional allowances made for the kitchen and electric vehicle charging as follows;

General building services	820kVA (allowance of 80VA/ sqm)
Kitchen	110kVA
Electric vehicle charging	250kVA (also used as backup supply capacity)
Total	**1188kVA**

The next larger available transformer size is 1500kVA.

Some historical data for other retirement villages was obtained that indicated a lower area based demand. The difference in bare substation material costs excluding installation between a 1000kVA and 1500kVA transformer is approximately $16,000 excl GST. Any decision to reduce the substation size during the design phase should take into consideration the benefit of additional back up capacity between the two installations that could also be used for increased electric vehicle charging facilities in the future.

The Aged Care Facility main switchboard should be located in the basement level close to the external substation.

A stand by generator will be required to maintain a reduced level of essential servicing to the Aged Care Facility during area wide power outages. The generator capacity is likely to be in the order of 250kVA to meet the essential services demand of the Aged Care Facility.

Retirement Village

The retirement village consists of Communal Facility building, Independent Living Units (ILUs) and other resident recreational facilities. The maximum demand for this site has-been determined using an area based demand for the Communal Facilities building, AS3000 calculated demands for the ILUs and allowances for the remaining loads as follows

Communal Facilities Building	140kVA (allowance of 80VA/ sqm)
Pool	20kVA
Gym equipment	15kVA
Stables	10kVA

Workshop	20kVA
Site hydraulics	25kVA
Road lighting	6kVA
Path lighting	4kVA
Electric vehicle charging	250kVA
Independent Living units	585kVA
Total	**1075kVA**

The next larger available transformer size is 1500kVA.

The largest component of the maximum demand is the ILUs and actual maximum demand are often lower that the AS3000 calculation. Any decision to reduce the substation size during the design phase should take into consideration the benefit of additional back up capacity between the two installations that could also be used for increased electric vehicle charging facilities in the future.

The main switchboard should be located in Communal Facilities building lower level as it is close to the load centre for the site and the building maybe used as an emergency gathering location.

A stand by generator will be required to maintain services to the Communal Facility during area wide power outages. This generator should be sized to supply the full load of the Communal Facility building as well as site lighting and essential hydraulic services required to keep the site functional. The ILUs would not be connected due to the magnitude of the load. The generator capacity is likely to be in the order of 250kVA to meet this demand.

Site power distribution to free standing independent living units will be by individual service connections supplied from turrets. A maximum of 6 units can be connected at a Turret. Up to4 turrets will be supplied on feeders with total feeder loads up to 250A per feeder.

Where multiple ILUs are contained in a building the building will have a single service connection to a distribution switchboard and then distribute within the building to the individual ILUs.

Metering

The electrical distribution within the title containing the communal centre and ILUs will be an embedded network subject to the associated rules and regulations. The rules and regulations are currently being reviewed. The objectives of the regulations are to protect customer's rights and provide for choice of energy retailers. A consumer could either be part of a collective power purchase as an Off Market consumer or take an energy contract with a retailer as an On Market consumer.

This development will require a "Parent" meter at the point of supply and "Child" meters at each ILU and the communal facilities. The use of an authorised Embedded Network Manager to analyse the meter data and produce billing information will be necessary

Meters need to be provided as part of the construction and be of an approved type. The meters are likely to be networked and set up for remote reading by the Embedded Network Manager.

The physical electrical distribution to suit the above will include a Parent meter at the point of supply from Tas Networks and Child meters at each ILU and the communal facilities. The meters at the ILUs would be two element type meters to suit light/ power and heating/ hot water tariffs should the resident elect to become an On Market consumer. Wiring within each ILU will support the two tariff option. The meter for the communal facilities could be an import/ export meter to support the connection of the PV solar system.

It is recommended that the Embedded Network Manager be engaged prior to the detailed design and documentation phase to guide the correct selection of meters and associated communications to match their ongoing needs.

Street and Path lighting

Compliance with AS1158.3.1 is now included in the interim planning scheme (E6.7.7) where a road or car park serves more than 5 cars, see below.

Parking and vehicle circulation roadways and pedestrian paths serving 5 or more car parking spaces, used outside daylight hours, must be provided with Lighting in accordance with clause 3.1 "Basis of Design" and clause 3.6 "Car Parks" in AS/NZS 1158.3.1:2005 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) Lighting.

A/NZS 1158.3.1 contains a number of lighting category options that are selected on the basis of criteria such as night time activity, risk of crime and prestige. During the design process the category to be used in the design needs to be determined.

It is envisaged that roads will be illuminated from pole mounted street lights (approximately 6m high, with 25m spacing) and pathways with a lower pole mounted light fitting (approximately 2.5m high). The actual pole height and spacing will be determined during the design phase.

Light fitting will be selected to limit light spill so a snot to have an unreasonable impact on residential amenity.

External lighting should be connected to the essential power supply so that site lighting remains operational under generator supply during area wide power outages.

Renewable Energy

A solar photovoltaic power (PV) system is planned for installation at the Caravan and Boat Parking area. Metering is to be provided to monitor the system output. The workshop sub mains will need to be sized to allow for the system connection at the local switchboard.

The economics of the PV system are dependent on the energy supply tariff rates applicable for the imported energy replaced and the export rates. The tariffs contain a demand and energy components. Solar output during the day is unlikely to reduce the monthly maximum demand with savings coming from the reduced energy costs.

The approximate cost, installation area and annual energy output for different size systems is as follows.

25KW	$33,000 (incl STCs)	200sqm,	30,000Kwh/ Annum
50KW	$60,000 (incl STCs)	400sqm,	60,000Kwh/ Annum
100KW	$110,000 (incl STCs)	800sqm,	120,00Kwh/ Annum
200KW	$300,000	1600sqm,	240,000Kwh/ Annum

Up to 100Kw STCs can be claimed upfront. Above 100Kw the large generator certificates apply and these are established based on actual measured energy production.

Input from a specialist energy consultant is recommended to analyse and resolve the best tariff options to ensure the lowest power supply cost and determine the PV system payback period. Energy ROI, Mob. 0488785039 and Powercom Solar, Mob.0427612245 could assist.

MECHANICAL SERVICES

Mechanical services includes

ILUs / Apartments.

- Heating
  - Floor heating. Option for hydronic floor heating incorporated below.
  - Potential for active natural ventilation control.
- Gas usage
  - Gas cooking and gas heating.

Communal Facilities.

- Heating and ventilation.
  - Heating, Ventilation, Air Conditioning.
    Fresh air ventilation.
    Refuge during bushfire where ambient air quality may be affected by smoke.
    Incorporate electrostatic filters on fresh air and pressurise building.
  - Potential for active natural ventilation control.
- Gas usage
  - Gas cooking.
  - Gas heating / backup heat source for pool and occupied spaces.

Aged Care Facility.

- Heating and ventilation.
  - Heating, Ventilation, Air Conditioning.
    Floor heat in wet areas as minimum.
    Fresh air ventilation internal areas. Natural where possible.
    Smoke hazard management requires stairwell pressurisation (multiple stairs).
    Smoke compartments / Fire Engineering may require zone pressurisation.

- Gas usage
  - Gas cooking. Gas driers in Laundry.

Centralised Services

- Precinct Heating Water.
  - As the largest combined heating load will be ILU floor heating and considering the aspects of plant noise in built areas, efficiency of heating methods, economies of diversification etc. the concept of centralised heating water production and circulation around the site is worthy of close investigation.
    Precinct water at 40-45±°C can be efficiently produced by air-source (or other) reverse cycle heat pumps. LPG can act as a secondary back-up source of heat in case of failure or under-performance.
  - Precinct water can be metered and directly used for hydronic floor heating.
  - Precinct water can be further raised in temperature to heat air or DHW in secondary systems in the larger buildings.
  - Using the two main heat sources of RC-HP and LPG there will be redundancy, efficiency and options for various modes of operation to suit load conditions, ambient conditions and acoustic constraints.

  - Reverse Cycle Heat Pumps should consist of a minimum of three units for part load capacity and redundancy.

- LPG storage – Refillable LPG tank (approximately 55, 000 litre LPG)
  - Storage tank size is based on potential demand and, refill frequency (2 weeks).
  - Storage tank preliminary sizing is based on assumed appliance capacity and operating characteristics which must be further investigated.
  - The 55,000 litre tank would be approximately 11m long and 2.8m diameter. It would require approximately 11m separation from a Public place (includes roadways) and 20m from a Protected place (dwellings or storage).
  - The option to use LPG as a backup to precinct heating requires additional analysis. It will have an impact on tank sizing and may warrant a separate tank.
  - LPG Boost heating to precinct water is shown located in proximity to LPG storage for this reason and the heat pump systems for primary production are located in the vicinity of the Utility zone.

FIRE SERVICES

- Fire sprinklers in Class 9C Aged Care Facility.
  Other buildings depending on Fire Engineering.

LIFT SERVICES

- All lifts should be accessible.
- A number of lifts, capable of carrying a resident's bed shall serve the 3 levels of the Aged Care Facility.
  Roped machineroomless or hydraulic.
- Two lifts shall serve the staff / guest / resident blocks. Load capabilities should allow for furniture transport.
  One of the two lifts is proposed to travel higher to the Observation Deck.