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**GENERAL
SPECIFICATION**

FOR

**DESIGN, SUPPLY, INSTALLATION, TESTING,
WARRANTY, COMMISSIONING & MAINTENANCE**

OF

SOLAR PV SYSTEMS

**FOR
CITY OF STONNINGTON**

ISSUE RECORD		
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1 GENERAL

1.1 CONDITIONS OF CONTRACT

The Conditions of Contract that apply to City of Stonnington Solar PV System work is Australian Standard AS4305 – 1996 Minor works contract conditions.

In the event of any conflict occurring between the Conditions of Contract and any contractual information contained within this General Specification, the Conditions of Contract shall take precedence.

1.2 DEFINITIONS

- 'Council' shall mean the City of Stonnington
- 'Contractor' shall mean the person appointed by Council to carry out the Solar PV System work, as stated in Item 3 of the Annexure to the Conditions of Contract.
- 'Approved' means approved by the Council or their authorised representative

1.3 SITE VISIT

Contractors shall fully inform themselves of the nature of the work and visit the site of the work prior to submitting a quotation for the work.

The Contractor shall be deemed to have thoroughly inspected the site of the work prior to submitting a quotation and to have taken into account all conditions likely to affect the extent or performance of the work.

Failure to not fully understand the nature or extent of the work, or physical constraints, will not in any way relieve the Contractor of his responsibilities to perform the specified work at the fixed price accepted by Council.

1.4 RULES & REGULATIONS

The work shall be carried out in accordance with the requirements of all Statutory bodies, the Regulations and by-laws of all controlling Authorities and the relevant Australian Standards and Codes of Practice, including the requirements of the Building Code of Australia, the Building Surveying Authority, the Electricity Supply Authority, Wiring Regulations, ACMA, Department of Labour and Industry, Gas Supply Authority, the Environmental Protection Authority and any other Authority having jurisdiction over the work.

1.5 PROGRAM

Refer to the details provided in Section 1 of the Invitation to Quote for the desired commencement and completion dates and staging requirements for the work.

The Contractor shall be responsible for carrying out the whole of the work on time, in accordance with their Program submitted at the time of contract award, and any staging or sequencing requirements for the work, and shall be deemed to have included all necessary allowance for overtime work or other provisions to ensure this is achieved.

1.6 CONTINUOUS WORK

The Contractor shall exercise due care and diligence in carrying out the work, and unless otherwise directed, shall proceed continuously from the date of commencement and in accordance with the agreed Program to complete each of the required stages of the work.

1.7 MATERIALS AND WORKMANSHIP

All materials, fittings, accessories and apparatus shall be new and unused of first grade design and manufacture and shall comply with Authority requirements and the relevant Australian Standards.

The Contractor shall carry out all work in a thorough and competent manner and to the satisfaction and approval of the controlling Authority and the Council.

Where the Council considers that the workmanship is not consistent with proper trade practice or standards, or that any part of the installation is inferior in quality, or deficient in quantity to that specified, the work may be rejected and be required to be reconstructed by the Contractor to conform to the standard specified.

All work shall be carried out by approved competent qualified first class trades persons, licensed and or registered as required for the particular service to be installed, by the Controlling Authority or Regulatory Body having jurisdiction over the work.

1.8 MANUFACTURER'S REQUIREMENTS

All equipment and systems shall be installed in accordance with the specific recommendations of the manufacturer, including the provision of ancillary or safety devices deemed necessary. Failure to observe such recommendations may result in equipment or systems being rejected by the Council.

1.9 SETTING OUT, CUTTING AWAY AND MAKING GOOD

The Contractor shall set out, at the earliest opportunity the position and sizes of all penetrations, recesses, etc. necessary for the accommodation of the work and shall arrange with the Council to perform the specified associated building work in accordance with the Program.

1.10 CO-ORDINATION

The Contractor shall be responsible for checking and co-ordination of work with all existing services including Structural, Electrical, Mechanical, Fire Protection and Hydraulics prior to and during the work.

1.11 TESTS

The Contractor must carry out all necessary and required tests during the progress of the work, and must provide all the necessary apparatus for the purpose. Prior to testing, details of proposed test methods and apparatus shall be submitted for approval and where tests or measurements are required to be witnessed by the Council (e.g.. final commissioning of equipment and systems), then a minimum of seven days advance notice shall be provided by the Contractor.

1.12 DRAWINGS

The contract documents do not detail all pipes, fittings and cabling and the Contractor shall therefore allow for all wiring, pipe work, drops, risers, wrap-arounds and fittings which are required to co-ordinate with building details, structure and other services. The final location of all outlets, piping, cabling and equipment shall be co-ordinated with other services and architectural details and are to be clearly dimensioned on the workshop drawings prepared by the Contractor.

The contract drawings form part of this Specification and show the general layout of the work to be carried out. The drawings are diagrammatic only, and do not purport to show all the structural and architectural details. Any information involving accurate measurement of the building shall be taken from site measurement.

1.13 HOISTING AND SCAFFOLDING

Provide all necessary lifting, hoisting and scaffolding facilities to install plant and equipment, and to provide access for conducting the work, and include within the Quotation Sum.

1.14 PROTECTIVE MEASURES

Provide all measures to protect and safeguard personnel and property to carry out the work.

Make good damage arising to property, goods and services consequent to any failure with the protection and safeguarding measures.

The Contractor shall provide all necessary on-site storage facilities required to store goods and materials in a protected and secure manner.

1.15 APPLICATION AND FEES

The Contractor shall make application for all necessary permits and/or certificates required by all Authorities having jurisdiction over the Solar PV work and pay the associated fees including all on-site inspection fees.

1.16 SITE MEETINGS

The Contractor shall attend Site Meetings, as may be requested by the Council.

1.17 GST AND OTHER TAXES

Allow for all applicable Sales and Goods and Services Tax (GST) in the Quotation. Identify in the Quotation the amount of GST included.

1.18 COMPLIANCE CERTIFICATES AT PRACTICAL COMPLETION

The Contractor shall issue a Certificate before the date of Practical Completion. The Certificate shall state that the work completed complies with all the requirements of this Specification and the relevant Australian Standards and Regulations which apply to the work.

The Contractor shall also issue a Certificate of Compliance in accordance with the requirements of the Building Act 1993.

1.19 DEFECTS LIABILITY

The Contractor shall warrant the whole of the work carried out against defective workmanship and materials and against non-compliance of equipment or complete systems with specified performance and operation for the Defects Liability Period applicable under the Contract (52 weeks).

Throughout this period, the Contractor shall replace any materials, equipment, components or systems that do not comply with the specified performance and any defective workmanship at no cost. Replacement made during the Defects Liability Period shall be subject to a similar extended period of guarantee, commencing from the date of approval by the Superintendent of the replacement work.

2 SCOPE OF WORK

2.1 PROJECT OVERVIEW

The purpose of this Specification is to provide sufficient information for a CEC accredited Solar PV Contractor to provide a Quotation for the design, supply, installation, testing, warranty, commissioning and maintenance of the proposed Solar PV System.

This Specification provides minimum solar module specifications, minimum inverter specifications and roof framing requirements.

Small-scale technology certificates (STC's) should be claimed by the Contractor and included in all costs (keep STC rebates separate in Quotation for comparative reasons).

Proposed Solar PV layouts, inverter locations and electrical connection points have been suggested. Alternative locations can be suggested by the Contractor in compliance with Electricity Authority requirements, but would be subject to approval by the Council.

2.2 DRAWINGS - DESIGN

The drawings supplied indicate a proposed layout of the Solar PV System and equipment. The Contractor may submit an alternate layout that is more optimal in performance, provided that it meets all other requirements in this Specification.

The drawings do not detail all pipe, fittings and cabling and the Contractor shall therefore allow for all wiring, pipework, drops, risers, wrap-around and fitting which are required to co-ordinate with building details, structure and other services.

Any information involving accurate measurement of the building shall be taken from site measurement. Where necessary to take site measurements to correctly locate work, responsibility for the accuracy of such measurements rests solely with the Contractor.

2.3 THE WORK

The work comprises all labour, materials, equipment necessary to supply, install, test, commission and maintain during the Defects Liability Period the complete Solar PV installation, including all unspecified minor and obvious work to the satisfaction of the Superintendent.

- Allowance for hoisting of all new equipment and provision of all scaffolding, swing stages and lifting devices as necessary to perform the work.
- Obtain building, electrical and any other approvals required for the complete installation of the Solar PV system.
- Supply & installation of Solar PV panels.
- Supply & installation of Solar PV inverters.
- Supply & Installation of Solar DB and it's connection to the relevant DB/MSB.
- Solar PV AC&DC Sub-board's are to be provided adjacent to the inverters.
- Provision of complete mounting frame systems including non-penetrating feet (if applicable), tilts, rails and brackets, as required.
- Electrical installation to connect the Solar PV system by CEC accredited electricians only.
- Provision of access to each Solar PV module and Solar Inverters to allow for commissioning.
- Complete Solar PV system commissioning.
- Complete power output measurements to demonstrate compliance to required power outputs.

- Provision of a suitable monitoring/data collection system for accessing instantaneous solar data and power output data via the Council's network.
- Supply & installation of any additional monitoring equipment (if required) and all cabling and conduits.
- Provision of OHS documentation, including but not limited to working at heights, safe work method statements, etc.
- Provision of training to staff and electricians of shutdown procedures, monitoring software, maintenance regimes etc.
- All associated and necessary Builder's work are to be included in solar scope of work.
- Provision of electrical compliance documentation.
- Provision of operation and maintenance manuals.
- Allowance for out of normal hours work (out of normal hours work to include work that would cause interruption or disruption to normal operations) as required by the Council.
- Provision of 12 months Defects liability warranty and service including all parts and labour and preventative maintenance for the duration of the Contract's Defects Liability Period commencing from the Date of Practical Completion. Allow for a minimum of four inspections during the Defects Liability Period.

2.3.1 Authorities & Codes

Each Solar PV system shall be installed in accordance with the requirements and regulations of all authorities and codes relevant to the work including but not limited to the following:-

- Supply Authority Requirements
- Victorian Service and Installation rules
- Building Code of Australia and any applicable dispensations
- AS 3000 Australian Wiring Rules
- AS 4777 Grid Connection of Energy Systems via inverters
- AS 1768:2007 Lightning Protection
- AS 5033:2005: Installation of Photovoltaic (PV) Arrays
- AS 3008.1.1 Electrical Installations - selection of cable.
- AS 1170.2:2002: Structural Design Actions - Part 2, Wind Actions

2.3.2 Solar PV System Design

Each Solar PV System shall meet the following criteria:

- Have a service life of 25 years
- Each Solar PV System is to be 'future proofed' for battery connection in the future.
- Solar PV Module Warranty is valid for a minimum of 10 years
- Solar PV Inverter Warranty is valid for a minimum of 10 years

3 SOLAR PV SPECIFICATION

3.1 SOLAR PV MODULES

The Solar PV Modules shall meet the following criteria:

- Be on the approved list of CEC Solar Panels
- Each solar module must have a minimum peak power of 300W
- Mono-crystalline or Poly crystalline
- Have a maximum temperature co-efficient (Pmax) of -0.45%/°C or less
- Have a linear performance warranty (or equivalent) of at least 90% guaranteed power after 10 years and 80% after 25 years.
- Preference will be given to solar module manufacturers who score well on the 2016-17 Solar Scorecard.
- Be designed and installed in an aesthetic, symmetrical and optimal configuration, approved by the Council.

3.2 SOLAR PV INVERTERS

The Solar PV Inverters shall meet the following criteria:

- Be on the approved list of CEC Solar Inverters
- Have a weighted European Inverter efficiency factor >95%
- Have a minimum of 2 MPP trackers per inverter
- Be able to connect to the Council network via ethernet
- Anti-islanding protection system required
- Overload, short circuit and transient protection required.

3.2.1 Solar PV Inverters Location

Each Solar Inverter shall be wall mounted and the Solar PV Contractor is to ensure restricted access to the Inverters as per AS/NZS 5033. The Contractor shall provide a mesh lockable cage or the like to enclose the Solar PV Inverters if not being installed within a compliant enclosure.

3.3 SOLAR PV SYSTEM MONITORING

The Solar PV Monitoring System is to be connected to the Council's network and include the following features:

- Instantaneous power readings (kW)
- Energy yield (kWh)(day, month, year)
- System status (on/off)
- PV array output for each inverter and total system
- Ability to generate reports
- Ability to send service messages

The system shall be capable of logging and storing data with a minimum of 5 years historical data capacity (minimum 30 minute intervals).

3.4 SOLAR PV SYSTEM FRAMING

The Contractor is to provide specific details of the proposed solar array framing. The Contractor shall ensure that:

- The framing footings are to be of the non-penetrative type (where applicable).
- Provide verification of the framing to AS1170.2 including Engineering Certification from the frame supplier.
- The framing shall be installed to the Manufacturer's recommendations to ensure AS1170.2 compliance and will consider minimum spacing between fixings for the specific wind regime.
- The framing is to be weatherproof and corrosion resistant.
- The framing is concealed under the solar PV modules.

3.5 ENVIRONMENTAL CONSIDERATIONS

The Contractor is required to provide equipment and materials with externally located items suited to the installation and the prevailing environmental conditions, including but not limited to:

- Maximum outdoor ambient temperature (44.1°C in 2009)
- Minimum outdoor ambient temperature (-6°C in 1982)
- Humidity (RH range 5% to 100%)
- Wind (maximum recorded gust 120km/hr)
- Marine conditions (proximity to nearest large salt water body)

3.6 SCHEDULED POWER SHUT DOWN

The power to the associated buildings must be maintained during the work, wherever possible. Liaise with Council for shut down of power to enable connection to the distribution board/MSB. Allow for a weekend cut-over to avoid disruption to the buildings.

3.7 INCIDENTALS & MAKING GOOD

The Contractor is responsible for and shall pay all costs arising from incidental work that is required of this Contract. This work may include:

- Proper installation and concealment of all conduits, piping and other services
- Installation of proper supports and fixings
- Weather flashings
- Making good all services, wall penetrations, re-painting and fire rating as required.

3.8 COMMISSIONING

The commissioning of the Solar PV system is to be conducted in accordance with the solar panel and inverter manufacturer's requirements. The commissioning must also prove that the installation meets the design specifications.

A commissioning report is to be provided with certification that all equipment and installation work meet and are able to operate in accordance with the relevant Australian standards, legislation and any requirements from the electricity authority.

3.9 DOCUMENTATION/MAINTENANCE MANUALS

The Contractor is to provide 3 x hard copies of as-installed documentation and maintenance manuals as specified below within 3 weeks of the Date of Practical Completion. It is recommended to issue electronic copies of documentation first to allow approval from the Council before hard copies are sent.

The maintenance manuals shall include:- Index (table of contents) and divided as follows:

- A. System description
- B. Operating procedures and equipment schedules
- C. Suppliers and contractors
- D. Operating and maintenance instructions
- E. As installed drawings including PV layout, circuitry details and schematics
- F. Manufacturer's literature
- G. Testing and commissioning data
- H. Certificates of all services
- I. Warranties
- J. Monitoring equipment instructions and passwords

The maintenance manuals are also to be provided in electronic form on CD/DVD. Manufacturer's brochures on all other electrical equipment and accessories, e.g. solar modules, inverters, cabling, framing and the like. Maintenance procedures (monthly, quarterly, six monthly, annually, etc. in accordance with Australian Standards and on recommendation by the manufacturer). A list of service companies and agencies for maintenance of components, equipment and systems.

3.10 TRAINING

The Contractor is to provide training to any person nominated by the Council at a time agreed and is to include as a minimum:

- Overview of the Solar PV system
- Explanation of the maintenance manual to clarify system details and features
- Monitoring software training including data reporting features
- Shutdown and emergency procedures

3.11 MATERIALS, STANDARDS & WORKMANSHIP

All materials, fittings, accessories and apparatus shall be new and unused of first grade design and manufacture, and shall comply with the relevant Australian Standards.

Workmanship shall be of a high standard throughout. Where the Council considers that the workmanship is not consistent with proper trade practice or standards, or that any part of the installation is inferior in quality, or deficient in quantity to that specified, the work may be rejected and be required to be reconstructed to conform to that specified.

All electrical work shall be carried out by electrical trades people licensed to operate in Victoria with CEC Solar Accreditation.

The work shall be carried out strictly in accordance with this Specification.

Any alternatives to specified equipment shall only be permitted with the written approval, during tender period by the Superintendent.

3.12 LABELLING

Supply & install labels for all Solar PV system isolators, circuit breakers and other relevant equipment, including but not limited to service panel locations and solar inverter enclosures.

Approved signage and warning labels shall be incorporated on the distribution board and the main switchboard of the building.

3.13 WIRING

Supply and install the complete wiring system for the Solar PV installation in accordance with AS 3000, AS 5033 and the Clean Energy Council Installation Guidelines Section 7.7.

For industry best standards the voltage drop shall be below 1% from the array to the MSB.

Unless otherwise noted or approved by the Superintendent, all cables and conduits shall be concealed. Within ceiling spaces, all cables shall be mounted on catenary wires.

In all cases, wiring must be installed so that any cable can be easily replaced at any time in the future without damage to the building.

Power cables shall be kept separate from data and security cables in accordance with ACMA standards. Cables shall be run in configurations designed to reduce magnetic effects.

Where cables pass under external walls of buildings they shall be enclosed in PVC conduits with long sweep radius bends. Continuous lengths of cables for all new cables shall be used.

All conductors shall be annealed high conductivity copper conductors in accordance with AS1125. TPI and TPS cables shall be V-75, manufactured in accordance with AS1125. Conductors smaller than 1.5mm sq shall not be used except as detailed for control wiring.

3.14 EARTHING

Supply and install the complete earthing system for the Solar PV installation in accordance with AS 3000 and the Clean Energy Council Installation Guidelines Section 7.8. Equipotential bonding required to comply with AS 5033.

3.15 STRING PROTECTION

For String protection, adhere to the Clean Energy Council Installation Guidelines Section 7.9 and AS 5033 clause 3.3.4 and clause 3.3.5.1.

3.16 PV ISOLATOR AT ARRAY

Adhere to the Clean Energy Council Installation Guidelines Section 7.10.

3.17 PV ARRAY CABLE

Adhere to the Clean Energy Council Installation Guidelines Section 7.11.

3.18 LIGHTNING PROTECTION

Lightning protection to comply with AS 1768. The Contractor must check that the building and Solar PV System has adequate lightning protection.

4 WORKSHOP DRAWINGS

The Contractor shall be responsible for the preparation and submission to the Council for approval of his own Workshop Drawings and documents required for the fabrication and installation of the work.

Submit shop drawings for Council's review/comments prior to installation.

The drawings shall be of a scale not less than 1:50 and must be approved by the Council prior to commencement of any manufacture or installation.

Shop drawings shall include at least electrical and instrumentation schematics, solar PV system layouts, parts lists and cable runs. On completion of work, these drawings shall reflect the As-built installation.

Drawings submitted for approval will be notated by the Superintendent to indicate that construction or installation may commence, or alternatively marked or notated "Resubmit", which will automatically require the sample and/or drawing to be amended as required and resubmitted.

Drawings shall be submitted within sufficient time to permit modifications to be made without delaying the work if such are deemed necessary by the Council and to allow the Council not less than seven (7) working days to make his comments.

Drawings shall be supplied with a sufficient number of copies as may be required for co-ordination purposes, be prepared by competent draftsmen (freehand drawings will NOT be accepted) and be preferably in AutoCAD format. (Note that the final As-Installed documents shall be provided in AutoCAD format as specified.)

5 AS-INSTALLED DOCUMENTATION

The Contractor shall update as-installed drawings and provide details of all new equipment manuals prior to the Date of Practical Completion. A draft copy shall be submitted to the Council for approval prior to compiling the final sets.

As installed documentation shall include at least electrical and instrumentation schematics, solar PV system layouts, parts lists and AC&DC cable runs.

6 PERFORMANCE GUARANTEE

The Contractor will be deemed to guarantee that the installed plant/equipment, when operating in accordance with the instructions provided, shall provide the capacities scheduled at the conditions nominated.

The Contractor shall verify with the equipment supplier that the completed installation complies fully with all warranty conditions. Provide full warranty for all new equipment covering parts and labour for the duration of the Defects Liability Period. Where the manufacturer's warranty period is for a lesser period, the Contractor shall include all costs for extending the warranty to the end of the Defects Liability Period.

**QUOTATION BREAKDOWN
SUPPLY, INSTALLATION,
TESTING, WARRANTY, COMMISSIONING & MAINTENANCE OF
SOLAR PV SYSTEM AT(Insert Site Name)**

The following breakdown of the Fixed Price Lump Sum Tender is required:

	System Offer 1	System Offer 2
1. Site Preliminaries	\$ _____	\$ _____
2. Supply of PV Modules	\$ _____	\$ _____
3. Supply of PV Inverters	\$ _____	\$ _____
4. Supply of PV Framing	\$ _____	\$ _____
5. Supply of all wiring, Solar DB and balance of system	\$ _____	\$ _____
6. Installation of Solar PV System	\$ _____	\$ _____
7. Crane/Scissor Lift hire (if required)	\$ _____	\$ _____
8. Grid Connection approvals and Cost	\$ _____	\$ _____
9. Secondary Grid protection if required	\$ _____	\$ _____
10. Monitoring Equipment (including connection to Council network)	\$ _____	\$ _____
11. Twelve Month's Maintenance / Defects Liability	\$ _____	\$ _____
12. Testing & Commissioning	\$ _____	\$ _____
13. Extra warranties (if required)	\$ _____	\$ _____
14. Other (please denote)	\$ _____	\$ _____
15. STC Discount	\$ _____	\$ _____

Total Fixed Lump Sum Tender Price (Offer 1): \$ _____

Total Fixed Lump Sum Tender Price (Offer 2): \$ _____

Date for Completion of Project Work: _____

Signed:

Tenderer:

Address:

Dated:

Witness:

