ENERGY EFFICIENT UPGRADE OF TUMBARUMBA’S WATER SUPPLY PUMPING STATIONS

Final Progress Report
July 2013
FOREWORD

This final report for the Energy Efficient Upgrade of Tumbarumba’s water Supply Pumping Stations is prepared to fulfil the requirement of Australian Government, Department of Climate Change and Energy Efficiency’s funding Agreements requirement. The report presents the detail of project activities from concept to completion.

This is a very successful project, in terms of resources utilization, management and benefits to community. It has made possible the Council to deliver its water supply services using less energy and also help to reduce the costs associated with running the pumps.

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Introduction

Background

Tumbarumba Shire Council is situated on the western side of the Snowy Mountains in New South Wales.

Tumbarumba Shire Council is currently operating two pump stations; one bore pump station at McMeekin Street, and the other drawing water from Tumbarumba Creek for its water supply. Tumbarumba Creek pump stations transfer the raw water to the 68ML storage tank located on the water treatment plant site. McMeekin Bore which is directly connected to the town’s water supply reticulation after chlorine treated.

Old pumping systems used in both pump stations were not optimised to achieve efficient operation, primarily due to the pumps being both oversized and fixed speed; resulting in excess consumption of power.

Tumbarumba Shire Council has been successful in obtaining funding from the Australian Government’s Community Energy Efficiency Program to upgrade the pumps used for Tumbarumba’s drinking water supply.

On November 2012 Council was successful in obtaining $75,000 funding from the Australian Government’s Community Energy Efficiency Program towards replacing the 25 year old pumps at the Tumbarumba Creek and McMeekin St bore. This was matched by $75,000 of Council’s own funds. With this financial assistance of the Australian Government the energy efficient upgrade was successfully commenced.

Council engaged NSW Public Works to prepare a suitable strategy and technical specification to upgrade the pumping arrangement using appropriately sized pumps to suit variable flow rates and by providing other facilities such as smart metering to operate pumps during off-peak times when power tariffs are lower. NSW Public works also provided advice to Council in evaluation of quotations and project management.

It consisted of the replacement of the existing pump at Tumbarumba creek and McMeekin bore with a Variable Speed Drive (VSD) controlled pump, provide a Smart Metering Management system to operate the pumps during off-peak power tariff times.

Quotations were called and the contract for the supply, installation and commissioning of the Tumbarumba Creek Pump and McMeekin Bore works was awarded to QMAX Pumping System in April 2013.

There was a delay to appoint subcontractor/award the work but regardless of this, the project was successfully completed within the time frame and within the allocated budget.
Project Objective

The main objectives of the project were to;

i. Decrease the operational cost of the town water supply for the Tumbarumba Township.

This was achieved by installing new efficient pump including new electrical switchboard fitted with VSD control and associated electrical services. The new pumping system replaced the old large capacity pump at McMeekin Bore and fixed rate large pump at Tumbarumba Creek Pump Station.

ii. Optimise the energy usage.

The new facility is able to operate the pumps during off-peak power tariff times. Pump Start and Stop time will be based on pre-set times (adjustable by the operator) selected by the operator on the HMI (Human Machine Interface, touch Screen) on the pump unit. This pre-set timing facility will allow the pumps to run only during off-peak power tariff times. The ON and OFF times will be 11PM to 7.00AM Monday to Friday and 10PM Friday to 7AM Monday.

In summary, upon completion of the project, both of these important objectives had been satisfied.

Scheme Concept

For many decades, the residents of Tumbarumba Township have suffered from the poor quality of its water and the limitations of its water supply.

The residents of Tumberumba underwent considerable hardship during the severe water restrictions imposed to mitigate the impact of depleted water sources during the drought conditions between 2001 and 2010. The socio-economic impacts of this difficult period affected most aspects of daily life and business activity in the town.

Tumbarumba water supply currently sources its raw water mainly from Burra creek (Primary Source). Water form this creek is supplied to the Tumbarumba reservoir, a 68ML storage tank, via 10km gravity main. Burra creek has a hydraulic capacity of approximately 4ML/d.

Water from Tumbarumba reservoir is treated at the new water treatment plant located next to the reservoir and supplied to the town for potable applications.

Raw water from the Tumbarumba Creek (secondary Source) is also used by pumping the water into the 68ML storage tank when Burra Creek flow is low. Water from Tumbarumba Creek is used if the supply from Burra Creek is not sufficient to meet town demand. Council
generally imposed water restriction if water has to pump from Tumbarumba Creek; it was mainly due to high operational cost. Hence the Tumbarumba Creek’s supply was limited.

Further, Tumbarumba water supply has a currently operating bore on McMeekin Street in the town. This bore is directly connected to town’s potable reticulation treated with chlorine only. McMeekin St Bore is mainly operated during the drought when the supplies from creeks are not sufficient for town’s demand.

Council commissioned a number of reports looking at all aspects of the local water cycle to identify opportunities for improving the quality and quantity of water supply.

In 2012, Community Energy Efficiency Program provided an opportunity for Council to upgrade its old pumping system with the efficient pumping system. Tumbarumba Shire Council has been successful in obtaining funding from the Australian Government’s Community Energy Efficiency Program to upgrade the pumps used for Tumbarumba’s drinking water supply.

Council engaged NSW Public Works to prepare a suitable strategy and technical specification to upgrade the pumping arrangement using appropriately sized pumps to suit variable flow rates and by providing other facilities such as smart metering to operate pumps during off-peak times when power tariffs are lower. NSW Public works also provided advice to Council in evaluation of quotations and project management.

The proposed upgrading was intended to replace the old Southern Cross Model SC50-09, 15kw three phase motor which is capable of pumping approximately 60m³/Hour (17 L/s) at 130m head McMeekin bore with submersible borehole type turbine pumps with the duty of 1-4 L/s at 179 m head including new electrical switchboard fitted with VSD control. And a fixed speed Southern Cross MHC 18-A-F Tumbarumba Creek pump to be replaced with end suction centrifugal pumps with the duty of 8-20 L/s at 124 m head including new electrical switchboard fitted with VSD control associated electrical services.

In the new system Pump Start and Stop time will be based on pre-set times (adjustable by the operator) selected by the operator on the HMI (Human Machine Interface, touch Screen) on the pump unit. This pre-set timing facility will allow the pumps to run only during off-peak power tariff times.

**Contract for the supply, installation and commissioning of the Tumbarumba Creek and McMeekin Bore Pumps**

Quotations were called and the contract for the supply, installation and commissioning of the Tumbarumba Creek Pump and McMeekin Bore works was awarded to QMAX Pumping System in 2 April 2013. The Contract Sum was $146,570.00 (excl GST).

The final commissioning of the project was completed on 14th June 2013.
Project Funding

Without the assistance of the Australian Government, the project could not have succeeded. The Australian Government provided $75,000.00 under Community Energy Efficiency program. The remaining funds for the project were provided by Tumbarumba Shire Council.

The project has been successfully completed at an all up final cost including initial investigations and Council management costs of $162,183.94 (excluding GST). The project was managed by Tumbarumba Shire Council. All of the Milestones set in the Funding Agreement by the Australian Government were satisfied.

Project Management

Council provided its own project and construction management services, and sought expert advice, as required. Also advice from the NSW Department of Finance and Services (Public Works) staff greatly assisted in the project.

The Community Energy Efficiency Program, Energy Branch Department of Resources, Energy and Tourism were very helpful and have provided guidance to Council staff to manage and successfully complete this project.

The Contractor, QMAX Pumping System are commended for excellent project management. Their staff worked very closely with Council Management staff on the project ensuring quality workmanship and timely completion of milestones.

Council’s own Water Committee played a very effective role providing direction and guidance during the project period.

This has proven to be a very successful, well managed project, completed within the time and budget without any compromise in quality, regulatory, environmental or safety requirements.

Communication Activities

The project’s activities and progress was discussed in the Council’s Water Committee meeting during the project period.

The CEEP department was communicated via emails, mails and telephone during the project period. The department provided support and guidance to Council’s staff management team to complete the milestone reports on time. Department approved the Council’s request for extension in time for the third, fourth and fifth milestone and also approved the Council’s request to appoint QMAX Pumping Systems as a subcontractor.

The contribution by the Australian Government towards this project has been greatly appreciated by the community of Tumbarumba. This contribution has been stated to the
community of Tumbarumba in local press items reporting progress on the project, on Council’s web sites and in the Community news letter.

New Pumping System

Following work has been carried out under this project at each pumping station;

1. Supply, installation, testing and commissioning of one set of new submersible borehole type turbine pumps with the duty of 4 L/s at 179 m head including new electrical switchboard fitted with VSD control and associated electrical services at McMeekin bore.

2. Supply, installation, testing and commissioning of one set of new end suction centrifugal pumps with the duty of 20 L/s at 124 m head each including new electrical switchboard fitted with VSD control associated electrical services at Tumbarumba Creek Pump Station

3. Pump Start and Stop time are based on pre-set times (adjustable by the operator) selected by the operator on the HMI (Human Machine Interface, touch Screen) on the pump unit. This pre-set timing facility will allow the pumps to run only during off-peak power tariff times. The ON and OFF times will be 10:00PM to 7.00AM Monday to Friday and 10:00PM Friday to 7AM Monday.

4. The electrical switchboard with VSD (Variable Speed drives) get a 4-20 mA feed back signal and totalised flow pulse signal from the electromagnetic flowmeter on the respective pumping system to vary the pump speed, deliver the target flow rate, and for monitoring and no-flow protection.

5. Digital power monitoring system is provided at each station for real-time information to manage the electricity use and costs.

6. Mc Meekin bore is fitted with pressure bulb type level sensor to facilitate low water level protection for the borehole pump.

7. The Tumbarumba Creek Pump Station has a pressure transmitter fitted on the suction line to facilitate loss of suction lift. In addition, the electromagnetic flow meters will provide signals to the SCAs (Switchboard Control Assemblies) for no-flow protection for the pumps.

8. Provision has been made for the future telemetry system for remote monitoring and control.

The pump system is incorporated with the necessary alarm system to ensure the continuous pump operation. Alarms alert operational staff to abnormal conditions that may result in performance outside the specified requirements, danger to pump, failure of equipment and system faults.
Environment

There were very minimal environmental impacts of construction and operational activities. However, all practical efforts were undertaken to minimise the noise emission, air/dust pollution, and the priority was to protect the environment from any unanticipated consequences during the construction and commissioning activities.

Project Energy Efficiency Improvement

Tumbarumba Creek Pump and McMeekin bore are generally operated to back up the Burra Creek Source which is the primary source of water for the Tumbarumba Township. During the winter months Burra source is sufficient to meet the town demand so the Tumbarumba Creek and McMeekin Bore wouldn’t run during winter. As the upgrade work just recently completed and both pumps are not operating at the moment, an estimate of the likely energy usage based on past average usages is provided in the following table.

Table A: Energy Efficiency Baseline and Improvement

<table>
<thead>
<tr>
<th>Building, facility or site Category Type</th>
<th>Measuring Energy Efficiency Data</th>
<th>Additional Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Pumping- Tumbarumba Creek Pumping Station</td>
<td>$0.10/kL</td>
<td>• Volume of water pumped - 100ML/yr</td>
</tr>
<tr>
<td>Water Pumping- McMeekin Bore</td>
<td>$0.06/ kL</td>
<td>• Volume of water pumped - 90ML/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Change in head may affect energy consumption</td>
</tr>
</tbody>
</table>

Table B: Project Energy Efficiency Improvement

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>Energy Efficient Upgrade of Tumbarumba’s Water Supply Pumping Stations</th>
<th>PROJECT ID</th>
<th>CEEP1231</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUNDING RECIPIENT</td>
<td>Tumbarumba Shire Council</td>
<td>DATE</td>
<td>02/07/2013</td>
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</tbody>
</table>

Building Facility or Site 1

<table>
<thead>
<tr>
<th>Name of Building Facility or Site 1</th>
<th>Tumbarumba Creek Pump Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (Address)</td>
<td>Mate Street, Tumbarumba 2653</td>
</tr>
<tr>
<td>Type of Building, Facility or Site</td>
<td>Tumbarumba Creek Water Pump Station</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Upgrade of Pumping System</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Energy Efficiency Estimate Method</td>
<td>Based on the actual power tariff data in Council’s recent power bills</td>
</tr>
<tr>
<td>Base Line Energy Usage</td>
<td>59,641 kWh per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>2.147 MJ per kL</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>Reduction 6,535kWh/year = 23,526 MJ per annum</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>Daily hours of operation: off peak hour tariff from 10:00pm to 7:00 am</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$91,557.00</td>
</tr>
<tr>
<td>Estimated Cost Savings</td>
<td>$9,696.00/year</td>
</tr>
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</table>

**Building Facility or Site 2**

<table>
<thead>
<tr>
<th>Name of Building Facility or Site 1</th>
<th>McMeekin Bore Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (Address)</td>
<td>McMeekin Street, Tumbarumba 2653</td>
</tr>
<tr>
<td>Type of Building, Facility or Site</td>
<td>Bore Water Pump Station</td>
</tr>
<tr>
<td>Activity Type and Measure</td>
<td>Upgrade of Pumping System</td>
</tr>
<tr>
<td>Energy Efficiency Estimate Method</td>
<td>Based on the actual power tariff data in Council’s recent power bills</td>
</tr>
<tr>
<td>Base Line Energy Usage</td>
<td>34,167kWh per annum</td>
</tr>
<tr>
<td>Baseline Energy Efficiency</td>
<td>1.37 MJ per kL</td>
</tr>
<tr>
<td>Energy Efficiency Improvement</td>
<td>Reduction 47,500kWh/year = 171,000 MJ per annum</td>
</tr>
<tr>
<td>Reporting Data (Measuring Energy Efficiency and Additional Data)</td>
<td>Daily hours of operation: off peak hour tariff from 10:00pm to 7:00 am</td>
</tr>
<tr>
<td>Cost of Activity</td>
<td>$70,627.00</td>
</tr>
<tr>
<td>Estimated Cost Savings</td>
<td>$18,716.00/year</td>
</tr>
</tbody>
</table>

*(Source: Energy Efficiency Audit prepared by NSW Public Works)*
Conclusion

The operation of new pumping system has opened the opportunity to pump the available raw water from Tumbarumba Creek and McMeekin bore to 68 ML Tumbarumba reservoir in an efficient way by optimising the energy usage or by running pumps during off-peak power demand time. By replacing the pumps, Council will save approximately $28,000 each year in electricity costs. Council may pump water from Tumbarumba Creek and McMeekin bore to manage the town demand with lower level or no water restriction.

The contribution by the Australian Government towards this project has been greatly appreciated by Tumbarumba Shire Council and the community of Tumbarumba without who’s financial assistance this project could not have taken place.

Snapshot of Activities

Tumbarumba Creek Pump Station
Tumbarumba Creek New Pump

Touch Screen Control System (HMI)
New Switch Board and Touch Screen HMI

Tumbarumba Creek Flow Meter and New Piping
McMeekin Bore Switch Board and HMI

McMeekin Bore
Reference

A copy of this report is also available in the Council Website

www.tumbashire.nsw.gov.au

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DECLARATION

The Authorised Officer of the organisation makes the following declarations

☐ I declare that I am authorised to submit this Milestone Report (including any attachments) on behalf of

.......................................................................................... (Name of organisation)

☐ I declare that the information provided in this Milestone Report is true and accurate.

☐ I understand, and acknowledge that giving false or misleading information in this Milestone Report is an offence under the Criminal Code Act 1995.

☐ I understand that progress payments will only be made in accordance with the Funding Agreement including on satisfactory completion of Milestones.

Authorised Officer Signature: ........................................ Date: 20.1.2013

Name: ........................................................................

Position: ........................................................ Organisation: ..................................................

Witness Signature: ........................................ Date: 20.1.2013

Name: ........................................................................

Position: ........................................................ Organisation: ..............................................

The use and disclosure of information provided in this application is regulated by the relevant provisions and penalties of the Public Service Act 1999, the Privacy Act 1988, the Freedom of Information Act 1982, the Crimes Act 1914 and the general laws of the Commonwealth of Australia.

The information contained in this application will be regarded as private and confidential and will be treated as such by the Department. This is subject to the operational need to provide applications to assessors, and any statutory or legal requirements to provide information to the Commonwealth Parliament and other organisations, for audit, law enforcement, investigative or other legitimate governmental purpose.

As part of the assessment process for this application, the Department may need to consult with, and provide material from this application to, other government agencies or bodies, other organisations and/or relevant individuals, in order to substantiate any claims or statements made in this application, or to otherwise assist in the assessment of this application. If this occurs, the Department will endeavour to ensure that the parties who are consulted observe appropriate confidentiality provisions.

If this application is approved, the broad details of the application may be disclosed by the Department for purposes such as promoting the program and reporting on its operation and policy development. This information may also be used in answering questions in Parliament and its committees. In addition, the selected project information will be made publicly available. Public announcements may include the name of the successful applicant and of any project partners; title and description of the project and its intended outcomes; and amount of funding awarded.