



Attachments

**UNDER SEPARATE COVER
ORDINARY COUNCIL MEETING**

6:00PM, TUESDAY, 26TH NOVEMBER, 2019

Table of Contents

| | | |
|--------|---|----|
| 8.1.5 | Delivery Program/ Operational Plan Quarterly Progress Report | |
| | Attachment 1 Quarterly Progress Report - Q1..... | 4 |
| 8.1.12 | Annual Local Government New South Wales Conference - Warwick Farm 14th - 16th October, 2019 | |
| | Attachment 1 Cr Linda Scott - Association Initiatives | 56 |
| 8.6.1 | Concept Design Report, Cootamundra Water Supply System Rechlorination and Reservoir Review | |
| | Attachment 1 Cootamundra Chlorination Strategy | 66 |
| | Attachment 2 Reservoir Recholrination..... | 80 |

Delivery Program / Operational Plan

Quarterly Progress Report

2019/2020 Q1 (July-September 2019)

GENERAL MANAGER

General Manager

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------|----------|--|
| Councillors will support and advocate for the needs of all members in our community. | 4.1a (1) | Councillors available and contactable by community members | General Manager | Ongoing | 100% | Councillor's contact information is available on Council's website and can be obtained upon request. |
| Investigate options to work in partnership and enter into joint venture arrangements to make better use of facilities within the local government area. | 1.2c (5) | Provide Council representation on relevant Section 355 Committees | General Manager | In Progress | 50% | Majority of s.355 committees have council representation. An updated report will be provided to council. |
| Actively seek and apply for funding opportunities which deliver additional income and contribute to community objectives. | 2.1a (4) | Pursue available grant opportunities | General Manager | In Progress | 25% | Applications submitted for Stronger Country Communities round 3. |
| Support and advocate for the installation of the National Broadband Network across the local government area. | 2.1d (2) | Facilitate provision of information on the NBN to the Community on Council's website | General Manager | In Progress | 25% | NBN being rolled out and communicated to rate payers through various media channels. |

Page 1 of 52

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|---|----------|---|------------------------------|-------------|----------|--|
| Undertake connection of water supply to the Dog on the Tuckerbox site. | 2.3c (4) | Commence preparation of an option agreement for the Dog on the Tuckerbox site | General Manager | Completed | 100% | Option agreement has been established. |
| Seek funding for projects aimed at supporting the protection and sustainability of our natural environment. | 3.1d (5) | Grant Funding opportunities pursued and secured when available | General Manager | In Progress | 25% | Applications submitted for Stronger Country Communities round 3. |
| Councillors will use all occasions presented to advocate for funding and assistance from other levels of government and agencies. | 4.1b (1) | Seek funding opportunities when available | General Manager | In Progress | 50% | Applications submitted for Stronger Country Communities round 3. |
| Participation in LG NSW as the representative body of Local Government in order to improve the standing of Local Government in NSW. | 4.1b (2) | Advocate for increases in federal assistance grant funding for Regional NSW | General Manager | Completed | 100% | Council resolved and sent letters to support this action. |
| Participation in relevant REROC activities that will benefit the local government area. | 4.1b (3) | Participation in REROC events and activities | General Manager | Ongoing | 25% | Participated in REROC board meetings, Energy Workshop, Waste Forum, Youth Forum and any other events and activities hosted by REROC. |
| Work in partnership with community members, businesses and all levels of government to deliver community priorities. | 4.1b (6) | Participation in Stakeholder events and activities | General Manager | In Progress | 25% | Attendance at various events and activities undertaken. |

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|--|----------|--|------------------------------|-------------|----------|---|
| Support for Councillors to attend training, conference and development opportunities will be provided. | 4.1e (1) | CGRC attendance at the Local Government NSW Annual General Conference | General Manager | Completed | 100% | CGRC attended the Local Government NSW Annual General Conference. Report provided to the November Council Meeting. |
| Programs and activities which encourage and develop the capacity of current and future community leaders is provided. | 4.1e (2) | Identify programs and activities which encourage and develop the capacity of current and future community leaders | General Manager | Ongoing | 25% | Councillors have attended various seminars and training. |
| Provide and maintain services and infrastructure that assists the efficient and effective undertaking of the duties of the elected Council. | 4.1e (3) | Continue to provide and maintain services and infrastructure to assist elected representatives in undertaking their duties | General Manager | Ongoing | 25% | Councillors have attended various seminars and training. Hardware provided to facilitate Councillors in their role. |
| Support Council's elected representatives in undertaking their role in the community. | 4.1e (4) | Continue to provide administrative support to Council's elected representatives to assist in undertaking their role in the community | General Manager | Ongoing | 25% | Administrative support provided to Council's elected representatives. |
| Review the efficiency and effectiveness of Council's adopted Organisational Structure and ensure the structure and staffing mix can adequately deliver the activities approved by Council. | 4.3f (2) | Implement Operational Plan activities | General Manager | In Progress | 25% | Operational plan being delivered as required. |

Development, Building and Compliance

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|--|-------------------|----------|--|
| Provide accurate and timely advice regarding existing and proposed development within the legislative scope of Council. | 2.2a (3) | Inspections undertaken within 48 hours of notification | Manager Development, Building and Compliance | Ongoing | 100% | This is an ongoing measure. All inspections are undertaken within 48 hours of notification with many being undertaken in 24 hours or less. |
| | 2.2a (3) | Responses to enquiries provided within 5 working days | Manager Development, Building and Compliance | Ongoing | 100% | This is an ongoing action with responses to enquiries provided within 5 working days, many are responded in less time. |
| Develop and operate development control plans to ensure compliance with appropriate legislation and to achieve the best possible planning and development outcomes for the community. | 2.2b (1) | Commence preparation of new draft Development Control Plan | Manager Development, Building and Compliance | Not Yet Commenced | 0% | Drafting of the DCP will commence upon completion of LEP. |
| Develop and operate development control systems which ensure compliance with appropriate legislation and achieve the best possible environmental outcomes. | 3.1a (1) | Ongoing and continued assessment of all applications against environmental impact and legislative requirements | Manager Development, Building and Compliance | Ongoing | 100% | This is a statutory requirement and completed by all assessment staff. All applications are assessed for impact in accordance with legislation, assessment reports and decisions are recorded. |
| Contribute to coordinated planning and reporting across local, regional, state and federal areas for the | 3.1d (4) | Monthly lodgement of ABS statistics | Manager Development, Building and Compliance | Ongoing | 100% | Reports completed and submitted as required. |

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| management of the environment. | 3.1d (4) | Monthly lodgement of Building Professionals Board (BPB) statistics | Manager Development, Building and Compliance | Ongoing | 100% | Reports completed and submitted. |
| Develop and operate development control systems to ensure compliance with appropriate legislation and to achieve the best possible development outcomes for the community. | 3.2a (1) | Provide Development Applicants with relevant information concerning Disability Discrimination legislation | Manager Development, Building and Compliance | Ongoing | 100% | This is a standard condition on all applications. |
| Ensure new development is considerate of our heritage. | 3.2a (2) | Assessment of all Development Applications includes heritage considerations as applicable and in accordance with the LEP | Manager Development, Building and Compliance | Ongoing | 100% | All applications are assessed in accordance with legislative requirements, including heritage. The assessment reports and decisions are recorded as required by legislation. |
| Ensure that planning and development controls are in place to promote and facilitate a variety of housing options for residents. | 3.2b (1) | Commence preparation of new draft Development Control Plan | Manager Development, Building and Compliance | Not Yet Commenced | 0% | Drafting of DCP will commence upon completion of LEP. |
| Determine development applications in an efficient and effective manner based on merit | 4.1c (3) | 80% of DAs determined within statutory 40 days' timeframe | Manager Development, Building and Compliance | Ongoing | 100% | Development applications are assessed within legislative timeframes. 80% of applications meet this requirement. Staffing levels do, at times, make this difficult to achieve. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|--|-------------------|----------|--|
| Develop and operate safe food handling and public health controls. | 1.3c (2) | Implement a Food Safety Education Scheme by promoting the benefits of food safety to our communities and educating operators on food safety practices | Manager Development, Building and Compliance | In Progress | 10% | The employment of a dedicated environmental health officer in late July has seen the commencement of a program of risk based inspection and education with food shop operators. |
| Work with land-owners, farmers and other agencies to advocate for the protection of the local agricultural sector through an effective land-use strategy. | 2.1b (1) | Complete Rural Land Strategy | Manager Development, Building and Compliance | In Progress | 80% | The strategy is to be placed on public exhibition the first week in October with a view to being brought back to Council for adoption in November 2019. |
| Develop and operate development control systems which support the protection of agricultural land. | 2.1b (2) | Commence development of new LEP and DCP | Manager Development, Building and Compliance | Not Yet Commenced | 0% | Background strategic studies are nearing completion. Upon completion of these studies and adoption by Council the drafting of the LEP will commence. The DCP controls will commence after the LEP drafting is complete. |
| Implement a range of initiatives which support and promote the sustainable development of the towns' Central Business Districts and industrial land. | 2.1e (1) | Commence preparation of Cootamundra and Gundagai Town Strategies | Manager Development, Building and Compliance | In Progress | 80% | The Cootamundra 2050 Town Strategy is to be placed on public exhibition in the first week of October with a view to being brought back to Council for adoption in November. The Gundagai Town Strategy will be undertaken in 2020. |

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| Encourage growth in development and construction locally. | 2.1e (3) | Develop factsheets for developing and building in the local area | Manager Development, Building and Compliance | In Progress | 10% | Identification of existing and required factsheets has been undertaken. Some existing factsheets require updating and this has commenced. Limited staff resources at present has seen this item progress less quickly than would have been ideal. |
| Develop a new, comprehensive Local Environmental Plan for the local government area. | 2.2a (1) | Commence preparation of new draft Development Control Plan | Manager Development, Building and Compliance | Not Yet Commenced | 0% | Drafting of the DCP will commence upon completion of the LEP. |
| Identify and address current and future land-use needs through integrated strategic planning and development. | 2.2a (2) | Commence preparation of new draft Comprehensive Local Environmental Plan | Manager Development, Building and Compliance | Not Yet Commenced | 0% | The last of the background Strategic planning documents are nearing completion; the drafting of the LEP will commence upon completion of the studies. |
| | 2.2a (2) | Develop Rural Land Use Strategy | Manager Development, Building and Compliance | In Progress | 80% | This strategy is to be placed on public exhibition in the first week of October with a view to being reported to Council in November for adoption. |
| Develop and operate development control plans to ensure compliance with appropriate legislation and to achieve the best possible planning and development outcomes for the community. | 4.3a (4) | Develop new Section 7.11 Development Contribution plan and Section 64 Headworks Charges | Manager Development, Building and Compliance | Not Yet Commenced | 0% | These plans will be drafted upon the completion of the LEP drafting. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
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| Identify and follow-up opportunities to increase Council's revenue base including grant funding opportunities to deliver additional income to fund major projects. | 4.3a (4) | Identify grant opportunities to fund major projects as they arise, lodge grant applications as appropriate | Manager Development, Building and Compliance | Ongoing | 100% | Grants are applied for as appropriate and when available. |

Regulatory Services

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------|----------|--|
| Provide well-maintained cemeteries and efficient, appropriate and dignified cemetery operations and services that create the most peaceful surroundings possible for funeral parties and visitors. | 4.3d (5) | Complete the Mapping of Cemeteries for plot identification, future planning and publishing of information online | Manager Regulatory Services | In Progress | 60% | Project continuing. |
| | 4.3d (5) | Develop a Cemetery Services Strategic plan | Manager Regulatory Services | In Progress | 20% | Development of the Cemetery Services Strategic Plan has commenced. |
| A range of programs are supported, promoted and controlled to encourage and enforce responsible companion animal ownership. | 1.3c (3) | Continue Companion Animals Audit | Manager Regulatory Services | Ongoing | 25% | Companion Animals Audit continuing. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|--|-------------|----------|---|
| Develop and operate safe food handling and public health controls. | 1.3c (2) | Implement a Food Safety Education Scheme by promoting the benefits of food safety to our communities and educating operators on food safety practices | Manager Development, Building and Compliance | In Progress | 10% | The employment of a dedicated environmental health officer has seen the commencement of a risk based inspection and education program. Fact sheets are under development to assist in food operators increase their skills and knowledge in safe food handling. |
| Maintain an active involvement and positive relationship with FRNSW, RFS and SES, Health, Ambulance, Police, Local Land Services and all emergency services organisations within the legislative framework and for the benefit of the community. | 1.3d (3) | Liaise with Local Emergency Operations Controller to ensure coordination of emergency management assistance | Manager Regulatory Services | Ongoing | 25% | Coordination conducted at the Local Emergency Management Committee meetings (LEMC) scheduled four times a year. Next meeting scheduled for November 2019. |
| Provide administrative support for the co-ordination of the various emergency services to provide the most effective disaster management for the community. | 1.3d (4) | Provide administrative support to emergency management meetings | Manager Regulatory Services | Ongoing | 25% | Administrative support provided on an ongoing basis. |
| A range of programs are supported, promoted and controlled to encourage and enforce responsible | 1.3c (3) | Analyse data captured through Companion Animals Management System (CAMs) for resource reviews | Manager Regulatory Services | Completed | 95% | Data captured and CAMs systems is up and running. Data still to be analysed. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
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| companion animal ownership. | 1.3c (3) | Conduct two (2) Education and Awareness Days in regard to Companion Animals | Manager Regulatory Services | In Progress | 50% | Free Education and Awareness day scheduled for 23 November 2019, these are to be run in conjunction with the free microchipping days. |
| | 1.3c (3) | Conduct two (2) Free Microchipping Days for Companion Animals | Manager Regulatory Services | Ongoing | 50% | Free microchipping day scheduled for 23 November 2019. |
| Co-ordinate between the District and Local Emergency Management Committees and provide effective emergency management assistance as required. | 1.3d (1) | Liaise with the District and Local Emergency Management Committees to ensure coordination of Emergency Management assistance | Manager Regulatory Services | Ongoing | 25% | Local Emergency Management Committee meetings scheduled for four (4) times a year. Next meeting scheduled for November 2019. |
| Develop and maintain effective and well tested emergency management plans. | 1.3d (2) | Conduct annual review and update of the Local Emergency Management Plan and Emergency Management Procedures | Manager Regulatory Services | Completed | 100% | Completed in August 2019. |
| Provide administrative support for the co-ordination of the various emergency services to provide the most effective disaster management for the community. | 1.3d (4) | Establish and equip functional Emergency Operations Centres at Cootamundra and Gundagai | Manager Regulatory Services | In Progress | 80% 40% | Cootamundra centre 80% completed. Gundagai centre 40% completed. |

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| Provide, maintain and upgrade as funding permits the saleyards facility which allows the regular sale of animals from this and surrounding districts in a suitable environment. | 2.1b (3) | Current Saleyards facility maintained | Manager Regulatory Services | Ongoing | 25% | Saleyards facility maintained on a regular and ongoing basis. |
| Provide a facility through which used chemical drums can be disposed of correctly. | 3.1c (3) | Provide a drum muster collection service each year at both Cootamundra and Gundagai | Manager Regulatory Services | Ongoing | 25% | Drum Muster collection service is available on a scheduled day in February, May, August and November as well as available on an on-demand basis in Cootamundra and is available on an on-demand basis in Gundagai. |
| A range of programs are supported, promoted and controlled to reduce and enforce illegal dumping. | 3.1d (6) | Investigate options for technology, to enhance illegal dumping surveillance | Manager Regulatory Services | In Progress | 5% | Options are being investigated. |
| | 3.1d (6) | Undertake illegal dumping surveillance | Manager Regulatory Services | In Progress | 5% | Surveillance options are being investigated. |
| Noxious weeds will be contained, reduced or eliminated as appropriate. | 3.1e (1) | Develop a Community Education and Awareness program in regards to weed management | Manager Regulatory Services | In Progress | 25% | Community Education and Awareness program not yet developed, however weeds management education has been provided to farmers. |
| | 3.1e (1) | Undertake Weed Control program in conjunction with Riverina Regional Strategic Weed Management Plan 2017-2022 | Manager Regulatory Services | Ongoing | 25% | Weed Control Program continuing on an ongoing basis. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------|----------|--|
| Promote and deliver programs and initiatives which promote and educate the community on noxious weeds and pest management practices. | 3.1e (2) | Participate in the Managers Established Pest Animals and Weeds Project (MEPAAW) | Manager Regulatory Services | Ongoing | 25% | Participation in progress. |
| Provide well-maintained cemeteries and efficient, appropriate and dignified cemetery operations and services that create the most peaceful surroundings possible for funeral parties and visitors. | 4.3d (5) | Construct non-denominational beams at Coolac, Nangus, South Gundagai and Tumblong Cemeteries | Manager Regulatory Services | Completed | 100% | All beams installed. Project Completed. |
| | 4.3d (5) | Provide signage, seating and additional landscaping for the Gundagai Area Cemeteries | Manager Regulatory Services | In Progress | 40% | Seating and landscaping completed. Signage yet to be provided. |

Community and Culture

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|-------------------------------|-------------|----------|---|
| Ensure the best interests of local volunteer and community organisations are promoted where ever possible. | 1.1c (1) | Identify appropriate avenues to promote and support the best interests of local volunteer and community organisations where ever possible | Manager Community and Culture | In Progress | 30% | Promotion of various community events and activities through print, radio and online. |
| Encourage volunteerism across the local government area. | 1.1c (2) | Identify appropriate avenues to promote, support and encourage volunteerism across the local government area | Manager Community and Culture | In Progress | 30% | Planning underway for new Friend of Gundagai Gaol Group and support to Bradman Museum and Heritage Centre volunteers. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|-------------------------------|-------------|----------|---|
| Provide support and funding where possible to support a range of community groups deliver positive outcomes for the local community. | 1.1c (3) | Investigate funding opportunities | Manager Community and Culture | Ongoing | 25% | Several SCCF3 and other funding program applications of community groups supported. |
| Develop and implement accessibility strategies as identified in the Disability Inclusion Access Plan. | 1.1e (1) | Advocate for access to respite services for carers of disabled children | Manager Community and Culture | In Progress | 20% | Engaging in industry discussion and keeping informed of changes. |
| | 1.1e (1) | Advocate for the allocation of more resources for education, early intervention and childcare for children with a disability | Manager Community and Culture | In Progress | 20% | Keeping informed of industry and changes. |
| | 1.1e (1) | Conduct a triennial survey of service providers to garner information on access issues in the area | Manager Community and Culture | Completed | 100% | Audit paperwork obtained ready for assessment. |
| | 1.1e (1) | Ensure information concerning accessible public transport including Community Transport is readily available | Manager Community and Culture | Completed | 100% | Information is available and council is aware of where to refer people. |
| | 1.1e (1) | Ensure signage on Council buildings is clear and easy to read | Manager Community and Culture | Completed | 100% | Official audit yet to be completed but new signage installed is in keeping. |
| | 1.1e (1) | Ensure that the needs of all stakeholders are considered on all Council committees | Manager Community and Culture | Ongoing | 25% | Strategies have been identified and are being implemented to ensure the needs of all stakeholders are considered on council committees. |

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|---------------------------------------|----------|--|-------------------------------|-------------|----------|--|
| | 1.1e (1) | Ensure the Council's Community Strategic Plan considers barriers to an inclusive community and any issues raised | Manager Community and Culture | Ongoing | 0% | Council to ensure that Council's Community Strategic plan considers accessibility. Any updates made to the Community Strategic plan will consider this, as well as the new plan to be created in 2028. |
| | 1.1e (1) | Provide appropriate information on the available access in promotional material for community and tourism events | Manager Community and Culture | Ongoing | 25% | Appropriate information being developed and provided where applicable. |
| | 1.1e (1) | Provide opportunities for stakeholders to easily report access concerns | Manager Community and Culture | Ongoing | 25% | Provided through council complaints process and the Access & Inclusion Committee. |
| | 1.1e (1) | Provide support to community organisations in seeking funding for accessibility and inclusion projects | Manager Community and Culture | Ongoing | 25% | Support provided to community organisations, wherever possible, to assist with sourcing funding. |
| | 1.1e (1) | Review Council documents to make them easy to complete for people of all abilities. All forms to include how people can access assistance in completion | Manager Community and Culture | In Progress | 20% | Changed newsletter to larger print. |
| | 1.1e (1) | Update existing Council channels to ensure that they have the ability to include access information and other stakeholder requirements, and that this is collected | Manager Community and Culture | In Progress | 20% | Strategies gradually being put in place. Will be an ongoing action. |

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| | 1.1e (1) | When updating mapping and websites include access information on facilities and activities | Manager Community and Culture | In Progress | 20% | Some updates have been made as identified. Project will be ongoing, and is still underway. |
| Continue to consult with local health services providers and identify and advocate for opportunities to improve the quality and range of health services provided in the local government area. | 1.3a (1) | Initiate and participate in Community Drug, Alcohol and Mental Health first response meetings | Manager Community and Culture | In Progress | 25% | Attended meetings and provided assistance where able. |
| | 1.3a (1) | Participate in Interagency Network opportunities | Manager Community and Culture | Ongoing | 25% | Attended meetings. |
| Promote a wide range of health and community services offered by various agencies in the local government area. | 1.3a (2) | Utilise available mediums for promotion of services | Manager Community and Culture | Ongoing | 20% | Shared information given to Council by service providers. Listings of Health and Community Services promoted on Coota local/Gundagai local and CGRC website. |
| Provide and maintain Mirrabooka Community Centre building to facilitate health and welfare needs of the community. | 1.3a (3) | Undertake improvements at Mirrabooka Community Centre | Manager Community and Culture | In Progress | 70% | Works underway, some remain. |
| Work with various agencies to promote a range of programs, activities and opportunities which improve the health, well-being and employability of our community. | 2.4a (2) | Facilitate mediums to promote programs activities and opportunities offered in the local government area by other bodies | Manager Community and Culture | Ongoing | 25% | Promotion provided through websites, social media and email newsletters on request. |

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| Provide modern, vibrant and relevant library services, programs and activities to the community in conjunction with Riverina Regional Library (RRL). | 1.1a (4) | Consider the needs of stakeholders in developing library collections and services | Manager Community and Culture | In Progress | 65% | Customer requests, collection weeding (based on loans) and program based feedback used to respond to stakeholder needs effectively. |
| | 1.1a (4) | Implement program to encourage Library membership and increase overall membership numbers | Manager Community and Culture | Ongoing | 70% | <ul style="list-style-type: none"> * Sign Up September, RRL membership drive, saw memberships double from the previous month in Gundagai, also giving welcome packages (including book bag, pencil and book mark) and entering all new members into the 'new member' draw to be decided at the end of November. * Cootamundra Library had 33 new members sign up in September. * Penny Howse spoke to the local ladies Probus group in September to highlight library services and to attract new library members. |
| Encourage the development of initiatives to welcome new residents and make them aware of the opportunities which exist in the local government area. | 1.1a (3) | Develop and retain current centralised information on the LGA's attributes in the towns and villages including features, events and services | Manager Community and Culture | In Progress | 70% | New Cootamundra Website launched. Ongoing updates to New Resident Packs, Country Change information and Coota/Gundagai local sites. |
| | 1.1a (3) | Promote and make available, Liveability Information to residents via Council's website | Manager Community and Culture | In Progress | 70% | Tourism websites updates, Coota/Gundagai local and support to a number of community events. |

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| Build and sustain partnerships with cultural and arts bodies, and the local arts community, to support activities and to secure funding for cultural and arts development in the local government area. | 1.1b (1) | Pursue available grant opportunities | Manager Community and Culture | Ongoing | 0% | Worked with the Arts Centre Cootamundra to develop SCCF3 Funding applications. Ongoing work in developing the Old Mill Cultural Centre in Gundagai. |
| Provide assistance to art and cultural bodies to promote and develop programs and facilities. | 1.1b (2) | Advocate for funding for the Fit for the Future masterplan project for The Arts Centre Cootamundra | Manager Community and Culture | In Progress | 80% | Funding application submitted to SCCF3. |
| Continue to provide and maintain the local museums both as a repository and for public viewing of valuable local historical memorabilia. | 1.1d (1) | Continue to provide and maintain local museums | Manager Community and Culture | Ongoing | 50% | Ongoing support to museum operations. |
| Seek funding opportunities for the conservation and enhancement of local historical buildings and structures and undertake these activities. | 1.1d (2) | Investigate funding opportunities | Manager Community and Culture | Ongoing | 25% | Funding application for the Old Mill at Gundagai. Successful funding for the WW2 Heritage site at Cootamundra. |
| | 1.1d (2) | Secure funding for Main Street Heritage Paint Scheme in Gundagai and the Wallendbeen Heritage Study | Manager Community and Culture | Completed | 100% | Funding secured for Main Street Heritage Paint scheme in Gundagai and the Wallendbeen Heritage Study. |

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| Facilitate the coordination and promotion of the different historical groups and heritage assets within the local government area. | 1.1d (3) | Identify ways to promote the different historical groups and heritage assets within the local government area | Manager Community and Culture | Ongoing | 20% | Promotion through social media. |
| Enhance the amenity and appearance of our towns' main streets. | 1.2a (1) | Commence preparation for the creation of a Masterplan for Cootamundra CBD | Manager Community and Culture | In Progress | 0% | Report to October Council Meeting for stage 2. |
| | 1.2a (1) | Construct Gundagai Main Street Public Toilet | Manager Community and Culture | Completed | 100% | Gundagai Main Street Public Toilet project completed. |
| Provide and maintain a clean and attractive streetscape. | 1.2a (2) | Provide an attractive streetscape, by implementing the strategies identified in the Open Spaces Strategy | Manager Community and Culture | Ongoing | 20% | Strategies are being implemented. |
| Plan for and manage the construction of public space upgrades as funding permits. | 1.2a (3) | Investigate options for improving access to local businesses | Manager Community and Culture | In Progress | 20% | Audit paperwork is yet to be completed. |
| Improve the amenity of town and village entrances. | 1.2b (1) | Plan signage upgrades for entry to towns and villages | Manager Community and Culture | In Progress | 0% | Stockinbingal heritage walk and Tumblong interpretive signs under development. |
| Develop and implement an integrated Tourism and Economic Development | 2.1a (1) | Analyse 'standardised visitor data' to build a visitor profile | Manager Community and Culture | In Progress | 50% | Branding and marketing strategy under development. |

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| Strategy for the Cootamundra-Gundagai region. | 2.1a (1) | Appoint an Economic Development/Tourism Officer in Cootamundra | Manager Community and Culture | Completed | 100% | Tourism and Economic Development Officer appointed. |
| | 2.1a (1) | Arrange two annual joint meetings with the Cootamundra Tourism Action Committee and the Gundagai Tourism Action Committee | Manager Community and Culture | In Progress | 50% | One meeting held, further meeting to be held in March 2020. |
| | 2.1a (1) | Commence preparation for creating and maintaining Council's tourism websites | Manager Community and Culture | In Progress | 25% | Cootamundra tourism website complete, Council website yet to be reviewed. |
| | 2.1a (1) | Consider Assess Trails, Art Trails and Walking and Riding Trails, in budget development deliberations inclusive of capital and operational expenditure, for 2019/20 and beyond | Manager Community and Culture | In Progress | 20% | Trail funding sought through SCCF3. |
| | 2.1a (1) | Coordinate a workshop with businesses and Tourism Action Committees to plan for growth in the visitor economy held | Manager Community and Culture | In Progress | 25% | Tourism forum in Cootamundra held, Gundagai to be convened in new year. |
| | 2.1a (1) | Determine costing and funding source for an LGA wide promotional documentary | Manager Community and Culture | In Progress | 10% | Considering funding opportunities. |
| | 2.1a (1) | Implement 'standardised visitor data capture' | Manager Community and Culture | In Progress | 20% | Yet to be implemented at some sites. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|-------------------------------|-------------------|----------|--|
| | 2.1a (1) | Implement masterplan improvements to Heritage Centre and have shovel ready for grant applications | Manager Community and Culture | Not Yet Commenced | 0% | Need to develop masterplan and seek council endorsement. |
| | 2.1a (1) | In collaboration with investors/owners, assist in the creation of a masterplan for an outlet for local produce at the Old Gundagai Mill site | Manager Community and Culture | In Progress | 40% | Plan for site redevelopment drafted. |
| | 2.1a (1) | Prepare update reports to Council on achievements, against the action plan contained in the Tourism and Economic Development Strategy | Manager Community and Culture | Not Yet Commenced | 0% | Update report to be prepared for January 2020 Council meeting. |
| | 2.1a (1) | Secure and develop The Motorcycle Collection as a tourism attraction in Cootamundra | Manager Community and Culture | In Progress | 0% | Need to determine a suitable site. |
| Work in partnership with individuals, the private sector, other agencies and levels of government to deliver economic development initiatives. | 2.1a (2) | Facilitate and host a meeting with businesses across the LGA annually to discuss business conditions and issues impacting growth | Manager Community and Culture | Completed | 100% | Business Networking evenings to be held each October. Business Networking evening has been scheduled for 2019. |
| | 2.1a (2) | Identify businesses who would partner with Council in a program of regularly updated information distributed from their premises | Manager Community and Culture | In Progress | 30% | Information distribution through motels and food outlets has been in place for some time. Need to review information available in food businesses. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|-------------------------------|-------------|----------|---|
| | 2.1a (2) | Negotiate new memorandum of understanding with Cootamundra Development Corporation | Manager Community and Culture | Completed | 100% | Memorandum of understanding has been negotiated with Cootamundra Development Corporation. |
| Implement strategies which encourage the growth of the local population. | 2.1a (3) | Participate in Country Change initiative | Manager Community and Culture | Ongoing | 25% | Council participated in the initiative and will continue. |
| Work with key partners to explore and advocate for opportunities to better utilise and develop transportation and freight networks which meet our community needs. | 2.1c (1) | Investigate options to better use and develop transportation and freight networks in the Local Government area | Manager Community and Culture | In Progress | 10% | Invited potential developer to meet with Council. |
| Promote the development of efficient telecommunications technology for business, land owners, education and health needs. | 2.1d (1) | Support and promote the NBN installation in the Local Government area, which drives high quality connectivity to meet business and student needs | Manager Community and Culture | Completed | 100% | NBN roll out supported and promoted where appropriate. |
| Promote to the community and industry groups potential | 2.1e (2) | Facilitate communication mediums for training and funding opportunities for businesses | Manager Community and Culture | Ongoing | 20% | Ongoing through social media and newsletter. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|-------------------------------|-------------------|----------|--|
| growth opportunities and development efficiencies. | 2.1e (2) | Identify value adding opportunities (use of new technology, processes and packaging, collaborations, shared transport costs, use of waste materials for new products etc.) to maximise the opportunities in the sectors where Cootamundra-Gundagai's competitive advantage exists | Manager Community and Culture | In Progress | 0% | Statistical information obtained ready for opportunities to be determined. |
| Work in partnership with agencies and other levels of government to support local businesses. | 2.1f (1) | Facilitate and support local business training opportunities | Manager Community and Culture | Ongoing | 25% | Several training sessions held. |
| Work with key partners and local business owners, investors and employers to investigate, advocate for and promote opportunities for business development and networking. | 2.1f (2) | Develop a list of available industrial land and publish quarterly updates on Council's website | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| Maintain a close liaison and continue to work with Regional Development Australia. | 2.1f (3) | Attend Regional Development Australia forums | Manager Community and Culture | Ongoing | 25% | Attended Regional Development Australia forum. |
| | 2.1f (3) | Participate in the Country Change Initiative | Manager Community and Culture | Ongoing | 25% | Council participated in the initiative and will continue. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|-------------------------------|-------------------|----------|--|
| Develop and implement an integrated Tourism and Economic Development Strategy for the Cootamundra-Gundagai region. | 2.3a (1) | Implement strategies from the Tourism and Economic Development Strategy | Manager Community and Culture | In Progress | 50% | Strategy developed, implementation underway. |
| Work co-operatively with key partners to identify opportunities and to further promote the local government area to tourists and visitors. | 2.3b (1) | Include access information on facilities and activities when updating mapping and websites | Manager Community and Culture | Ongoing | 0% | Ongoing, updated as identified and as required. |
| | 2.3b (1) | Investigate options for the production of a Mobility Map | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| Work with the community to develop a marketing strategy for the local government area as a tourist destination. | 2.3b (2) | Develop Branding Marketing Strategy for Tourism and Economic Development of the Local Government Area | Manager Community and Culture | In Progress | 50% | Under development. |
| Ensure local programs, activities and events are actively promoted via a range of mediums to attract and encourage visitors and tourists. | 2.3b (3) | Create, maintain and promote a Calendar of Activities, Programs and Community Events | Manager Community and Culture | Completed | 100% | Calendar of Activities, Programs and Community Events have been created for both areas, and are regularly maintained and promoted. |
| | 2.3b (3) | Develop Cootamundra Tourism Website and both hardcopy and email Events Newsletter | Manager Community and Culture | Completed | 100% | Cootamundra Tourism Website and both hardcopy and email Events Newsletter developed. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|-------------------------------|-------------------|----------|--|
| | 2.3b (3) | Implementing a competitive application based events funding program in the LGA with guidelines for grant process and eligibility criteria to be developed, by 31 December 2019, and advertising for applications, by 29 February 2020 | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| Provide a high quality accommodation facility at the Caravan Parks in Cootamundra and Gundagai for the use of visitors. | 2.3c (3) | Review existing Caravan Park facilities, recommend improvements and consider funding options | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| Maintain and improve the tourism infrastructure, facilities and services in the local government area to make our area an attractive place to visit. | 2.3c (5) | Commence implementation of the recommendations of the Gundagai Gaol Masterplan | Manager Community and Culture | In Progress | 20% | Drainage work underway. |
| | 2.3c (5) | Develop Strategic Management Plan for WWII inland aircraft fuel depot | Manager Community and Culture | In Progress | 10% | Consultant engagement to prepare interpretive materials. |
| Develop a Place Plan which incorporates the Economic Development, Open Space Recreation, Arts and Cultural and Disability Action Strategies. | 4.1c (4) | Develop Placemaking plan for the planning decision and management of Public Spaces in the Local Government Area | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|-------------------------------|-------------------|----------|--|
| Provide and maintain Visitor Information Centres which meet the needs of tourists and visitors to our local government area. | 2.3c (1) | Analyse Visitor Services Review conducted in 18/19 and conduct further research as necessary | Manager Community and Culture | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| Undertake a redevelopment of the Gundagai Visitor's Information Centre. | 2.3c (2) | Re-develop the Gundagai Visitors Information Centre, including removal of internal visitors toilets, provision of a theatrette space and accessibility improvements | Manager Community and Culture | Not Yet Commenced | 0% | Yet to commence. Seeking further funding. |
| Continue to foster and support the Youth Council. | 4.1b (5) | Develop a Youth Council in Cootamundra | Manager Community and Culture | In Progress | 25% | Role of Youth & Inclusion Officer advertised. |

Finance and Customer Service

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|--------------------------------------|---------------------|----------|--|
| Provide quality customer service during all "front line" interactions between Council and the community and in all other interactions between staff, agencies, Council and the community. | 4.3d (1) | Develop and implement a new Customer Service Charter | Manager Finance and Customer Service | In Progress | 60% | Customer Service Charter has been developed. Early stages of implementation underway. |
| Requests for service are processed in an efficient and effective manner. | 4.3d (4) | Complete Customer Satisfaction Survey to provide comparison data for the benchmark identified in 2018 | Manager Finance and Customer Service | Not Due to Commence | 0% | Scheduled for first half of 2020. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|--------------------------------------|---------------------|----------|---|
| | 4.3d (4) | Review responsibilities and provide training to enable customer service staff to respond to Planning and Rating enquiries | Manager Finance and Customer Service | In Progress | 50% | CGRC hosted customer service staff from neighbouring councils at a 2-day rates for counter staff training session conducted by LGTI. Similar training on planning is being investigated. |
| Ensure Council's long term financial planning supports the delivery of community expectations and financial stability. | 4.3a (1) | Undertake processes to consolidate Council's rating structure | Manager Finance and Customer Service | In Progress | 15% | Councillor workshops have been held to identify priorities. Financial modelling will be conducted when land values provided by the Valuer General have been finalised. |
| Ensure the availability of finances are managed, controlled, reviewed and regularly reported on in order to provide the appropriate services and facilities within the allocated budget and achieve the maximum value for expenditure. | 4.3a (2) | Prepare and implement procedures to enable all staff with budget responsibility to effectively operate Council's integrated budgeting process | Manager Finance and Customer Service | In Progress | 75% | <p>Reporting procedures have been enhanced to enable managers to monitor budgets on a daily basis.</p> <p>Monthly reporting procedures running well.</p> <p>September 2019 Quarterly Budget Review completed one month ahead of schedule.</p> <p>Further expansion on reporting by department managers to be completed.</p> |
| Support and funding for elections is provided as required. | 4.3b (2) | Make provision in the Long Term Financial Plan for funding of the 2020 Council elections | Manager Finance and Customer Service | Not Due to Commence | 0% | Will be included in 2020 budget, to be complied early 2020. |

Business

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------|----------|--|
| Deliver a range of programs, activities and events and ensure they are planned, promoted and executed in an efficient, inclusive and professional manner. | 1.1a (1) | Develop a Civic Events and Ceremonial Functions Policy | Manager Business | In Progress | 70% | A draft policy has been developed and will be circulated for comment |
| Work with our community to promote community spirit by assisting with the administration, organisation and promotion of events and community gatherings as required. | 1.1a (2) | Develop and conduct a community survey to gauge community interests and expectations regarding local events and activities | Manager Business | In Progress | 20% | Development of survey has commenced. |
| A range of consultation and engagement activities will be offered to our community in order to plan the long term future direction of the local government area and to inform Council's decision-making. | 4.2a (1) | Establish Digital Communication Panel | Manager Business | Completed | 100% | Panel developed for surveys and for documents on Public Exhibition. |
| Progress towards the achievement of the Community Strategic Plan objectives will be shared with the community via a range of communication methods. | 4.2d (1) | Continue to promote the objectives of the community strategic plan via Council's media channels | Manager Business | Ongoing | 25% | Media channels including the community newsletter, social media and media releases are being utilised to promote council's strategies and plans. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------------|----------|---|
| Current, informative and easy access to Council information is made available to the community using a range of communication methods, including traditional media and digital channels, Council's website, Community News newsletter and social media. | 4.3c (1) | Develop Engagement Strategy to inform the community and receive feedback, including feedback on major projects | Manager Business | Not Yet Commenced | 0% | To commence in 2020. |
| | 4.3c (1) | Improve services available on Council's websites through the development of eServices and online forms | Manager Business | Not Yet Commenced | 0% | To commence with implementation of Authority Upgrade to 7.1 in 2020. |
| Council ensures statutory compliance is achieved and demonstrates good governance practices. | 4.3b (1) | Participate in the Alliance Legislative Compliance Framework Methodology | Manager Business | In Progress | 15% | Active participant in Alliance Audit Risk and Improvement Committee. |
| Implement effective integrated risk management strategies and practices. | 4.3b (3) | Undertake development of a Corporate Risk Register | Manager Business | In Progress | 20% | Organisational risk register is under development. |
| Promote local employment and training opportunities within the Council organisation. | 2.4a (1) | Develop Council Training Plan | Manager Business | In Progress | 30% | Information from Performance Reviews has been collated and will form the foundation of the training plan. |
| | 2.4a (1) | Include consideration for disability inclusion in Council's Workforce Management Plan | Manager Business | In Progress | 20% | To be included in update of Workforce Management Plan. |
| | 2.4a (1) | Investigate barriers that exist for people with a disability and their carers in accessing employment in council positions and standing for council positions | Manager Business | In Progress | 20% | EEO Policy has been developed as a starting point. Coordinator HR will liaise with Disability and Inclusion Action Group for further information. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|---------------------|----------|---|
| | 2.4a (1) | Relevant discrimination legislation to be included in EEO Policy, Staff Induction and Recruitment Training | Manager Business | In Progress | 50% | EEO Policy has been developed and adopted by Council. Integration into Induction and recruitment training is in progress. |
| Implement strategies which promote Cootamundra-Gundagai Regional Council as being an employer of choice. | 4.3f (1) | Review and enhance recruitment practices | Manager Business | Not Due to Commence | 0% | Will be done in conjunction with review of recruitment processes. |
| Implement the Workforce Management Plan to support all staff in the delivery of community expectations. | 4.3f (3) | Update statistics and demographics in the Workforce Management Plan | Manager Business | In Progress | 20% | Current statistical information being sourced. |
| Provide a safe and healthy environment for staff and contractors through compliance with all WH&S legislative requirements and minimising risk. | 4.3f (4) | Develop internal Council newsletter and incorporate WHS messages to all staff | Manager Business | Not Yet Commenced | 0% | Scheduled for initiation in 2020. |
| Develop and implement a Staff Wellbeing Program | 4.3f (5) | Develop and implement Staff Wellbeing Program | Manager Business | Not Yet Commenced | 0% | To be developed in 2020. |
| Implement a training plan to enhance the skills and knowledge of staff across the organisation. | 4.3g (1) | Develop Staff Training Plan | Manager Business | In Progress | 30% | Information from Performance Plans to provide the foundation for an organisation training plan. |
| Provide learning and development opportunities to | 4.3g (2) | Develop succession plans for each Section of Council | Manager Business | Not Due to Commence | 0% | To be initiated with Performance Reviews. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|---------------------|----------|--|
| staff to develop the individual's potential and meet the needs of the community and organisation. | 4.3g (2) | Performance Review Program implemented and the first cycle | Manager Business | Not Due to Commence | 0% | Performance Reviews to Commence in third quarter. |
| Offer and promote free public wi-fi internet access in key public spaces across the local government area. | 2.1d (3) | Continue to offer free Wi-Fi service at Council Libraries and Administration Centres | Manager Business | In Progress | 25% | Public Wi-Fi is has been consistently available to designated areas. |
| Implement effective integrated risk management strategies and practices. | 4.3b (3) | Develop and implement an Internal Audit and Fraud Control Plan | Manager Business | Completed | 100% | Internal Fraud Control Plan has been approved by Council. |
| Adopt and maintain information technology and communication services and infrastructure that assists the efficient and effective undertaking of Council's operations, increases productivity and adequately supports the organisation and our community's needs. | 4.3d (1) | Work with the Customer Service Team to develop an Online Booking System for Council facilities | Manager Business | In Progress | 20% | Investigation has commenced. |
| | 4.3d (2) | Integrate Civica/Authority (Finance System) and Magiq Documents (EDRMS) | Manager Business | In Progress | 15% | Integration has commenced. |
| | 4.3d (2) | Review Business Systems and identify services that can be delivered on Council's Website | Manager Business | Not Yet Commenced | 0% | To commence in 2020. |
| Staff are supported in the achievement of organisational objectives by having access to a range of business tools, systems and technologies. | 4.3g (3) | Provide ongoing enhancement to Staff Intranet | Manager Business | Not Yet Commenced | 0% | Needs analysis to be undertaken. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|------------------------------|-------------------|----------|---|
| Implementation of the Cootamundra-Gundagai Regional Council's suite of plans, including the Community Strategic Plan, Delivery Program, Operational Plan and resourcing plans. | 4.1a (2) | Present half-yearly Progress Reports on 19/20 Operational Plan to Council and the Community | Manager Business | Ongoing | 25% | Progress Reports are now taking place quarterly, to coincide with the Quarterly Budget Review Statements. The first Quarterly Progress Report is due at the November Council meeting. |
| Council's corporate plans are informed by community expectations and are reviewed and updated on a regular basis to meet the changing needs of our community members. | 4.1a (3) | Conduct 6 monthly review of Operational Plan and resourcing strategies | Manager Business | Not Yet Commenced | 0% | Will commence this quarter. |
| The development of the Cootamundra-Gundagai Regional Council's integrated suite of plans, including the Community Strategic Plan, Delivery Program, Operational Plan and resourcing plans, provide a clear strategic direction and drives the organisation's activities. | 4.1c (1) | Develop and adopt 2020-21 Operational Plan | Manager Business | Not Yet Commenced | 0% | Will commence in early 2020 in conjunction with the budget. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------------|----------|---|
| Council's decision-making and future planning shows evidence of being linked to Council's integrated suite of plans and the needs of our community. | 4.1c (2) | All decision making reports, including strategies and plans are to show linkages to the relevant objective in the Community Strategic Plan | Manager Business | In Progress | 50% | Linkages to the CSP are included in Business Paper reports. A process has commenced to link Strategic documents to the CSP. |
| Council will track the progress towards the achievement of the corporate plan objectives against measurable outcomes. | 4.1d (1) | Pulse software Program is fully operational and used by all relevant staff | Manager Business | Completed | 100% | Staff have received full training and are using the software to provide updates on their relevant section Operational Plan progress report actions. |
| The integrated planning and resourcing documents will be reviewed and updated on a regular basis to meet the changing needs of our community members. | 4.1d (2) | Develop a strategy to update Council's Integrated planning suite of plans and resourcing strategies on a regular basis to meet the changing needs of our community | Manager Business | Not Yet Commenced | 0% | Strategy to update the Community Strategic Plan will commence in 2020. |
| | 4.1d (2) | Integrated planning and resourcing strategies reviewed and updated as legislatively required | Manager Business | In Progress | 25% | Reporting required for the first quarter is on track. |
| Progress on the achievement of corporate plan objectives will be shared with the community via a range of communication methods. | 4.1d (3) | Develop and present report identifying Community communication options and strategies | Manager Business | In Progress | 70% | Analysis of current Community newsletter is underway. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------------|----------|--|
| Council will regularly and continuously seek community feedback to seek additional input to the Community Strategic Plan. | 4.2b (1) | Relevant staff to undertake Community Engagement Training (IAP2) | Manager Business | Not Yet Commenced | 0% | Conflict with training dates for 2019. Training will take place in 2020. |
| Cootamundra-Gundagai Regional Council's suite of plans will be reviewed and updated on a regular basis to meet the changing needs of our community members. | 4.2b (2) | Develop a strategy to update the Community Strategic Plan on a regular basis to meet the changing needs of our community | Manager Business | Not Yet Commenced | 0% | Due to commence in 2020. |
| Progress towards the achievement of the Community Strategic Plan objectives will be shared with the community via a range of communication methods. | 4.2c (1) | Continue to promote the objectives of the community strategic plan via Council's media channels | Manager Business | Ongoing | 25% | Media channels including the community newsletter, social media and media releases are being utilised to promote council's strategies and plans. |
| Promote the objectives of the Community Strategic Plan and work in partnership with community members, businesses and other local stakeholders to deliver community priorities. | 4.2c (1) | Develop a Community Engagement Strategy to assist with delivering the objectives in the Community Strategic Plan | Manager Business | Not Yet Commenced | 0% | For action in third quarter. |
| Develop and implement accessibility strategies as identified in the Disability Inclusion Access Plan. | 1.1e (1) | In reviewing Council purchasing policy consider ways we can better support businesses which employ people with disabilities | Manager Business | In Progress | 5% | Will be incorporated in conjunction with review of Procurement Policy and Procedure. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| Ensure all procurement meets legislative and policy requirements and delivers best value for the community and the Council. | 4.3a (3) | Develop a suite of Audit Reports to monitor procurement practices | Manager Business | In Progress | 40% | Several reports have been developed. Currently working to develop additional reporting methods. |
| | 4.3a (3) | Undertake assessment and improvement of procurement processes | Manager Business | In Progress | 25% | Review of Procurement Policy and Procedure is currently being undertaken. |
| Council's records are managed in compliance with the appropriate legislation and supports efficient and effective work practices. | 4.3d (3) | Review infoXpert workflows to streamline record keeping | Manager Business | In Progress | 100% | Comprehensive review has taken place along with system upgrade. Updates to workflows will take place as required. |

DEPUTY GENERAL MANAGER

Deputy General Manager

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------|----------|--|
| Investigate, identify and promote opportunities that exist within the local government area for implementation of renewable energy technologies. | 3.1b (1) | Negotiate terms of a power partnership agreement on various Council facilities | General Manager | In Progress | 25% | Two proposals received and presented at Councilor workshops. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------|----------|--|
| Ensure adequate project management techniques are in place to ensure the delivery of projects which meet the changing needs of our community on time, within budget and to an acceptable standard. | 4.3e (2) | Undertake monitoring of project implementation | General Manager | Ongoing | 25% | A spreadsheet detailing each of the projects has been developed and distributed to Councillors via the monthly major project report. |
| Enhance the amenity and appearance of our towns' main streets. | 1.2a (1) | Commence intersection improvements for the corner of West and Sheridan Streets in Gundagai | General Manager | In Progress | 50% | Majority of civil works undertaken, landscaping and pavements to follow. |

Civil Works

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|------------------------------|-------------|----------|--|
| Provide and maintain a safe and well maintained aerodrome for use by commercial and recreational aircraft and promote use by external users. | 2.1c (2) | Provide aerial loading facilities for RFS firefighting aircraft | Manager Civil Works | In Progress | 50% | Works commenced Late October and expected to be finished end November. |
| | 2.1c (2) | Provide asphalt surface for motor sport activities | Manager Civil Works | Completed | 100% | Asphalt surface provided at the Aerodrome. |
| Operate an efficient quarrying service in an environmentally responsible manner that meets all statutory requirements and standards. | 3.1a (2) | Renew permit with Forestry Corporation to access Nanangroe Quarry | Manager Civil Works | Completed | 100% | Agreement signed off. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------------|----------|---|
| Provide and maintain a stormwater disposal system which minimises the carriage of pollutants from the stormwater system to the creek and river systems. | 3.1a (3) | Complete upgrade of stormwater infrastructure in accordance with the priorities identified in the stormwater priority assessment report | Manager Civil Works | In Progress | 10% | Works commenced on projects in Gundagai and Cootamundra. |
| Maintain civil infrastructure including roads, footpaths, bridges and traffic facilities to agreed standards as set out in asset management plans. | 3.2d (2) | Undertake annual road maintenance program | Manager Civil Works | Ongoing | 45% | Ongoing as resources and conditions permit. Currently road maintenance being completed as required. |
| Undertake the annual footpath renewal and extension program. | 3.2d (3) | Undertake Footpath Renewal and Extension Program | Manager Civil Works | Ongoing | 45% | Renewal being completed as per budgets. |
| Improve functionality and amenity within Council's work depots. | 4.3a (6) | Complete planning for improvements to Cootamundra Depot and Bradman Street Depot | Manager Civil Works | In Progress | 5% | Ongoing discussions taking place. |
| Ensure that a supply of industrial and residential land is available at all times to facilitate the orderly expansion of the local government area. | 2.2b (2) | Complete construction of roads and provisions of services for subdivision of industrial land at Turners Lane in Cootamundra | Manager Civil Works | Not Yet Commenced | 0% | Design completed with costing for CGRC to undertake works. Awaiting further advice. |
| | 2.2b (2) | Market and promote Bourke Estate residential subdivision in Gundagai | General Manager | In Progress | 25% | Marketing being undertaken as required and will continue. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------|----------|--|
| | 2.2b (2) | Prepare preliminary planning proposal for Stage 2 of Claron Estate residential subdivision in Cootamundra, including access to the Cemetery | General Manager | In Progress | 10% | Planning underway. |
| Work in partnership with local agencies to identify and advocate for opportunities to improve overall community safety. | 1.3c (1) | Road Safety Officer to work in partnership with RMS on RMS Road Safety Campaigns | Manager Civil Works | Ongoing | 45% | RSO projects ongoing both with CGRC and RMS. |
| Develop and implement strategies to improve safety and accessibility of all road users. | 3.2d (1) | Ensure information is available for users of scooters and electric wheelchairs on footpaths. Pedestrian safety information should also be made available | Manager Civil Works | In Progress | 5% | RSO been in discussions with relevant groups and Access Committee. |
| | 3.2d (1) | Road Safety Officer to work in partnership with RMS on RMS Road Safety Campaigns | Manager Civil Works | Ongoing | 45% | RSO working with RMS and in conjunction with road safety campaigns to raise Road safety awareness. |
| Programs are developed to ensure the ongoing risk assessment and maintenance of Council facilities. | 1.3b (7) | Review existing footpath network and facilities to determine upgrade and connectivity improvement requirements | Manager Civil Works | Ongoing | 45% | Ongoing throughout the year. Apply for grants for works when available. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|---------|----------|---|
| Provide a safe and healthy environment for staff and contractors through compliance with all WH&S legislative requirements and minimising risk. | 4.3f (4) | Monthly WHS reports and statistics discussed at Managers Meetings | Manager Civil Works | Ongoing | 25% | Audit undertaken and results discussed at managers meeting. Injury statistics are discussed at managers meetings. |

Technical Services

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| Provide and maintain a stormwater disposal system which minimises the carriage of pollutants from the stormwater system to the creek and river systems. | 3.1a (3) | Complete upgrade of stormwater infrastructure in accordance with the priorities identified in the stormwater priority assessment report | Manager Technical Services | In Progress | 25% | Works are underway at O'Hagan St and will commence within Tor St next week. These are the priority locations identified within the Stormwater Mitigation Project. |
| Maintain civil infrastructure including roads, footpaths, bridges and traffic facilities to agreed standards as set out in asset management plans. | 3.2d (2) | Undertake Adjungbilly Road Heavy Vehicle Access Project | Manager Technical Services | In Progress | 80% | Remaining road works are scheduled to commence, with a seal date targeted prior to Christmas. |
| | 3.2d (2) | Undertake annual road maintenance program | Manager Technical Services | Ongoing | 25% | Ongoing Maintenance Grading and other routine works as appropriate. |
| Undertake the annual footpath renewal and extension program. | 3.2d (3) | Undertake Footpath Renewal and Extension Program | Manager Technical Services | Ongoing | 0% | Footpath works are programmed in accordance with allocated budget. |
| Improve functionality and amenity within Council's work depots. | 4.3a (6) | Complete construction on Gundagai Depot Training Facility | Manager Technical Services | Completed | 100% | Training Facility is operational. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|---------|----------|---|
| Council's fleet of light vehicles and heavy plant is maintained to ensure efficient, cost-effective and timely service delivery. | 4.3d (6) | Undertake plant replacement in accordance with related policies and programs | Manager Technical Services | Ongoing | 25% | Excavator replacement tender is in the evaluation stage, RFQ has been issued for a new watercart. |
| Programs are developed to ensure the ongoing risk assessment and maintenance of Council facilities. | 1.3b (7) | Review existing footpath network and facilities to determine upgrade and connectivity improvement requirements | Manager Technical Services | Ongoing | 25% | Footpath program in place - creation of an updated PAMP has been discussed but not actioned to date. |
| Provide a safe and healthy environment for staff and contractors through compliance with all WH&S legislative requirements and minimising risk. | 4.3f (4) | Monthly WHS reports and statistics discussed at Managers Meetings | Manager Technical Services | Ongoing | 25% | Audit undertaken and results discussed at managers meeting. Injury statistics are discussed at managers meetings. |

Assets

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| Enhance the amenity and appearance of our towns' main streets. | 1.2a (1) | Construct Gundagai Main Street Public Toilet | Manager Assets | Completed | 100% | Work completed and final cost report is to be prepared. |
| Provide and maintain a stormwater disposal system which minimises the carriage of pollutants from the stormwater system to the creek and river systems. | 3.1a (3) | Complete upgrade of stormwater infrastructure in accordance with the priorities identified in the stormwater priority assessment report | Manager Assets | In Progress | 0% | Asset Management Plans reviewed and GPT are considered where appropriate. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| Provide and maintain a stormwater disposal system which allows the removal of stormwater from the towns in the most economical and efficient manner possible whilst minimising impact on natural environment. | 3.2c (5) | Complete upgrade of stormwater infrastructure in accordance with the priorities identified in the stormwater priority assessment report | Manager Assets | Ongoing | 0% | Design and construction of new systems / amplification is in progress. |
| Implement effective integrated risk management strategies and practices. | 3.2c (6) | Undertake Cootamundra Flood Study | Manager Assets | In Progress | 25% | Cootamundra Flood study Interim report submitted on 29 August 2019. Modelling and final report is being prepared. |
| Develop and implement asset management plans and strategies for all transport assets. | 3.2d (4) | Review and update condition assessment data across the local government area | Manager Assets | Ongoing | 0% | Service providers are to be engaged to do condition assessment and identifying capital works requirements. |
| Advocate for State and Federal departments to improve public transport networks to meet the needs of our community. | 3.2e (2) | Work with Riverina Joint Organisation on identified public transport initiatives | Manager Assets | Ongoing | 0% | Coordinated with REROC on technical and procurement related issues. |
| Develop Asset Management plans which deliver long-term financial sustainability and asset renewal. | 4.3a (5) | Implement works programs to improve asset condition | Manager Assets | Ongoing | 0% | Asset management plans reviewed and updated and new assets created are capitalised. |
| | 4.3a (5) | Review and improve Asset Management Plans | Manager Assets | Ongoing | 0% | Asset management plans revised and updated as required. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------|----------|---|
| Staff are supported in the achievement of organisational objectives by having access to a range of business tools, systems and technologies. | 4.3g (3) | Undertake integration of Mapping Systems with Council's Corporate Systems | Manager Assets | Ongoing | 0% | Council Mapping system is updated regularly. |
| Undertake connection of water supply to the Dog on the Tuckerbox site. | 2.3c (4) | Deliver infrastructure for water supply extension to Dog on the Tuckerbox site | Manager Assets | In Progress | 10% | Meeting with designers and RMS held and detailed design work is in progress for Stage 1 Water supply to Dog on the Tucker Box and Stage 2 (Detailed design only), Water supply Extension to Coolac. |
| Provide programs, information and services to our community to increase awareness of, and participation in, environmentally sustainable activities. | 3.1d (1) | Investigate opportunities to use raw water | Manager Assets | Ongoing | 25% | Options will be investigated to use raw water where feasible. |
| Encourage the best use of treated water through water saving measures. | 3.1d (3) | Investigate opportunities to increase the use of reuse water | Manager Assets | Ongoing | 25% | Recycled water is in used for irrigation of parks and Gardens at Cootamundra and Golf Course and sporting fields at Gundagai. |
| Operate and maintain a water reticulation system capable of providing potable water to all connected premises with minimum disruption and maximum efficiency. | 3.2c (1) | Implement an Integrated Water Cycle Management (IWCM) Plan | Manager Assets | Ongoing | 25% | PWA is preparing Integrated Water Cycle Management Plan. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| Undertake Cootamundra Water Main Replacement Program. | 3.2c (2) | Continue Cootamundra Water Main Replacement Program | Manager Assets | In Progress | 70% | Mains laid and progressively connected to the system. |
| Investigate options for the connection of a water supply to Nangus Village, and consult with the community. | 3.2c (3) | Partner with Goldenfields Water to prepare business case for connection of water supply to Nangus Village | Manager Assets | In Progress | 20% | Consulting Engineers 'Cardno' has been engaged to do Feasibility Study and draft Feasibility Report and will be available for comments in February 2020. |
| Operate and maintain a sewage system and treatment plant capable of removing sewage from all connected premises with minimum disruption and maximum efficiency. | 3.2c (4) | Commence construction for the Gundagai Sewer Treatment Plant replacement | Manager Assets | Ongoing | 10% | Detail design work completed on the proposed new Sewage Treatment Plant for Gundagai and tender documents are being prepared. Proposed construction commencement on March / April 2020. |
| | 3.2c (4) | Invite tenders and enter into contract for the relining of Sewer Mains | Manager Assets | Completed | 100% | Existing contract was extended for another year with Interflow for cleaning and lining. Using the provisions. |

Waste, Parks and Recreation Services

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|---|-------------|----------|---|
| Provide and maintain a clean and attractive streetscape. | 1.2a (2) | Provide an attractive streetscape, by implementing the strategies identified in the Open Spaces Strategy | Manager Waste, Parks and Recreation Service | In Progress | 75% | Beautification and refurbishment of Cootamundra's C.B.D area is progressing well with the current works program 50% completed. Works will stop during the hot summer months while work will focus on watering and caring for the new gardens/plants/trees. Upgrade works will recommence in April 2020. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|---|-------------|----------|---|
| Maintain and improve Council's parks and recreation and sporting facilities. | 1.2c (3) | Complete revitalisation works to Council Parks, Gardens and Sporting Grounds across the local government area | Manager Waste, Parks and Recreation Service | In Progress | 60% | Improvement works have commenced throughout Cootamundra and surrounding villages. These works have included new tree plantings, removal of unwanted trees and shrubs, garden refurbishments, upgrade and refurbishment of open space infrastructure. There has also been a lot of work involved in preparing open space and street tree strategic plans, open space classifications, specifications and works implementation plans. |
| Co-ordinate the provision of Council facilities for community use. | 1.2c (4) | Public open spaces maintained, and capital improvement works identified and managed, as detailed in the Open Spaces Strategy | Manager Waste, Parks and Recreation Service | Ongoing | 25% | Public open spaces maintained as per the Open Spaces Strategy. There has been no funding allocated for any Open Space capital or improvement works outside normal maintenance works. |
| Promote programs which encourage healthy lifestyle choices and activities. | 1.3a (4) | Promote programs which encourage healthy lifestyle choices and activities as identified in the Recreation Needs Study and Open Spaces Strategy | Manager Waste, Parks and Recreation Service | Completed | 100% | Draft Recreation Needs Study has been completed. |
| Maintain and improve Council's parks and recreation and sporting facilities. | 1.3b (1) | Construct Country Club Oval Clubhouse/Amenities Building | General Manager | In Progress | 80% | Project was delayed due to labour and budget challenges. A loan was approved by council to undertake outstanding works. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|---|-------------|----------|--|
| Provide, maintain, renew and promote high quality sporting, swimming and active recreational facilities and programs for the community, active sporting associations and visitors. | 1.3b (1) | Develop Recreation Needs Study and Open Spaces Strategy | Manager Community and Culture | In Progress | 50% | Draft is being internally reviewed. |
| | 1.3b (1) | Facilitate comprehensive consultation sessions with stakeholders, the public and users, to assist in the development of the Public Open Spaces Strategy | Manager Community and Culture | In Progress | 55% | Sports Council meetings and recreational needs study consultation. |
| | 1.3b (1) | Undertake a full review of Council's Recreational Officers position descriptions to maximise opportunities for future recreational development | Manager Waste, Parks and Recreation Service | Completed | 100% | Review completed, currently with Human Resources for review and submission to the Consultative Committee and General Manager for consideration. |
| | 1.3b (1) | Undertake Fisher Park lighting upgrade | Manager Waste, Parks and Recreation Service | In Progress | 70% | Works are progressing to time, cost and quality. All materials have been ordered and waiting delivery. Project is on schedule and due for completion by December 2019. |

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| Provide and maintain parks and gardens that are aesthetically pleasing, accessible and are available for passive recreational pursuits. | 1.3b (2) | Commence planning for the installation of a Regional Playground at Jubilee Park in Cootamundra | Manager Community and Culture | In Progress | 80% | Playground due for completion in December 2019. |
| | 1.3b (2) | Complete maintenance and revitalisation works to Council Parks, Gardens and Sporting Grounds across the local government area | Manager Waste, Parks and Recreation Service | Ongoing | 60% | Improvement works have commenced throughout Cootamundra and surrounding villages. These works have included new tree plantings, removal of unwanted trees and shrubs, garden refurbishments, upgrade and refurbishment of open space infrastructure. There has also been a lot of work involved in preparing open space and street tree strategic plans, open space classifications, specifications and works implementation plans. |
| Develop and implement an inspection and maintenance plan for playground equipment. | 1.3b (4) | Investigate funding opportunities to enhance Council playgrounds, indoor and outdoor sporting and passive areas to enhance accessibility | Manager Waste, Parks and Recreation Service | Completed | 100% | Grant applications have been submitted for funding to build a bouncing pillow at the Cootamundra Aquatic Centre, Rock Climbing Wall at the Sports Stadium, upgrade of Pioneer Park, Palmer Park Wallendbeen, & Pump Track Cootamundra. |
| | 1.3b (4) | Playground inspection and maintenance program developed and implemented for Cootamundra | Manager Waste, Parks and Recreation Service | Ongoing | 100% | These works are carried out on a regular basis. |
| Undertake improvements to the Cootamundra and Gundagai swimming pool facilities. | 1.3b (5) | Conduct a full operational review and report to council on the Cootamundra Aquatic Centre | Manager Waste, Parks and Recreation Service | In Progress | 50% | EOI have been called and due to close in October. Report will be submitted to the November council meeting for consideration. Consultant appointed timeline for completion is 22 weeks. |

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| | 1.3b (5) | Project manage and deliver a new splash play area at Cootamundra Pool | Manager Waste, Parks and Recreation Service | In Progress | 70% | Works are on Schedule, on budget and to expected quality outcomes. Works are scheduled to be completed by December 2019. |
| Work in partnership with active sporting associations, community groups and health providers to ensure sporting facilities are fit for current and future community need. | 1.3b (6) | The current and future community needs of Council's Public Open Spaces are identified and actions implemented as per the Public Open Spaces Strategy | Manager Waste, Parks and Recreation Service | In Progress | 50% | Works are continuing and will be in accordance with financial allocations. |
| Programs are developed to ensure the ongoing risk assessment and maintenance of Council facilities. | 1.3b (7) | Carry out and document regular safety inspections and implement work activities that will ensure that all facilities are in a safe and working condition fit for purpose | Manager Waste, Parks and Recreation Service | Ongoing | 50% | Works have been implemented in accordance with financial allocations. |
| | 1.3b (7) | Develop a Detail Works Activity Program that will review the asset and condition, maintenance programs and unit costs to annually maintain these assets to an adopted standard | Manager Waste, Parks and Recreation Service | Completed | 100% | All full review and report have been submitted to council and adopted. Adopted plan is now ready for consideration and implementation for the next 2020/2021 financial and operation plan review. |
| | 1.3b (7) | Investigate funding opportunities to enhance Council playgrounds, indoor and outdoor sporting and passive areas to enhance accessibility | Manager Waste, Parks and Recreation Service | Completed | 100% | Grant applications have been submitted for funding to build a bouncing pillow at the Cootamundra Aquatic Centre, Rock Climbing Wall at the Sports Stadium, upgrade of Pioneer Park, Palmer Park Wallendbeen, & Pump Track Cootamundra. |

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| Undertake a review of waste services across the Local Government area and develop a waste strategy that provides equitable waste services for all residents. | 3.1c (1) | Undertake waste strategy review and community consultation | Manager Waste, Parks and Recreation Service | In Progress | 75% | Draft waste strategy has been completed and presented to council at a workshop, currently being considered by council. |
| Provide and maintain appropriate rubbish removal, disposal, recycling and greenwaste facilities in the most cost effective, environmentally sustainable and efficient manner. | 3.1c (2) | Commence planning for construction of a re-use shop at Cootamundra Waste depot | Manager Waste, Parks and Recreation Service | In Progress | 10% | Currently being considered as part of the waste strategy. |
| | 3.1c (2) | Commence planning for construction of Waste Facilities and methods of operation as determined by the Waste Implementation Plan | Manager Waste, Parks and Recreation Service | In Progress | 10% | Pending the outcome of the Waste Strategy. |
| | 3.1c (2) | Undertake improvements at Gundagai Waste Depot as per the Waste Implementation Plan | Manager Waste, Parks and Recreation Service | In Progress | 20% | Pending the outcome of the Waste Strategy. |
| Provide a facility for the composting and re-using of greenwaste. | 3.1c (4) | Implement Cootamundra Regional Organics Project (CROP) | Manager Waste, Parks and Recreation Service | In Progress | 10% | Pending the outcome of the Waste Strategy. |
| Provide programs, information and services to increase voluntary recycling and reuse to reduce waste to landfill. | 3.1d (2) | Investigate funding opportunities and community consultation to locate a suitable adult change room in Cootamundra | Manager Waste, Parks and Recreation Service | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |
| | 3.1d (2) | Undertake construction of a new Adult Change facility to Gundagai | Manager Waste, Parks and Recreation Service | Not Yet Commenced | 0% | Not yet commenced due to competing priorities. |

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| Manage Council's waste collection, disposal and processing facilities. | 3.2c (7) | Manage Council's waste collection, disposal and processing facilities in accordance with the Waste Strategy and Implementation Plan | Manager Waste, Parks and Recreation Service | Completed | 100% | Being implemented in accordance with councils financial and implementation plan. |
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Facilities

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|---|------------------------------|-------------|----------|---|
| Undertake development of Cootamundra library outdoor area. | 1.1b (3) | Develop outdoor space adjoining the Stephen Ward Rooms Cootamundra Library for indoor/outdoor meeting space | Manager Facilities | In Progress | 40% | Updated design being undertaken, some works completed eg: auto doors and awning. |
| Maintain and improve Council buildings and properties in accordance with asset management plans. | 1.2c (1) | Create an Outdoor Reading Space adjoining the Gundagai Library | Manager Facilities | In Progress | 95% | Major works completed waiting for under cover tables/chairs. |
| | 1.2c (1) | Design new Council developments with accessibility to the main entrance | Manager Facilities | Ongoing | 15% | New builds having accessibility taken into consideration. |
| | 1.2c (1) | Future Council building upgrades to include all access considerations | Manager Facilities | Ongoing | 15% | All new builds to have accessibility included. |
| | 1.2c (1) | Investigate modifications to Council buildings to improve accessibility for staff | Manager Facilities | Ongoing | 10% | Major projects to be completed first. Budgets and designs to be investigated for access within existing structures. Toilet facilities to be first step. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|--|----------|--|------------------------------|-------------------|----------|--|
| Undertake a review of the environmental impact of Council-owned facilities and infrastructure and implement measures which Council's environmental impact. | 3.1b (2) | Investigate funding sources for solar energy works for Council buildings | Manager Facilities | Ongoing | 25% | Electricity contracts being reviewed. Solar options being further investigated and identification of main buildings which would be beneficial to have solar installed. |
| Provide an adequate mix of high quality, disabled accessible and appropriately located public toilet facilities. | 3.2c (8) | Finish construction of the Gundagai Main Street Public Toilet | Manager Facilities | Completed | 100% | New facility completed. |
| Maintain and improve Council's parks and recreation and sporting facilities. | 1.2c (3) | Sporting Grounds maintained as per the current adopted schedules and specifications | Manager Facilities | Ongoing | 70% | Audit carried out and works undertaken as per audit results. Ongoing project. |
| Co-ordinate the provision of Council facilities for community use. | 1.2c (4) | Public open spaces maintained, and capital improvement works identified and managed, as detailed in the Open Spaces Strategy | Manager Facilities | Ongoing | 30% | Capital works being undertaken. |
| Promote programs which encourage healthy lifestyle choices and activities. | 1.3a (4) | Promote programs which encourage healthy lifestyle choices and activities as identified in the Recreation Needs Study and Open Spaces Strategy | Manager Facilities | Not Yet Commenced | 0% | Investigating options. |
| Provide, maintain, renew and promote high quality | 1.3b (1) | Develop Recreation Needs Study and Open Spaces Strategy | Manager Facilities | In Progress | 80% | Report to go to council after final review of study and strategy. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|---|------------------------------|-------------|----------|---|
| sporting, swimming and active recreational facilities and programs for the community, active sporting associations and visitors. | 1.3b (1) | Facilitate comprehensive consultation sessions with stakeholders, the public and users, to assist in the development of the Public Open Spaces Strategy | Manager Facilities | Completed | 100% | Public meeting held throughout LGA and ideas taken on board. |
| | 1.3b (1) | Undertake improvements to the Gundagai Netball Courts lighting and amenities | Manager Facilities | Ongoing | 40% | Lighting upgrade completed. Design and costing being investigated for clubhouse area. |
| | 1.3b (1) | Upgrade Community Fitness infrastructure in Gundagai and Cootamundra | Manager Facilities | In Progress | 60% | Funding of \$15,000 allocated from Grant funding. Equipment and quotes being investigated. Upgrades to Gundagai Pool has been undertaken. |
| Provide and maintain parks and gardens that are aesthetically pleasing, accessible and are available for passive recreational pursuits. | 1.3b (2) | Complete maintenance and revitalisation works to Council Parks, Gardens and Sporting Grounds across the local government area | Manager Facilities | Ongoing | 50% | Tree plantings, garden bed upgrades. Mowing, spraying and general upkeep being routinely undertaken. |
| | 1.3b (2) | Complete re-development of border gardens to Gundagai playground areas | Manager Facilities | Ongoing | 35% | Gardens being upgraded on a needs to basis. Flowers being rotated and new beds being created. |
| Construct a large-scale Adventure Playground in Gundagai. | 1.3b (3) | Commence construction of the Gundagai Large Scale Adventure Playground | Manager Facilities | In Progress | 30% | Major play equipment currently being installed. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------|----------|--|
| Develop and implement an inspection and maintenance plan for playground equipment. | 1.3b (4) | Playground inspection and maintenance program developed and implemented for Gundagai | Manager Facilities | Ongoing | 25% | P&G foreman undertaking inspections and records being compiled for repairs/replacement. |
| Undertake improvements to the Cootamundra and Gundagai swimming pool facilities. | 1.3b (5) | Commence and complete re-painting works during off season to Gundagai Pool | Manager Facilities | Completed | 100% | Re-painting of pools has been undertaken, along with new disable ramp. |
| | 1.3b (5) | Commence planning & tendering for disable ramp to Gundagai Pool | Manager Facilities | Completed | 100% | All works completed for tiling, construction of ramp. |
| | 1.3b (5) | Encourage the pool & gymnasium managers/ leasees to conduct activities for people of all abilities | Manager Facilities | Ongoing | 60% | Current lessees already programming activities and encourage use by all user groups. |
| Work in partnership with active sporting associations, community groups and health providers to ensure sporting facilities are fit for current and future community need. | 1.3b (6) | Commence construction of the new facility building located at the Gundagai Netball Precinct as part of Recreation Master Plan | Manager Facilities | In Progress | 25% | Designs being updated to fit within budget. User groups to be consulted on the design prior to tendering. |
| | 1.3b (6) | The current and future community needs of Council's Public Open Spaces are identified and actions implemented as per the Public Open Spaces Strategy | Manager Facilities | Ongoing | 25% | Open space strategy has been completed in consultation with public groups. Further planning required for creation of budget items. |
| Programs are developed to ensure the ongoing risk assessment and maintenance of Council facilities. | 1.3b (7) | Investigate funding opportunities to enhance Council playgrounds, indoor and outdoor sporting and passive areas to enhance accessibility | Manager Facilities | Ongoing | 25% | Investigation and applications to be formalised. Proposals ready for when required. |

| Delivery Program - Principal Activity | Code | Operational Plan - Action | Responsible Officer Position | Status | Progress | Comments |
|---|----------|--|------------------------------|-------------|----------|--|
| Develop and implement a street tree planting plan which enhances amenity and our natural environment. | 3.1a (4) | Street Tree planting undertaken in accordance with Gundagai Street tree planting Masterplan | Manager Facilities | Ongoing | 50% | Tree works well underway as per council's master plan. Dangerous trees have been removed and new plantings in place. |
| Reuse waste water to increase the amenity of Council parks, gardens and recreational facilities and to reduce the demand on the water supply. | 3.1c (5) | Collaborate with Council departments to increase the use of re-treated water to Gundagai ovals | Manager Facilities | In Progress | 40% | Discussions with water/sewer team and sporting groups to highlight the need to use re-use water on sporting fields and Yarri Park. |



LGNSW ANNUAL CONFERENCE 2019

ASSOCIATION INITIATIVES

**Cr Linda Scott
President, Local Government NSW**

Wednesday 16 October

WILLIAM INGLIS HOTEL, WARWICK FARM

Good morning delegates, council representatives, distinguished guests, ladies and gentlemen.

I would like to pay my respect and acknowledge the traditional custodians of the Land on which we meet, the Darug, Gandangara and Tharawal Aboriginal People. To these people I pay my respects, as I do to and to Elders past, present and emerging; and to the Aboriginal and Torres Strait Islander people present here today.

Today I am pleased to highlight the Association's major initiatives and achievements over the past year. During the year, I was honoured to visit every single council in NSW, meeting members face-to-face and hearing their priorities and concerns. These visits, along with our member summits, forums and other events, ensure everything we do as an Association is focused on the issues most important to you. They play a critical role in ensuring LGNSW speaks for you with a unified voice. And they have greatly improved our organisation's ability to advocate even more effectively for you and your communities.

The results and outcomes are outlined in our Annual Report, circulated to you all last month.

However today is my opportunity to stand before you, to report back to the membership, and to share our initiatives and our achievements on your behalf, and on behalf of the public good.

LGNSW's key objective is to deliver 'value and outcomes' to the local government sector.

Both myself, as your President, and Chief Executive, Tara McCarthy, have repeatedly emphasised the importance – in everything we do – of continually improving transparency, accountability and governance.

We have taken the motions passed by you at the 2018 Conference, added the feedback and input we received from you, and focused on key advocacy priorities covering the issues impacting councils across the state.

Those priorities included:

- Better funding for libraries
- local infrastructure and recycling
- planning reform
- better, fairer and more transparent local government electoral laws
- financial independence and sustainability
- the support of disadvantaged communities
- an end to 'cost shifting' and
- the protection of local water utilities.

This strategic focus paid off.

In the lead-up to the 2019 State election we won commitments from the major parties – many bipartisan – in almost all of these advocacy areas.

The 2019 State Budget rewarded a great deal of our hard work and delivered the concrete results of our continuous engagement with our state colleagues.

I'd like to outline many of these results for you today.

Local Infrastructure is the foundation of our daily lives, and is consistently a fundamental priority for local government.

In the last 12 months, Local Government NSW has secured for you:

- bipartisan commitments of **\$1 billion** for fixing local roads and country bridges
- **\$150 million** funding for new public parks
- **\$400 million** for regional telecommunications towers
- 13 new bus routes to connect **44 regional towns**; and
- prevented **Crown Land** used for recreation from being sold.

The NSW Government has also agreed to fast track Sydney's **Metro West** project. And LGNSW continues to lobby government for sufficient funding to significantly reduce an estimated road maintenance backlog of more than **\$700 million**.

Cost Shifting: is one of the most significant problems faced by councils in NSW. It directly affects councils' abilities to deliver and maintain infrastructure for their communities. Our research revealed 'cost shifting' had grown to \$820 million in 2018/19, and to an estimated 10-year total of **\$6.2 billion**.

No-one thinks that cost-shifting is an easy nut to crack. However, thanks to our advocacy the Independent Pricing and Regulatory Tribunal has formally recognised this problem, and the impact it has on local councils.

The NSW Government has also responded, by agreeing to take back up to 15,000km of regional roads.

We continue to fight for increased assistance for our **disadvantaged communities** throughout NSW, including those experiencing hardship as a result of prolonged drought. To date, these efforts have helped secure a **\$170 million Drought Stimulus Package**, channelled through drought-affected councils, and part of an **additional \$355 million in drought assistance**.

Following the 2018 motion proposed by Bega Valley Shire's Mayor Kristy McBain, we successfully lobbied the NSW Government to extend the **Stronger Country Communities Fund by \$100 million** in 2019/20. Up to half of this funding is dedicated to regional youth infrastructure and programs.

I am particularly pleased to highlight the extraordinary success of the '**Renew Our Libraries' campaign**', following the Annual Conference motion from Cr Romola Hollywood at Blue Mountains City Council. Similar motions were received from Gunnedah Shire Council, Lane Cove Council, Leeton Shire Council, Tamworth Regional Council, Warren Shire Council and Wingecarribee Shire Council and it was great to see those councils backed by so many others who signed up to our campaign. It was the support of these councils, and our strategic alliance with the NSW Public Libraries Association, that drove the campaign

and secured an **additional \$60 million** over the next 4 years.

Let me be very clear: this is the **largest single funding increase for public libraries since 1939**. It means every single council in NSW has received an increase in library funding for 2019/20 or will benefit from the increased funding to the Outback Letterbox Library. 34 of the smallest councils – particularly in regional NSW – have seen their public library funding double; even *triple*. In fact, for 85 per cent of councils, their **immediate annual increase** in library funding was greater than their total annual membership fee paid to LGNSW. Libraries weren't the only beneficiary of our campaign activity.

Phase One of the **Save our Recycling Campaign** gained bipartisan support for a state-wide recycling and waste management plan.

But it does not stop there.

You have heard this morning our renewed and detailed call for the reinvestment of the Waste Levy in

- Funding councils to collaboratively develop regional-scale plans for the future of waste and recycling in their regions
- the delivery of the priority infrastructure and other local government projects needed to deliver regional-scale plans, particularly where a market failure has been identified
- support for the purchase of recycled content by all levels of government, to help create new markets
- Funding and delivery of a state-wide education campaign on the importance of recycling, including the right way to recycle, the purchase of products with recycled content and the importance of waste avoidance.

Reform of the planning system continues to concern councils, whether metropolitan, regional or rural. We delivered real progress in several areas of planning reform, including:

- a welcome pause on the introduction of the **medium-density planning code**, following a 2018 motion from the City Of Ryde Council and others
- more time for metropolitan councils to finalise their local **strategic planning statements**; and
- limits to the size of **boarding houses** in low-density areas.

And we will continue to fight on a number of fronts, until there is a restoration of power to

councils and their communities to make decisions impacting their neighbourhoods.

Financial independence and sustainability is another bedrock issue for local governments. Following last year's Conference motion from Greater Hume Shire, we secured the review of the government's T-Corp loans policy, which prevents councils from using regional (unrated) banks. We also called for councils to be allowed to levy rates up to 2% over the rate peg, so they can meet community needs with less red tape. The government heeded our call to amend unfair local government **electoral expenditure** legislation to ensure equitable and balanced expenditure caps and committed to doing so well before the 2020 council elections.

We continue to push for mayors and councillors to receive superannuation, just like everyone else in the Australian workforce including elected State and Federal MPs.

Rest assured delegates ... we are only just getting started and this will be a strong focus for 2019/20.

We secured **extra time** for councils to implement asbestos checks at waste facilities.

We achieved pre-election commitments from the major parties to continue local government ownership of Local Water Utilities.

We partnered with the Australian Local Government Association to release a **national skills survey** report to identify council areas and professions facing critical skills shortages. This will form the basis of our ongoing advocacy.

We welcomed the appointment of both a dedicated **Minister for Local Government** and the first **Minister for Public Spaces**.

And as recently as this week, our hard work came to fruition with the signing of a **new Inter-governmental Agreement**. The previous Inter-governmental Agreement between the State and LGNSW expired in 2015, and was not renewed during the difficult period of forced council mergers.

The new agreement goes far beyond the old.

It formally acknowledges State and local governments as equal partners.

It commits our State colleagues to consulting with our sector and seeking our views before introducing any laws or policy initiatives that will impact upon us.

It commits them to consideration of our budget cycles and financial capabilities in such

decisions.

And to alleviate budgetary impacts before asking local government to provide a new or expanded function or service.

The new Agreement includes a pledge that the State Government **will not progress any forced council mergers** and that **the term of any administrator be as brief as possible**, with the earliest possible return to democratically elected representatives.

The agreement was this week signed by the Premier, the Deputy Premier, and the Local Government Minister, and by me on your behalf.

The new Inter Governmental Agreement fulfils yet another of our advocacy priorities and it formalises a constructive and collaborative approach that will continue to deliver for our sector into the future.

The necessity for ongoing consultation and feedback is, of course, not limited to the State Government.

As your President I have significantly increased member consultation and created more opportunities for cross-sector engagement.

LGNSW conferences, summits and events bring members together to exchange ideas, debate issues and keep up-to-date with developments in local government.

Our summits in particular brought neighbouring councils together with key LGNSW staff to address local challenges and solutions.

These included the:

- **Small Business Friendly Councils Summit in Narrabri**, which explored ways to boost small business throughout the State's North-West
- **Local Planning Panels Summit on Central Coast**, which addressed the corrosion of council planning powers evidenced in the introduction of mandatory Independent Hearing and Assessment Panels , and
- **Rural & Regional Health Summit in Temora** , which outlined the challenges and explored solutions to health care delivery in rural and regional areas.

Our larger member events included not only last year's Annual Conference in Albury but

- **The Annual Water Conference in Armidale**, which focused on the critical safety and water quality issues faced by all NSW local water utilities
- **The LGNSW Tourism Conference in Terrigal**, which looked at local tourism and its capacity to drive local and regional economic growth

- **Our Big Ideas Forum at Darling Harbour**, where leading experts from universities came together with councils and commercial companies to discuss working together to better access funding for innovation.
- **The LGNSW Good Governance Forum**, and the **Local Government Employment Law Seminar**
- **Our International Women's Day Lunch**, and
- **Our pre-election Leaders' Debate** at NSW Parliament House, run jointly with the Country Mayors' Association. This event helped deliver strong support from party leaders on public libraries; recycling and a circular economy; better infrastructure funding; and returning planning powers to communities.

These events brought us all together as a sector, but of equal importance is our commitment to come to you. As your President I visited every council in NSW over the last 12 months, to see and hear your issues firsthand and that way ensure our work on your behalf continued to be on target and on point.

Throughout the year, we also sought to keep you updated on news and sector developments via our weekly newsletter, regular member messages and the website.

LGNSW, like the sector, is committed to continuous improvement. We have provided tailored professional development and services for thousands of council staff and elected officials , to help our sector be 'best-in-class' .

We continue to expand and update our range of **training programs** to ensure our courses meet your needs and are accessible.

Over the past 12 months:

- More than **12,000 people attended** Learning & Development events
- more than **6,500 councillors and staff** were trained on the new Code Of Conduct
- more than **7,300 users** registered for e-Learning
- almost **800 local government staff** received specialised procurement training

We offered every member council in NSW our industry-leading **Industrial Relations support and case management** , saving individual councils tens of thousands of dollars.

Members similarly had daily access to free, confidential legal and policy advice through our **Legal Officer**.

Our IR and legal experts

- had **more than 100** matters settled in the financial year
- achieved a 100% success rate in favourable outcomes for **five** matters determined by a court or tribunal
- represented councils in the negotiation and ratification of **six** enterprise agreements and awards
- provided around 320 legal advices to member councils, worth up to \$150,000.

Our Management Solutions team continued to provide the sector with competitively priced, specialist human resource and employment services,

- recruiting 25 general managers, senior staff and specialist professional roles
- facilitating 42 senior staff performance reviews for 31 councils
- delivered LGNSW's annual HR benchmarking and remuneration survey report, providing valuable comparative data on recruitment and retention, leave, work health and safety, learning and development, and remuneration.

Our 'organisation structure review' service assisted councils to assess strengths and weaknesses of existing structures in order to identify delivery priorities and challenges and in February we launched a new digital benchmarking platform.

I'm delighted to advise that more than 70 councils in NSW have now use the tool to compare performance data.

In response to the introduction of mandatory annual reporting of councillor professional development, we provided **new programs** for elected members including:

- Audit, Risk & Improvement Committee
- The new Model Code of Conduct and Meeting Practice (delivered face-to-face and online), and
- Social Media and Public Speaking Skills

Overall **LGNSW delivered**:

- 38 in-house programs for 228 councillors
- 37 public programs for 173 councillors
- 126 councillors registered for Professional Development in a Box, and, as I mentioned earlier.
- more than 7,300 users registered for LGNSW's new e-Learning modules.

As part of our '**Capacity Building**' for Council Staff, we facilitated:

- the **Executive & Personal Assistant Conference** attended by 128 staff from 50 councils
- the **NSW Local Government Human Resources Conference**, where 145 human resources professionals from 79 councils were brought up-to-date with the latest technology, legal changes and major issues in the HR field
- **Best practice Asbestos Forums** for more than 310 council staff from 75 councils
- Regional workshops which provided training to representatives from 18 councils to improve their management of local roadsides via Rapid Assessment Methodology and the EcoRoadside App
- **Natural Asset Workshops**, held in collaboration with Hunter Joint Organisation and Port Stephens Council , and
- **Night Time Economy Masterclasses** for more than 160 council staff.

NSW is at the vanguard when it comes to the development and training of our sector's 55,000 workforce. But we are about to break new ground to ensure local government right across the country is able to access the right people and skillsets for the incredibly broad work we do for our communities.

I am delighted to launch today an exciting new careers and jobs hub created **for local government, by local government**.

The '**Careers at Council**' website offers a one-stop-shop of information about the diversity of roles and the skills and qualifications required of council employees. 'Careers at Council' is a national site, designed to attract talent of all ages and experience, to our councils. It has the potential to overcome skills shortages in local government right across the country, branding local government as the best possible place to make a difference and build a fantastic career.

Careers at Council tells your stories about what it's like to work in council.

It takes candidates directly to the jobs and secondment opportunities you have to offer, and to drive our best talent to local government.

Here's a little taste:

****Short Video from NeonLogic (90 seconds)***

This website is made for us as a sector. It's made for you as a council. And so today I'm urging you to come on board, promote your employee experiences and to post your jobs on this site.

Colleagues, I cannot complete my report to you, the membership, without also showcasing the outcomes delivered by our wholly-owned entity, Local Government Procurement.

During 2018/19 **LGP**

- Saved members **\$22 million** in costs for goods and services
- Allocated **\$1.4 million** in rebates for ROCs, JOs and councils
- Had **31 contracts** in operation, encompassing **890 LGP Approved Contractors**
- Provided specialist probity advice and audit services to councils through **22 procurement projects**
- Used the LEAP efficiency and analytics program to identify more than **\$5.2 million** in savings for nine councils, and ...
- Delivered seven **procurement and engineering events** and **three sustainability forums**.

LGP adds value to you, our members, by seeking the best possible deal when procuring goods and services.

It not only saves LGNSW's membership time and money, it helps build council capacity to continue to drive savings into the future.

We can all be proud about how hard this sector continues to work to deliver real value to our communities.

We should also be proud of how we come together as one body, through Local Government NSW, to advocate on their behalf.

I know as President I could not be more proud of the myriad ways Local Government NSW seeks to support you, your communities, and the public good.

And so, I would like to recognise the people who have made our joint achievements possible: our dedicated Board directors, and the hardworking LGNSW and Local Government Procurement staff.

Their passion for local government and their commitment to our sector is unparalleled, and on your behalf, I want to take this opportunity to say thanks.

Thank you.

Cootamundra Water Supply Chlorination Strategy
Cootamundra-Gundagai Regional Council

1. Executive Summary

Maintaining free chlorine residuals at >0.2 mg/L in the reticulation network has been an issue for the Cootamundra drinking water supply scheme, as shown with data from 2017. The poor integrity of the reticulation network (some sections are currently under renewal), places the supply at greater risk of pathogen ingress, and is likely contributing to low disinfectant levels.

Chlorine demand was estimated in the report for the various monitoring sites used by the scheme, and revised targets for chlorine residual for the two reservoirs for the scheme were calculated. The revised targets would raise minimum chlorine residual in the reservoirs from a current value of 0.33 mg/L to a minimum of 1.34 mg/L.

To achieve this target, introduction of rechlorination plant at both of the reservoirs is recommended, including:

- water quality monitoring at handover points from Goldenfields Water (prior to the reservoirs - can be through data sharing arrangement with Goldenfields Water or installation of online monitoring meters owned by Council)
- additional free and total chlorine and pH monitoring for water within the reservoir
- chlorination (recommended as sodium hypochlorite) to maintain chlorine residual within the reservoir
- a recirculation system for the reservoir monitoring and chlorination plant.

Funding requirements were assessed on a 'Rough Order of Magnitude' basis (-25%/+75%). Capital requirements for the recommended option is \$180,000, and operating costs are expected to be approximately \$35,100 per annum including energy, chemical supply, operational labour and maintenance.

The report also recommends further actions, including:

- undertake a detailed investigation to identify the cause of poor water quality in the pipework connecting the Sale Yards and Binowee Road
- continue to undertake and document the renewal of the drinking water distribution network
- undertake a detailed implementation study for rechlorination plant, including design of reservoir monitoring, chemical storage and dosing equipment

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

2. Introduction

Cootamundra-Gundagai Regional Council (CGRC) provides reticulated water to approximately 5,600 people in the township of Cootamundra through one drinking water supply system. The Council purchases bulk drinking water from Goldenfields Water.

This report reviews the maintenance of free chlorine in the Cootamundra Drinking Water Supply Scheme (DWSS) and recommends a strategy for improved control of free chlorine in the network.

Water for the scheme is sourced from the Murrumbidgee river and is treated by Jugiong Water Treatment Plant (WTP) by Goldenfields Water before distribution to a number of consumers, including the Cootamundra DWSS (see Figure 1). Jugiong WTP uses a conventional filtration process, followed by chlorination and fluoridation, to produce up to 40 MLD of potable water. Jugiong WTP delivers water to two CGRC reservoirs (Reservoir No. 1, Reservoir No. 2), with the responsibility handover point between Goldenfields Water and CGRC located at the reservoir inlet. The Goldenfields Water scheme includes a rechlorination station between Cowangs Reservoir and Cootamundra Reservoir No. 1.

The reservoirs hold a total of 5.5 ML, with 3 ML capacity in Reservoir No. 1 and 2.3 ML capacity in Reservoir No. 2.

The Cootamundra DWSS currently includes no monitoring of water at the handover point by Council and no automated rechlorination at the storage reservoirs (manual rechlorination is undertaken) or throughout the network.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

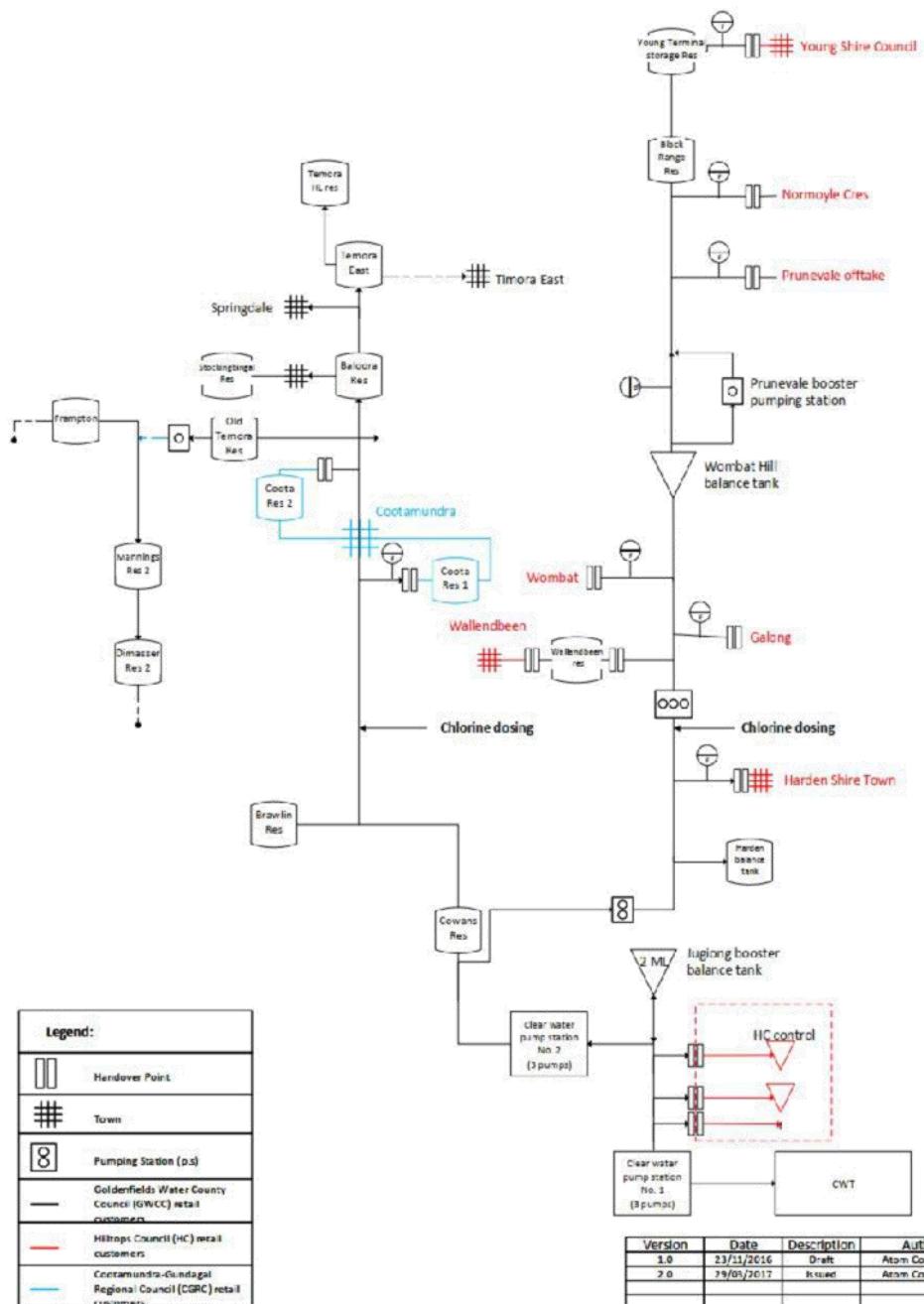


Figure 1 Jugiong water supply system (courtesy of Goldenfields Water)

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

3. Current Issues

Poor maintenance of free chlorine is noted throughout the reticulation network. Issues relevant to chlorination and confidence in the pathogen-protection of the drinking water supply system at Cootamundra exist, including:

- an aged reticulation network with a low confidence regarding its integrity against the ingress of pathogens
- no monitoring data maintained by or accessible to Council for incoming water quality delivered to the Cootamundra DWSS from Goldenfields
- rechlorination at the reservoirs is conducted manually

An aged reticulation network significantly increases the risk of poor public health outcomes for the scheme, and is likely a contributor to poor maintenance of chlorine residual throughout the network. CGRC has noted numerous breakages and customer complaints about 'dirty' water.

It is noted that CGRC are currently undertaking a staged renewal of the drinking water reticulation system. While improving the integrity of the network reduces the public health risk and will likely improve chlorine residual throughout the network, it is noted that the current chlorination methodology does not provide a robust solution for pathogen protection through normal integrity-breach events (such as pipe-breakage or minor leaks).

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

4. System Performance

As a part of the verification monitoring for the scheme (NSW Health monitoring program), sampling is undertaken periodically throughout the network. Samples are collected on a weekly basis, with the weekly sampling location selected from nine monitoring locations representing dead-ends and other high-risk locations for chlorine residual. The monitoring program also includes samples taken nearby to Reservoirs No. 1 and No.2.

4.1. Free Chlorine

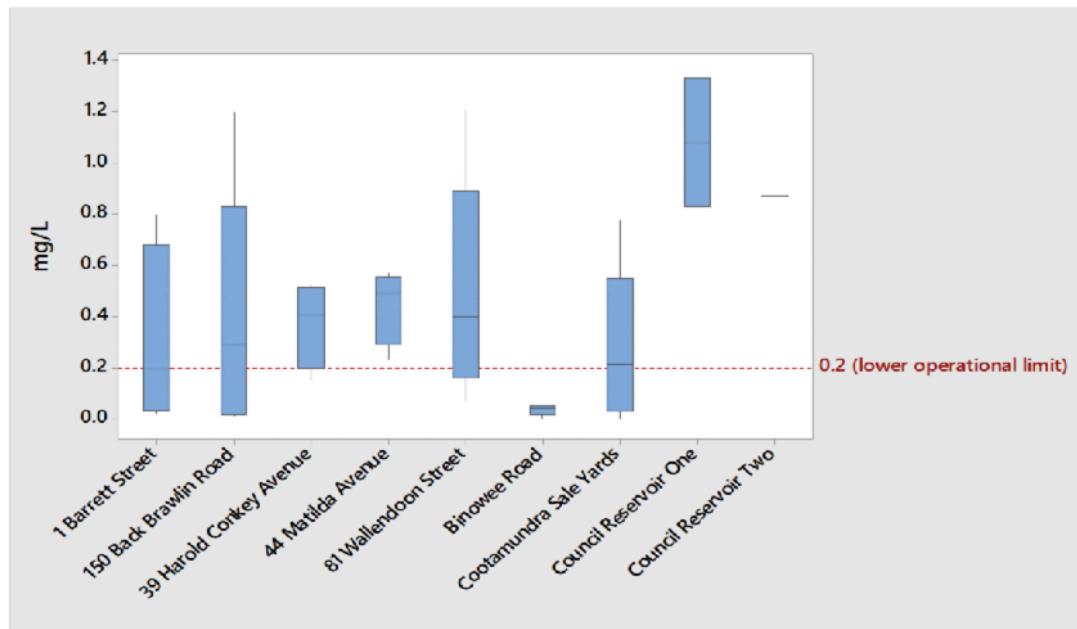


Figure 2 Boxplot of laboratory-analysed free chlorine samples taken in 2017

Monitoring data over 2017 shows inconsistent performance across the network, with all monitoring sites except two (near Reservoirs No. 1 and No. 2) having low (<0.2 mg/L) chlorine residual levels. It is noted that the reservoir readings have a low sample count (two samples for Reservoir No.1 and one sample for Reservoir No. 2, compared with an average of 5.7 samples for other sampling locations).

Further data from grab samples (operational monitoring) was analysed to better characterise free chlorine within the reticulation network and is presented in Table 1. The data shows that chlorine levels are maintained in the reservoirs at levels between 0.33 mg/L and 1.76 mg/L, with mean free chlorine residuals of 0.83 mg/L and 1.00 mg/L for Reservoir No. 1 and Reservoir No. 2 respectively.

Chlorine residual results for distribution monitoring locations show significant destruction of free chlorine within the reticulation network. Out of 152 total samples taken, 63 (or 44%) did not contain at least 0.2 mg/L of free chlorine, the minimum residual target recommended in the ADWG 2011.

With concerns over the integrity of the network, a free chlorine residual of 0.5 mg/L should be considered to provide protection against opportunistic pathogens e.g. *N. fowleri* into the network (ADWG 2011). When considering a more conservative target appropriate for the aged reticulation network of 0.5 mg/L, this rises to 64% of all samples.

*Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council***Table 1 Analysis of free chlorine data for grab samples within the Cootamundra network**

| Location | ADWG Value (mg/L) | Sample Count | Out-of-specification | Min (mg/L) | 5%tile (mg/L) | Mean (mg/L) | Max (mg/L) |
|-------------------------|-------------------|--------------|----------------------|------------|---------------|-------------|------------|
| 1 Barrett Street | 0.2 – 0.5 | 17 | 7 | 0.02 | 0.03 | 0.38 | 0.99 |
| 150 Back Brawlin Road | 0.2 – 0.5 | 18 | 5 | 0.01 | 0.02 | 0.5 | 1.31 |
| 39 Harold Conkey Avenue | 0.2 – 0.5 | 17 | 6 | 0.07 | 0.09 | 0.46 | 0.93 |
| 44 Matilda Avenue | 0.2 – 0.5 | 18 | 3 | 0.03 | 0.07 | 0.45 | 0.94 |
| 81 Wallendoon Street | 0.2 – 0.5 | 36 | 5 | 0.07 | 0.11 | 0.62 | 1.79 |
| Binowee Road | 0.2 – 0.5 | 28 | 28 | 0.00 | 0.00 | 0.03 | 0.09 |
| Saleyards | 0.2 – 0.5 | 18 | 9 | 0.00 | 0.02 | 0.29 | 0.29 |
| Reservoir No. 1 | 0.2 – 0.5 | 28 | 0 | 0.43 | 0.45 | 1.00 | 1.76 |
| Reservoir No. 2 | 0.2 – 0.5 | 26 | 0 | 0.33 | 0.51 | 0.83 | 1.73 |

These results reflect the known state of the distribution network, with much of the pipework in the network aged and its integrity regarding ingress of contaminants unknown. The network is currently undergoing a planned renewal, completed in stages.

The results also indicate a number of problem areas, particularly:

- distribution to the Sale Yards showed significant degradation in chlorine residual, with 50% of all samples having very low chlorine
- pipework connecting the Sale Yards with Binowee Road. All samples were out of specification taken at this site in 2017.

The pipework connection between the Sale Yards and Binowee Road is of particular concern, as the relatively close proximity and (assumed) commonality of distribution indicates:

- a failure of the pipework system between these locations.
- indication of cross-connections contaminating the water supply
- indication of a very low use dead-leg in the network
- that the sampling location is from a non-potable source, rather than a part of the potable water network
- that other issues are interfering with the sampling process.

While some areas of the network show integrity issues that need to be addressed, the residual chlorine level throughout the network is unreliable, and indicates that an increase in free chlorine at reservoir storage is warranted.

4.2. Total Chlorine

Total chlorine within the scheme was assessed and is shown in Table 2. While total chlorine within the network is within the ADWG health guideline of up to 5 mg/L, the results indicate a higher than expected result for 'combined chlorine'.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

Combined chlorine typically consists of monochloramine, and to a lesser extent dichloramine and trichloramines. These compounds are disinfection byproducts that are typically caused by hypochlorous acid oxidising nitrogen containing compounds including ammonia, urea and amino acids.

Jugiong WTP does not implement a chloramination process, although results indicate that a significant residual of monochloramine is present in the treated water. The data indicates that the raw water source is likely high in nitrogen, with pre-chlorination likely increasing the formation of chloramine compounds.

One area of note is the total chlorine results for 'Binowee Road' are significantly lower in total chlorine than the nearby Sale Yard samples and samples taken at the reservoirs. Total chlorine does not readily degrade in drinking water supplies, indicating some issues at Binowee Road as mentioned earlier under section 4.1.

Table 2 Total chlorine for grab samples taken within the Cootamundra distribution network

| Location | ADWG Value (mg/L) | Sample Count | Out-of-specification | Min (mg/L) | Mean (mg/L) | 95%tile (mg/L) | Max (mg/L) |
|-------------------------|-------------------|--------------|----------------------|------------|-------------|----------------|------------|
| 1 Barrett Street | 5 | 17 | 0 | 0.18 | 0.55 | 1.08 | 1.23 |
| 150 Back Brawlin Road | 5 | 18 | 0 | 0.18 | 0.7 | 1.48 | 1.54 |
| 39 Harold Conkey Avenue | 5 | 17 | 0 | 0.13 | 0.67 | 1.18 | 1.29 |
| 44 Matilda Avenue | 5 | 18 | 0 | 0.21 | 0.66 | 1.2 | 1.24 |
| 81 Wallendoon Street | 5 | 36 | 0 | 0.27 | 0.87 | 1.53 | 2.05 |
| Binowee Road | 5 | 28 | 0 | 0.04 | 0.11 | 0.18 | 0.3 |
| Saleyards | 5 | 18 | 0 | 0.07 | 0.51 | 1.15 | 1.44 |
| Reservoir No. 1 | 5 | 28 | 0 | 0.56 | 1.24 | 1.73 | 2.09 |
| Reservoir No. 2 | 5 | 26 | 0 | 0.52 | 1.09 | 1.6 | 2.02 |

4.3. Free Chlorine Demand

Free chlorine demand was estimated for the seven sampling sites in the network. The demand was tested using two methods:

- **Concurrent Samples:** Analysis of samples where reservoir chlorine residual was sampled on the same day as distribution point sample was taken.
- **All Samples:** Analysis of all network samples against mean chlorine residual at the distribution point.

Free chlorine consumption for each sampling site of the scheme is estimated by comparing the free chlorine at each sample point with the maximum free chlorine at each reservoir. This methodology calculation is intentionally conservative to ensure that chlorine and dosing plant requirements presented represent a realistic 'worst-case scenario'.

Concurrent sampling is expected to be a more accurate estimation of chlorine demand, however only a limited number of concurrent samples were available (most sites have less than 10 concurrent samples). The 'All Samples' method is used to check the veracity of the concurrent sampling method. The results are presented below in Table 3 and Table 4.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

It is noted that treated water from the scheme can be delivered directly to some consumers (about 2 properties) from the incoming main to the Cootamundra reservoirs. There is no data available to isolate this supply from the reservoir-supplied customers, however, majority of water delivered to the reticulation network is sourced from the reservoirs.

Table 3 Network chlorine demand using the 'Concurrent Samples' method

| Location | Consumption Min (mg/L) | Consumption Mean (mg/L) | Consumption Max (mg/L) | Consumption Std Dev (mg/L) | Valid Sample Count |
|-------------------------|------------------------|-------------------------|------------------------|----------------------------|--------------------|
| 1 Barrett Street | 0.12 | 0.37 | 0.93 | 0.24 | 10 |
| 150 Back Brawlin Road | 0.23 | 0.41 | 0.57 | 0.23 | 5 |
| 39 Harold Conkey Avenue | 0.01 | 0.31 | 0.73 | 0.22 | 9 |
| 44 Matilda Avenue | 0.09 | 0.27 | 0.55 | 0.18 | 8 |
| 81 Wallendoon Street | 0.01 | 0.25 | 0.49 | 0.17 | 10 |
| Binowee Road | 0.41 | 0.92 | 1.74 | 0.47 | 14 |
| Saleyards | 0.24 | 0.52 | 0.86 | 0.31 | 8 |
| Reservoir No. 1 | 0.12 | 0.37 | 0.93 | 0.24 | 10 |
| Reservoir No. 2 | 0.23 | 0.41 | 0.57 | 0.23 | 5 |

Table 4 Network chlorine demand using the 'All Samples' method

| Location | Consumption Min (mg/L) | Consumption Mean (mg/L) | Consumption Max (mg/L) | Consumption Std Dev (mg/L) | Valid Sample Count |
|-------------------------|------------------------|-------------------------|------------------------|----------------------------|--------------------|
| 1 Barrett Street | 0.01 | 0.62 | 0.98 | 0.32 | 17 |
| 150 Back Brawlin Road | #N/A | 0.5 | 0.99 | 0.39 | 18 |
| 39 Harold Conkey Avenue | 0.54 | 0.54 | 0.93 | 0.31 | 18 |
| 44 Matilda Avenue | 0.06 | 0.55 | 0.97 | 0.27 | 18 |
| 81 Wallendoon Street | #N/A | 0.38 | 0.93 | 0.39 | 36 |
| Binowee Road | 0.91 | 0.97 | 1 | 0.02 | 28 |
| Saleyards | 0.1 | 0.71 | 1 | 0.27 | 18 |
| Reservoir No. 1 | 0.01 | 0.62 | 0.98 | 0.32 | 17 |
| Reservoir No. 2 | #N/A | 0.5 | 0.99 | 0.39 | 18 |

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

5. Reservoir Free Chlorine Levels

5.1. Data Analysis

Using the demand analysis from Section 4.3, the following control limits and setpoints are reviewed below, comparing the analysis methods from Section 4.3.

Data from Binowee Road was excluded from the analysis. As discussed in Section 4.1, it is likely that a distribution issue is the cause of low chlorine at this site.

A detailed network analysis was not conducted for this report to analyse the effects of relative supply from Reservoir No. 1 and Reservoir No. 2 on the free chlorine levels in the network. As such, free chlorine levels are not distinguished between the two reservoirs in Table 5.

Table 5 Comparison of free chlorine control limits and setpoint between the 'Concurrent Samples' and 'All Samples' methods

| Method | Reservoir LCL (mg/L) | Reservoir Setpoint (mg/L) | Reservoir UCL (mg/L) |
|--------------------|----------------------|---------------------------|----------------------|
| Concurrent Samples | 1.34 | 2.02 | 2.7 |
| All Samples | 1.48 | 2.1 | 2.72 |

The lower control limit (LCL) is calculated using the maximum demand in the network and allowing for a variation in the network chlorine demand (at the 95% confidence interval level). The upper control limit (UCL) for the reservoir considers the current variation in free chlorine levels at the reservoirs to a 95% confidence interval. The reservoir set point is the mean of the LCL and UCL values.

The 'All Samples' method shows agreement with the concurrent samples method, confirming that the limited sample population has not adversely affected results.

5.2. Reservoir Chlorination Target

This report recommends the chlorination control limits for the reservoirs in the Cootamundra scheme as presented in Table 6 (based on analysis using the concurrent samples method). A nominal setpoint is provided at the mean of the lower control limit and upper control limit. The LCL value will enable the free chlorine in the reticulation to be at least 0.2 mg/L or greater.

Table 6 Reservoir chlorination control limits and setpoint targets

| Reservoir | Reservoir LCL (mg/L) | Reservoir Setpoint (mg/L) | Reservoir UCL (mg/L) |
|-----------------|----------------------|---------------------------|----------------------|
| Reservoir No. 1 | 1.34 | 2.02 | 2.7 |
| Reservoir No. 2 | 1.34 | 2.02 | 2.7 |

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

6. Process Improvements

Achieving the targets set in Section 5.2 is unrealistic with the current configuration of the supply scheme (which includes chlorination at Jugiong WTP and rechlorination of the Goldenfields main prior to the Cootamundra reservoirs). There are a number of water users downstream of the Cootamundra reservoirs and a major increase in the chlorination level may not be acceptable to all Goldenfields Water clients. Additionally, the water supply is subject to significant variation in free chlorine levels.

To improve the performance of the disinfection system, two process improvements are recommended within the Cootamundra DWSS:

- local rechlorination station for each reservoir
- improved monitoring of free chlorine within the reservoirs

6.1. Rechlorination

Rechlorination at each reservoir is recommended as one of the options to improve chlorine residual throughout the network. For the rechlorination of reservoirs for the Cootamundra scheme, the following methods are considered:

- sodium hypochlorite dosing
- offline sodium hypochlorite generation
- chlorine gas dosing

Each method has advantages and disadvantages, however all methods require recirculation of water from the reservoir. This provides a discrete dosing point and measurement location to ensure that the correct dose of chemical is applied.

The methods are reviewed in Sections 6.1.1 to 6.1.3 below, however this report recommends a detailed investigation on sodium hypochlorite dosing plant as the best fit for this scheme.

Estimates given in this report are approximate in nature and are only provided to allow high level assessment of options. A detailed study of the selected chlorination method is required to determine capital and operating cost suitable for a budget submission.

Figures provided are accurate only to a 'Rough Order of Magnitude' accuracy (-25%/+75%) as per Project Management Body of Knowledge (PMBOK) standards. Operating costs estimated in this report include estimates of:

- chemical supply cost
- operating labour cost
- typical maintenance cost
- plant energy cost

No assessment of sinking fund requirements, cost of capital or other economic factors is provided. Capital cost estimates consider the requirement for rechlorination at both Reservoir No. 1 and Reservoir No. 2.

6.1.1. Sodium Hypochlorite Dosing

Sodium hypochlorite (commonly known as liquid chlorine) is a common chlorination method utilising bulk delivery of sodium hypochlorite. The operation and maintenance of hypochlorite dosing plant is straightforward and generally well understood by treatment operators. Sodium hypochlorite is a Class 8 Corrosive, and handling of the chemical requires care typical of liquid dangerous goods used in water treatment.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

A sodium hypochlorite dosing system typically consists of:

- a tanker filling station, including control panel and bund
- a bulk storage tank, including bund
- dosing pumps, typically in a duty/standby arrangement.

To enable bulk delivery of hypochlorite, a storage bund is required for the storage tank and a tanker delivery bund is also required. This can make the spatial requirements for the dosing plant considerably larger than other methods and is a point of consideration for space-restricted applications.

When compared with other methods, sodium hypochlorite plant has a low capital cost but moderate operating cost. A summary of a typical system for this application is given below in Table 7.

Table 7 Typical sodium hypochlorite dosing plant performance and cost

| Item | Units | Value |
|---------------------------------|-------|-------------|
| NaOCl Bulk Storage | kL | 3000 |
| Dosing Pump Size | L/h | 20 |
| CAPEX Estimate | \$ | \$180,000 |
| Annual OPEX Estimate | Spa | \$35,082 |
| 25 year Total Cost of Ownership | \$ | \$1,057,043 |

Hypochlorite storage systems must be designed with chemical delivery and storage in mind. In addition to the bunding requirements, regular delivery of chemicals is required as sodium hypochlorite is unsuitable for long-term storage. Additionally, sodium hypochlorite tanks are highly recommended to be provided with shade, as an elevated temperature rapidly accelerates the degradation of the chemical. Typically, sodium hypochlorite systems in shaded or indoor areas are designed for no more than seven days of storage.

6.1.2. Offline Sodium Hypochlorite Generation

Offline generation of sodium hypochlorite uses common salt (sodium chloride) to produce a weak hypochlorite solution. Hypochlorite generators have a number of advantages, including:

- long-term storage of the precursor (common salt) is viable
- a reduction in the hazard of the chemical due to a weaker solution

Fundamentally, offline hypochlorite generators electrolyse a saturated brine solution to produce hypochlorite solution. Offline generators are offered by a number of major water vendors (Evoqua, Prominent, Grundfos), and each system is a unique design utilising similar processes. Generally, offline electrochlorinators use the following process:

- production of a saturated brine solution using bulk salt and a saturation tank
- softening of the saturated brine solution through an ion exchange process
- blending of the brine with process water as required by the vendor's design
- electrolysis of the solution
- removal of the hydrogen by-product
- transfer of the hypochlorite product to a storage tank, ready for dosing.

Electrolysis is conducted either through a diaphragm or a direct electrolysis cell. Diaphragm electrolysis membranes aid in the separation of hydrogen gas and waste brine. The waste brine produced by the diaphragm electrolysis cell is partially recirculated back into the brine solution, as it is high in pH which assists in binding the chlorine produced by the process into hypochlorous acid.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

Offline generators generally require less handling of dangerous chemicals, however regular maintenance is important for the system. The electrochlorination process includes hydrogen gas, and the maintenance of gas handling systems and associated sensors is critical for ensuring safe operation of the plant.

When compared with other methods, sodium hypochlorite generator plant has a both a high capital cost and a high operating cost. Generally, offline generation systems are introduced where remoteness of the site or difficulty in supply or storage of chemicals are the primary concerns for the treatment plant. The use of offline generation is not recommended for this facility.

A summary of a typical system for this application is given below in Table 8.

Table 8 Typical offline sodium hypochlorite generator plant performance and cost

| Item | Units | Value |
|---------------------------------|-------|-------------|
| NaCl Bulk Storage | kg | 500 |
| Dosing Pump Size | L/h | 30.00 |
| CAPEX Estimate | \$ | \$250,000 |
| Annual OPEX Estimate | \$pa | \$76,875 |
| 25 year Total Cost of Ownership | \$ | \$2,171,869 |

6.1.3. Chlorine Gas Dosing

Chlorine gas is a common disinfection methodology used in large or remote treatment plants. While chlorine is a dangerous gaseous chemical, safe design of plant and operation methodologies and widespread training have allowed wide adoption throughout water treatment, particularly where sodium hypochlorite use is impractical. Chlorine gas as a disinfectant is generally cost effective.

Chlorine gas systems generally operate as a ‘vacuum’ system to reduce the hazard of the plant. Chlorination via chlorine gas generally works as per the following:

- chlorine is stored under pressure in one or more cylinders (90kg) or drums (1000kg)
- a vacuum regulator device is fitted to the cylinders, allowing the cylinder to open only under vacuum
- the chlorine delivery line is through the dosing line, where it is regulated for rate and on/off control while under vacuum
- a recirculation line for process water is pumped through an ‘inductor’ or ‘ejector’, which creates the vacuum in the dosing line, drawing chlorine into the process water
- when expended, chlorine cylinder and drums are exchanged with the chemical vendor for refilling.

Chlorine does carry an additional risk over other chlorination methods, as a failure in the storage tank can result in a significant hazard to operations and maintenance staff as well as emergency crews and the general public. A number of mechanisms are put in place to reduce this risk, including:

- construction and siting of chlorine gas plant is regulated by a prescriptive standard to reduce the likelihood and consequences of failure, as well as provide a common interface to operators
- specific training in the operation of chlorine gas plant is required
- specific procedures for the operation of chlorine gas plant is required
- regular maintenance of plant by competent contractors

Vendors perform detailed due diligence before supply of chlorine gas to ensure that recipients are suitable customers for the chemical.

While chlorine does have a relatively high capital cost, chlorine has two major advantages:

- reduced operating cost due to low energy and chlorine supply cost
- long-term storage of chlorine is practical for remote sites.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

A summary of a typical system for this application is given below in Table 9.

Table 9 Typical chlorine gas plant performance and cost

| Item | Units | Value |
|---------------------------------|-------|-----------|
| Chlorine Bulk Storage | kg | 220 |
| Regulator/Injector Size | Kg/h | 1400.00 |
| CAPEX Estimate | \$ | \$220,000 |
| Annual OPEX Estimate | \$pa | \$24,599 |
| 25 year Total Cost of Ownership | \$ | \$834,973 |

Chlorine gas has only a minor cost advantage over sodium hypochlorite dosing for this facility, and with regular chemical supply to Cootamundra expected to be possible it is difficult to recommend the use of chlorine gas due to the additional risk and training associated with this solution.

6.2. Other Improvements

6.2.1. Reticulation Network Renewal

Council has planned a renewal of the aged reticulation network for the Cootamundra scheme. The renewal is being undertaken in a staged manner. This staged approach gives Council the opportunity to take a 'pareto' approach to the renewal, focusing on areas of greatest concern for urgent replacement, while replacing lower risk services as funding becomes available.

This report considers the current state of the reticulation network when assessing chlorine demand throughout the network. It is noted however that this strategy aims to provide Council with a robust performance solution to reduce the sensitivity of the system to breaches in integrity of the network, and the improved integrity achieved with the renewal of the reticulation network will work in conjunction with the proposed chlorination strategy to improve the protection provided to consumers.

6.2.2. Handover Monitoring

Council are currently investigating the implementation of improved analytics at the handover point between the Jugiong WTP DWSS and the Cootamundra DWSS to improve understanding and control of water supply to the scheme. The options which Council can consider include data sharing arrangement with Goldenfields Water to access/use their online monitoring data or investigate online monitoring at the offtake points (chlorine, turbidity, pH) which are Council owned. Having access to handover water quality monitoring will allow Council to adequately monitor and work with Goldenfields Water to ensure safe quality drinking water for the community.

6.2.3. Reservoir Monitoring

In addition to handover monitoring, reservoir monitoring using recirculated water is also recommended where rechlorination systems are installed. It is not necessary to include all parameters for the reservoir monitors. Free chlorine, total chlorine and pH are suitable for appropriate monitoring and control of this process.

A major advantage of the inclusion of free chlorine monitoring and control is that reduced variability of the free chlorine level in the reservoir would be expected. This allows the control limits to be reduced in line with the control system performance.

Cootamundra Water Supply Chlorination Strategy - Cootamundra-Gundagai Regional Council

7. Recommendations and Next Steps

The recommendations and next steps for Council include:

- consider local rechlorination station for each reservoir
- undertake a detailed implementation study for sodium hypochlorite dosing rechlorination plant, including design of reservoir monitoring, chemical storage and dosing equipment
- improve monitoring of free chlorine (total chlorine and pH) at the reservoirs (recirculation and online monitoring) and maintain free chlorine to at least 1.34 mg/L in each reservoir
- continue to undertake and document the renewal of the drinking water distribution network
- investigate having access to handover water quality monitoring data to enable Council to adequately monitor and work with Goldenfields Water to ensure safe quality drinking water for the community. Council can consider data sharing arrangement with Goldenfields Water to access/use their online monitoring data or investigate online monitoring at the offtake points which are Council owned.
- undertake a detailed investigation to identify the cause of poor water quality in the pipework connecting the Sale Yards and Binowee Road

Concept Design Report
Cootamundra Supply System Rechlorination and
Reservoir Review

November 2019



Concept Design Report

Cootamundra Supply System Rechlorination and Reservoir Review

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*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***Contents**

| | |
|---|-----------|
| 1. Executive Summary | 1 |
| 2. Introduction | 2 |
| 2.1. Background | 2 |
| 2.2. Scope of the Report | 2 |
| 3. Treated Water Storage | 4 |
| 3.1. Forecast Supply Water Requirements | 4 |
| 3.2. Required Storage Capacity | 6 |
| 3.3. Reservoir Configuration | 8 |
| 3.4. Estimated CAPEX Requirements | 10 |
| 4. Reservoir Rechlorination | 11 |
| 4.1. Background | 11 |
| 4.2. Chlorine Demand | 11 |
| 4.3. Hypochlorite Storage | 12 |
| 4.4. Recirculation System | 13 |
| 4.5. Power, Control and Analytics | 14 |
| 4.6. System Layout | 15 |
| 4.7. Estimated CAPEX Requirements | 17 |
| 4.8. Future Expansion | 17 |
| 5. Handover Water Quality Monitoring | 18 |
| 5.1. Background | 18 |
| 5.2. Analytics and Control | 18 |
| 5.3. Configuration and Communication | 19 |
| 5.4. Power | 19 |
| 5.5. Estimated CAPEX Requirements | 20 |
| 5.6. Future Expansion | 21 |
| 6. Reticulation Chlorination Issues | 22 |
| 6.1. Background | 22 |
| 6.2. Potential Solutions | 23 |
| 6.2.1. Rechlorination | 24 |
| 6.2.2. End Reconnection | 24 |
| 6.2.3. Increased Flushing | 26 |
| 7. References | 27 |

Appendices

| | |
|-------------------------------------|---|
| Supporting Calculations | A |
| Proposed Equipment Datasheets | B |

Figures

| | |
|--|---|
| Figure 1 Estimated daily average demand forecast | 5 |
| Figure 2 Average, daily and peak demand estimation forecast | 5 |
| Figure 3 Storage capacity components (DoHWA, 2009) | 6 |
| Figure 4 Diagram of storage requirements and current capacity (not to scale) | 7 |
| Figure 5 Reservoir connections | 8 |



Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

| | |
|---|----|
| Figure 6 Proposed pressure reduction system schematic | 9 |
| Figure 7 Schematic diagram of the recirculation system..... | 14 |
| Figure 8 Typical chlorination system layout | 16 |
| Figure 9 Handover monitoring station siting..... | 18 |
| Figure 10 Configuration of the monitoring station..... | 19 |
| Figure 11 Cootamundra reticulation network with problem areas shown..... | 22 |
| Figure 12 Typical metallic pipe condition | 23 |
| Figure 13 Cootamundra reticulation network with potential dead-end loops shown..... | 25 |

Tables

| | |
|---|----|
| Table 1 Cootamundra township population estimate..... | 4 |
| Table 2 Treated water storage requirements | 7 |
| Table 3 Capital cost estimate..... | 10 |
| Table 4 Chlorine demand | 11 |
| Table 5 Hypochlorite storage volumes | 12 |
| Table 6 Reservoir recirculation system requirements | 13 |
| Table 7 Monitoring parameters at each reservoir chlorination system | 14 |
| Table 8 Cost comparison of solar power and grid power..... | 15 |
| Table 9 Capital cost estimate..... | 17 |
| Table 10 Monitoring parameters at each handover monitoring station | 18 |
| Table 11 Cost comparison of solar power and grid power..... | 20 |
| Table 12 Capital cost estimate..... | 20 |
| Table 13 Options summary..... | 24 |
| Table 14 Summary of reconnection options..... | 25 |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review**Document History and Status**

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Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

1. Executive Summary

Cootamundra-Gundagai Regional Council (CGRC) have engaged Viridis Consultants to review the storage capacity and rechlorination requirements for the Cootamundra system, following on from an earlier study (*Cootamundra Chlorination Strategy*) undertaken by Viridis in 2018.

CGRC provides reticulated water to approximately 5,600 people in the township of Cootamundra through one drinking water supply system. Council purchases bulk drinking water from Goldenfields Water for the scheme, storing it in two reservoirs with a total capacity of 5.3ML. These reservoirs are currently operated at a maximum of 60% of capacity to manage pressure within the reticulation network.

Storage requirements were reviewed for the Cootamundra scheme, with a total of 4.99ML of storage recommended to account for operational and incident management. This is less than to total reservoir capacity for the scheme, although greater than the current usable volume of the reservoirs. In order to provide an appropriate storage volume, the installation of pressure control valves at each reservoir is recommended. This will allow the full volume of the reservoirs to be utilised. This implementation is also recommended to install a bypass around the pressure control valve and the reservoir itself to allow maintenance of these assets. Implementation of this system is estimated to require a capital investment of \$68,600.

The *Cootamundra Chlorination Strategy* recommended the implementation of rechlorination at each reservoir using sodium hypochlorite. This report contains the recommended implementation of this system, including analytics and integration with the project to implement ClearSCADA (currently being undertaken by the Department of Public Works on behalf of CGRC). This report recommends that the chlorination system recirculates water in the reservoir to maintain a stable chlorine residual within the reservoir. Power is required at both sites, and this report recommends that pole-mounted grid power be brought to the site, as solar power was found to be uneconomical on a life-cycle cost basis.

Implementation of this system is estimated to require a capital investment of \$264,162.

The *Cootamundra Chlorination Strategy* also recommended the implementation of handover monitoring stations to enable verification that water received from Goldenfields Water is compliant with the Bulk Water Supply Agreement and to enable prompt corrective actions for any out-of-specification water. The report contains the recommended implementation of a monitoring system for free chlorine, total chlorine and pH at the two handover points. Implementation of this system is estimated to require a capital investment of \$76,114.

The report also briefly reviews chlorination issues noted at the saleyards and at Old-Binowee Road. It is expected that chlorine residual at these sites will improve after completion of the mains replacement works, and also after implementation of the reservoir rechlorination works detailed in this report. The report finds an increase in flushing (or implementation of a continual bleed) at these locations to be the most viable solution. Other solutions were explored, although found to be unfeasible with the existing network. It is noted however that increased consumption of water poses an issue in terms of consumption and public perception. The report recommends continued collection of data in these areas to better inform rectification actions after the implementation of mains repairs and reservoir rechlorination projects.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

2. Introduction

2.1. Background

Cootamundra-Gundagai Regional Council (CGRC) provides reticulated water to approximately 5,600 people in the township of Cootamundra through one drinking water supply system. Council purchases bulk drinking water from Goldenfields Water for the scheme.

Water for the scheme is sourced from the Murrumbidgee river and is treated at the Jugiong Water Treatment Plant (WTP) by Goldenfields Water before distribution to a number of consumers, including the Cootamundra supply system. Jugiong WTP delivers water to two reservoirs in the Cootamundra supply system (Reservoir No. 1, Reservoir No. 2), with the responsibility delineation between Goldenfields Water and CGRC located at nominated handover points. The Goldenfields Water scheme includes a rechlorination station between Cowangs Reservoir and Cootamundra Reservoir No. 1.

The reservoirs currently hold a total of 5.3 ML, with 3 ML capacity in Reservoir No. 1 and 2.3 ML capacity in Reservoir No. 2. Both reservoirs are operated at maximum of 60% to limit leakage losses and line breaks within the network. While the network is undergoing significant renewal, it is expected that this pressure limit will remain in place for the near and medium term.

The Cootamundra supply scheme currently includes no monitoring of water at the handover point by CGRC and no automated rechlorination at the reservoirs (manual rechlorination undertaken) or in the network.

A number of issues relating to chlorination were noted in a report to CGRC during a regular review of the Drinking Water Management System (Viridis, 2018). These included:

- a lack of monitoring of the quality of water at the handover point
- high variability of free chlorine residual within the reservoirs
- low chlorine in various locations within the chlorination network.

Additionally, CGRC have not conducted a study to determine whether the level of storage in the Cootamundra system is fit-for-purpose.

2.2. Scope of the Report

CGRC have engaged Viridis Consultants to review the storage capacity and rechlorination requirements for the Cootamundra system.

This report provides the following:

- a review of storage requirements within the Cootamundra system
- a concept design for enabling the required storage
- a concept design for a rechlorination system
- a concept design for a handover telemetry system
- a review of potential solutions to low chlorine residual within the reticulation network.

The report and associated documents do not provide the following:

- detailed design or construction documentation
- detailed design of interfaces with the new SCADA system currently in development with the Department of Public Works
- consideration of pressure within the network or a detailed reticulation network demand analysis
- condition assessment of existing assets and assets to be reused (including reservoirs).

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Where shown in this report, all costs and other financial impacts are provided at a 'Budget Estimate' basis (-10%/+25%).

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

3. Treated Water Storage

3.1. Forecast Supply Water Requirements

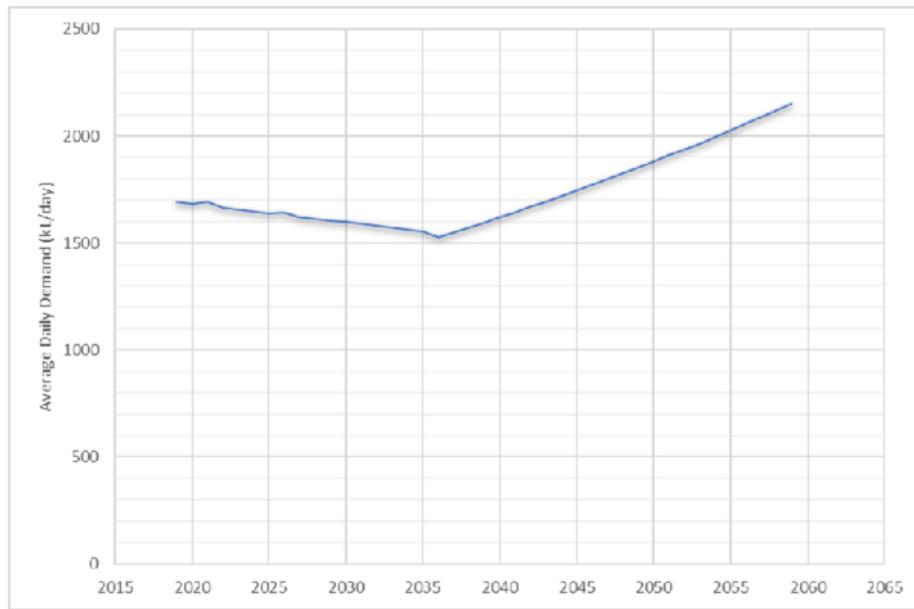
Consumption data and population data was provided by Council for FY18-29, which was interpolated and extrapolated to forecast future demand from 2019 to 2059 (40 years). Population forecast for Cootamundra for 2011 to 2036 was taken from data provided by the NSW Government (Transport for NSW, 2018). After 2036, a generic long-term growth factor was applied of 1.5% per annum (Australian Bureau of Statistics, 2018). This analysis does not include allowance for any significant future industrial development that may impact consumption.

Table 1 Cootamundra township population estimate

| Year | Population Estimate |
|------|---------------------|
| 2019 | 7,355 |
| 2024 | 7,170 |
| 2029 | 6,984 |
| 2034 | 6,798 |
| 2039 | 6,945 |
| 2044 | 7,482 |
| 2049 | 7,594 |
| 2054 | 8,683 |
| 2059 | 9,354 |

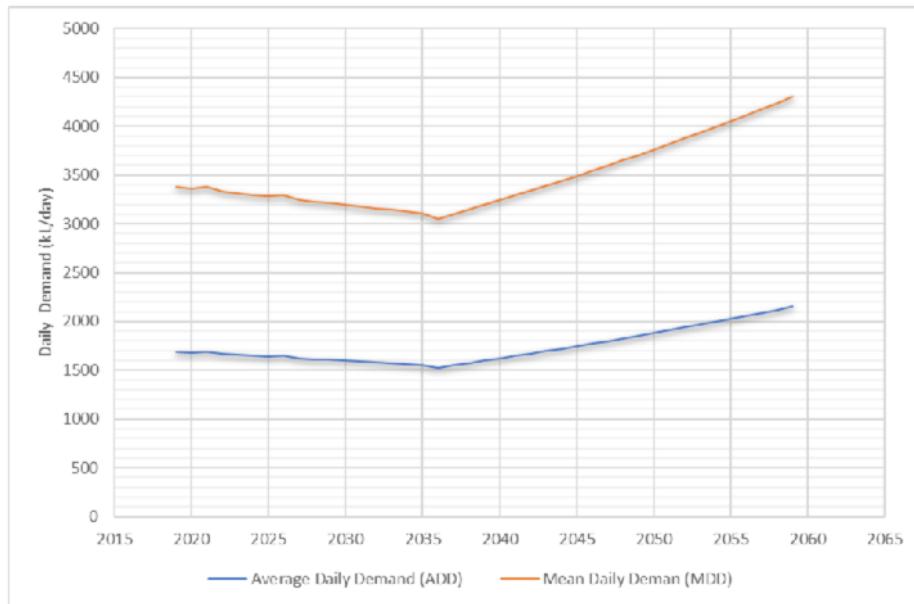
Consumption within the scheme was indexed based on population data. This assumes that consumption per resident remains constant over the projection period at 229.8 L/person/day. This assumption is considered reasonable for this analysis and provides a conservative base when considering current unproductive water (due to network leaks and an intensive flushing program) and potential future demand reduction strategies.

The average daily water demand was calculated from the yearly forecast (Figure 1). The current (2019) demand is estimated to be around 1700 kL per day, and maximum forecast being around 2150 kL/day (2059).

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review**Figure 1 Estimated daily average demand forecast**

The estimated average daily demand (ADD) was used to then estimate the maximum daily demand (MDD):

$$MDD = 2 \times ADD$$

**Figure 2 Average, daily and peak demand estimation forecast**

The estimated average daily demand (ADD) was used to estimate the peak hourly demand (PHD):

$$PHD = \frac{4 \times ADD}{24}$$

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Peak hourly demand is used to determine the equalizing storage required, and was taken at 99.55 L/s. This result is closely comparable with the peak hourly demand in the Bulk Water Supply Agreement (98.17 L/s).

3.2. Required Storage Capacity

Methodology Employed

Storage capacity analysis adapts the methodology by Washington State Department of Health for determining reservoir volume (DoHWA) in lieu of a local standard or guideline. Storage capacity required is a function of the following factors:

- *Operational Storage (OS)*, used as an operating buffer for filling and discharging the reservoir in normal operation
- *Equalising Storage (ES)*, used to provide an operating buffer where peak hourly demand is greater than inflow into the reservoir
- *Standby (SB) / Fire Suppression Storage (FSS)*, used to provide sufficient volume to enable management of incidents
- *Dead storage*, representing water that is unsuitable for use due to insufficient reservoir head.

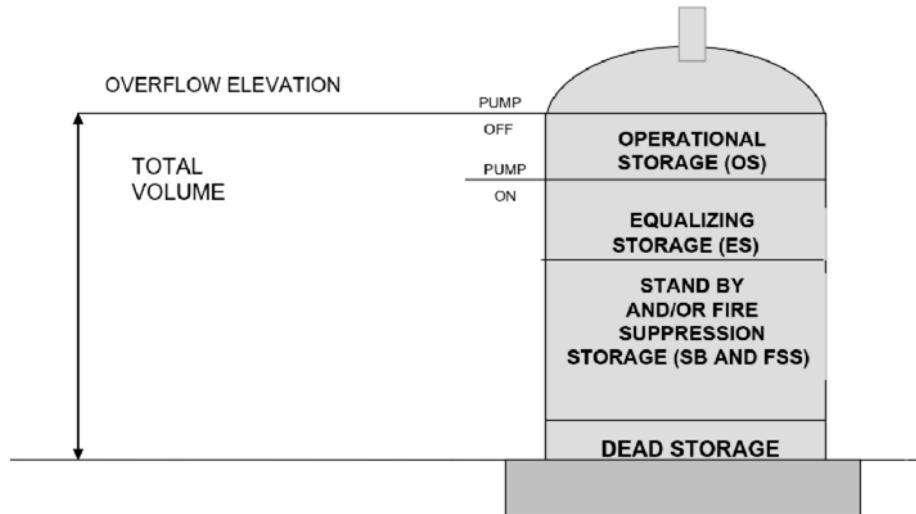


Figure 3 Storage capacity components (DoHWA, 2009)

The methodology employed deviates from the methodology presented by DoHWA in the following ways:

- OS is taken as a 5% range of the non-operational storage elements, reflecting operation of the system utilising level control and automated valves from a larger storage reservoir.
- SB is provided for 24 hours only reflecting the Bulk Water Supply Agreement between CGRC and Goldenfields Water.
- FSS does not consider pressure within the network. Pressure analysis is outside the scope of this report.
- Fire water flow (used for calculating FSS) is taken as a single FRNSW Class 2 Pumper (2900 L/min) (FRNSW, 2012).
- Fire water duration (used for calculating FSS) is taken as 240 minutes in accordance with AS2419.1-2005.

This analysis consolidates the SB and FSS volume requirements, taking only the larger of the requirements. This is consistent with the DoHWA methodology, as the dead storage level (taken at 50% for both reservoirs) is expected to provide sufficient pressure for routine use of the network (which

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

includes fire suppression). Both the level and suitability of the dead storage level were discussed at an onsite meeting with CGRC in March 2019. Dead storage is significant for this system, as issues within the reticulation do not enable the system to run below 50% without significantly impacting available pressure within the network.

Required Capacity

Analysis of the required capacity found that a total of 4.99ML is required for the Cootamundra system (refer Table 2). Calculations are presented in Appendix A.

Table 2 Treated water storage requirements

| Storage Element | Volume (ML) | Notes |
|--|-------------|---|
| Operational Storage (OS) | 0.14 | 5% Non-operational volume |
| Equalising Storage (ES) | 0 | Not required as inflows exceed peak hourly demand |
| Standby (SB) / Fire Suppression Storage (FSS) | 2.15 | Limiting factor is 24-hour standby supply volume. |
| Dead Storage | 2.65 | Limiting factor is the minimum 50% fill volume. |
| Total | 4.94 | |

The required storage is above the current available storage (3.24 ML), however below the capacity of the reservoirs (5.4 ML) as shown in Figure 4. As the maximum reservoir level is limited due to reticulation pressure considerations, it is possible to increase the utilisation of the reservoir utilising a pressure control valve (PCV).

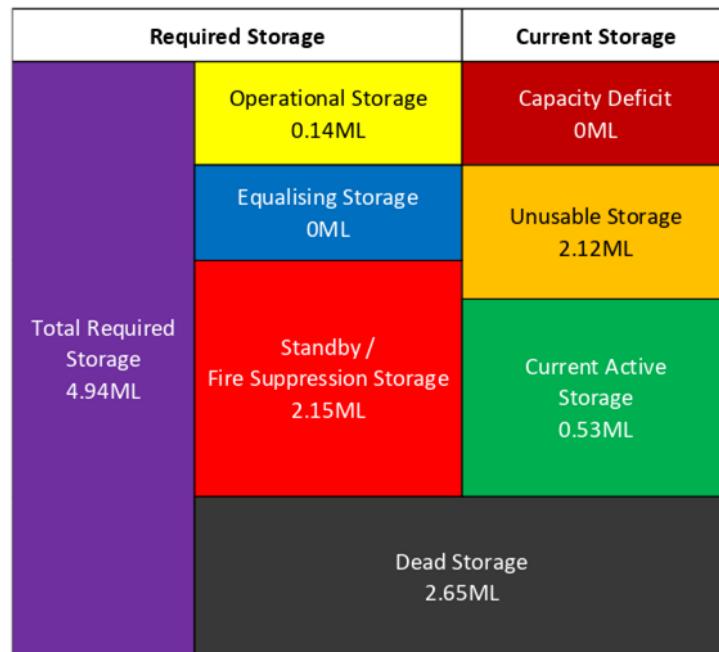


Figure 4 Diagram of storage requirements and current capacity (not to scale)

The utilisation of a PCV is expected to be significantly more cost effective than construction of a new reservoir. Additionally, construction of a new reservoir may significantly increase water age, as much of

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

the current storage is 'dead'. Depending on siting of a new reservoir, a significant dead storage component may also be present. While this report does not analyse water age, it is noted that significant storages and transfer mains exist prior to the Cootamundra system. As such, water age should be minimised as far as possible to limit the potential for trihalomethanes and other concerns in the reticulation system.

It is noted that the commissioning of the PCV must ensure that minimum pressures (as represented by the current dead storage levels) are maintained throughout operation.

3.3. Reservoir Configuration

Each reservoir is provided a separate handover location from Goldenfields Water (Figure 5). Balancing between the reservoirs occurs using a 'balancing main', although a large number of connections to the reticulation network have been made from the balancing main.

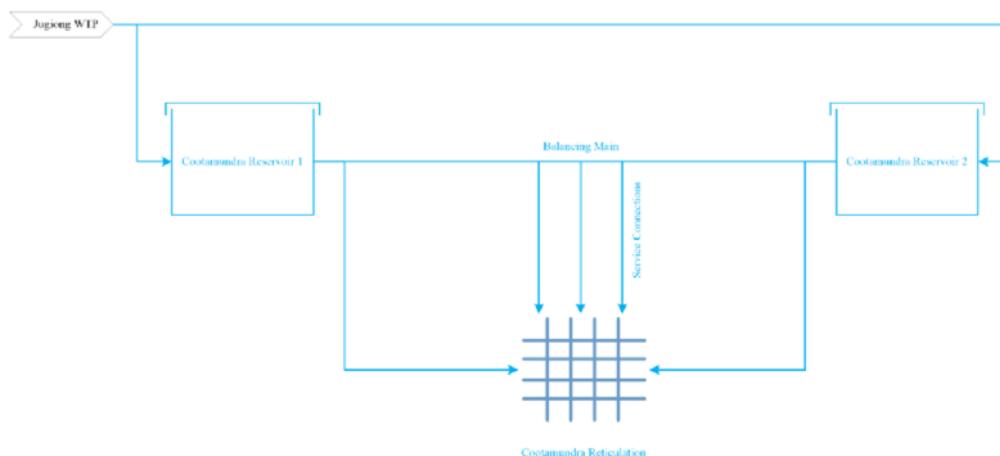
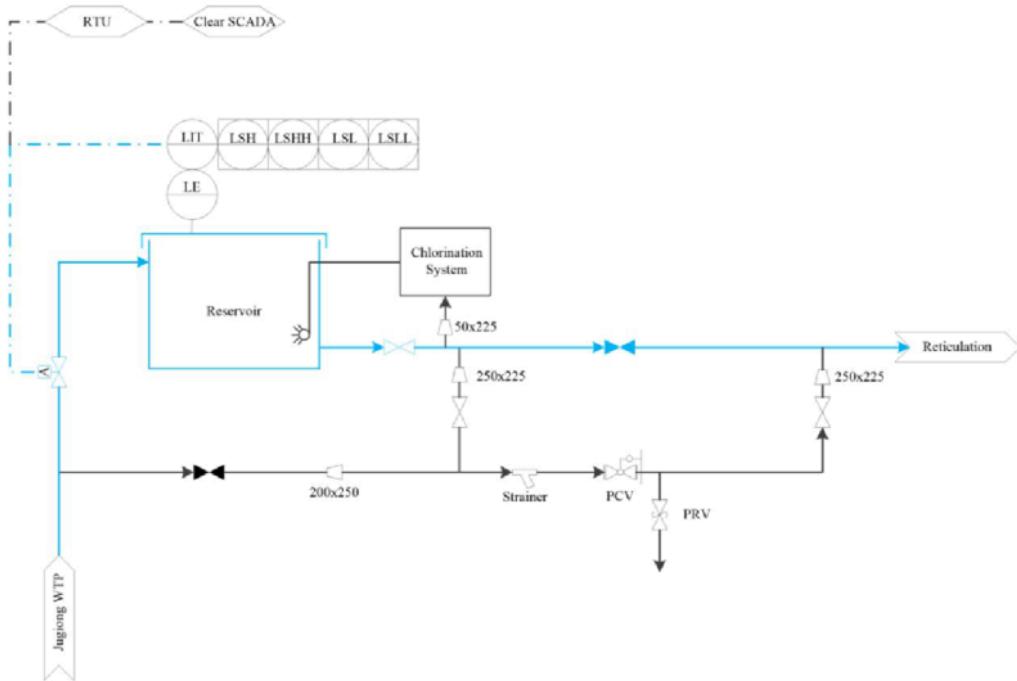


Figure 5 Reservoir connections

To enable better utilisation of the reservoirs, a pressure reduction system is proposed (refer section 3.2). It is proposed the system includes the following features as shown in Figure 6:

- a hydraulically-piloted pressure control valve (PCV) type Bermad 7PM or similar, protected with an inline strainer
- a hydraulically-piloted pressure relief valve type Bermad WW730 or similar to protect the reticulation network from a failure of the control valve
- a bypass from the reservoir inlet to the to the PCV to allow the reservoir to be taken out of service for maintenance
- a bypass around the PCV to allow the PCV to be taken out of service for maintenance.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review**Figure 6 Proposed pressure reduction system schematic***Note: Existing equipment shown in blue.*

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review**3.4. Estimated CAPEX Requirements**

Capital expenditure was assessed for the proposed design solution. Figures are provided at a 'Budget Estimate' basis (-10%/+25%) and are excluding GST. The project is assumed structured as a 'Design and Construct' package, let to a single contractor. It is expected that the implementation of pressure control system will require capital expenditure of \$68,600.

Table 3 Capital cost estimate

| Item | Qty | Unit | Cost per Unit | Total Cost |
|--|-----|------|---------------|--------------------|
| <i>Preliminaries</i> | | | | |
| Project Management | 24 | hrs | \$160.00 | \$3,840.00 |
| Detailed Design | 32 | hrs | \$160.00 | \$5,120.00 |
| Training | 4 | hrs | \$160.00 | \$640.00 |
| Handover | 2 | hrs | \$160.00 | \$320.00 |
| <i>Equipment</i> | | | | |
| Stop Valves | 4 | ea | \$950.00 | \$3,800.00 |
| Pressure Control Valve | 2 | ea | \$3,500.00 | \$7,000.00 |
| Pressure Relief Valve | 2 | ea | \$3,500.00 | \$7,000.00 |
| Strainer | 2 | ea | \$1,000.00 | \$2,000.00 |
| <i>Integration</i> | | | | |
| Mechanical Installation Materials & Sundry | 2 | ea | \$5,000.00 | \$5,000.00 |
| Mechanical Installation Labour | 160 | hrs | \$110.00 | \$17,600.00 |
| M&E Pre-Commissioning | 8 | hrs | \$160.00 | \$1,280.00 |
| M&E Commissioning | 8 | hrs | \$160.00 | \$1,280.00 |
| Subtotal | | | | \$54,880.00 |
| Administration | 5 | % | | \$2,744.00 |
| Contingency Reserve | 5 | % | | \$2,744.00 |
| Overheads & Margin | 15 | % | | \$8,232.00 |
| Total | | | | \$68,600.00 |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

4. Reservoir Rechlorination

4.1. Background

As identified in the Cootamundra Water Supply Chlorination Strategy (Viridis, 2018), rechlorination at the reservoirs is recommended to improve control of free chlorine residual at the reservoirs and within the reticulation network. The report compares chlorination methodologies and recommends sodium hypochlorite (colloquially known as liquid chlorine) for further consideration.

The Cootamundra Water Supply Chlorination Strategy (Viridis, 2018) identifies a recommended setpoint of 2.1 mg/L for free chlorine residual. Review of chlorination data from CGRC has identified 0.52 mg/L as the minimum chlorine level at the reservoirs, and likely represents the minimum free chlorine residual for water at the handover location.

4.2. Chlorine Demand

Considering ADD and MDD for the system at Cootamundra, chlorination system requirements are presented in Table 4 below.

Table 4 Chlorine demand

| Item | Value | Unit | Notes |
|---|-------|--------|--|
| Mean Chlorine Demand | 3.4 | kg/day | Total for both sites |
| Peak Chlorine Demand | 6.79 | kg/day | Total for both sites |
| Mean Hypochlorite Dosing Rate | 0.71 | L/h | Value for each site |
| Peak Hypochlorite Dosing Rate | 1.42 | L/h | Value for each site |
| Recommended Dosing Pump Minimum Dose Rate | 0.071 | L/h | Based on 10% mean dosing rate |
| Recommended Dosing Pump Duty | 7.5 | L/h | Based on Grundfos DDA 7.5/16-FCM, with 3000:1 turndown |

Note: values above are totals for both reservoirs.

The recommended dosing pump is a Grundfos DDA 7.5/16-FCM, configured as per Figure 7. Alternative dosing pumps may be considered, however they should possess these features in addition to the requirements in Table 4:

- detection and alarm of low flow from the dosing pumps
- automatic degassing of the dosing pump
- fully automated control from the peak dosing flow rate to the minimum dosing rate

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

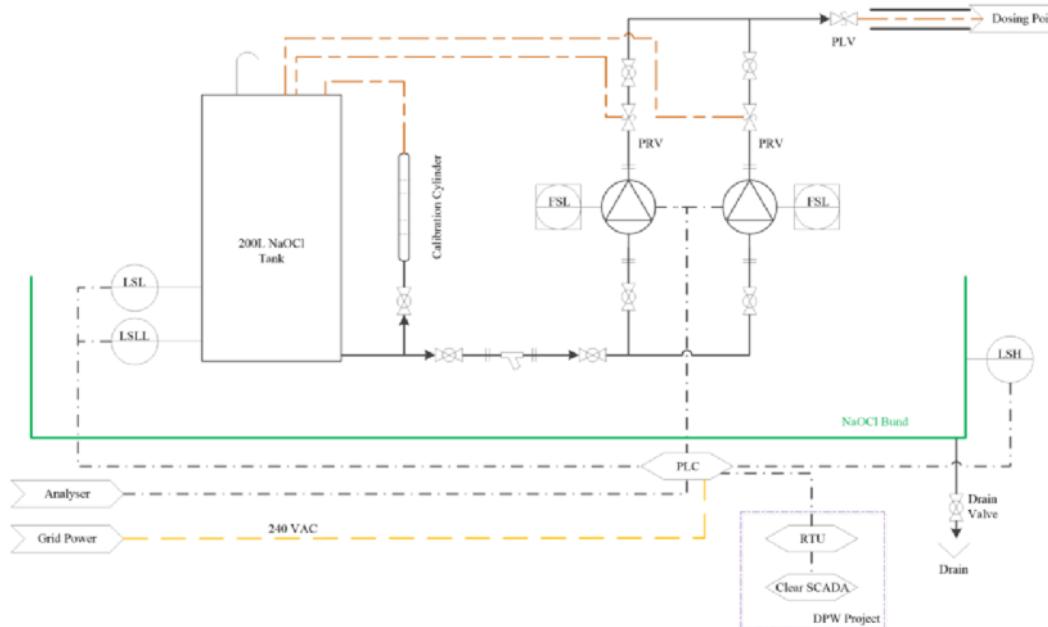


Figure 7 Dosing system configuration, showing bunded storage

Calculations supporting dosing system sizing are provided in Appendix A.

4.3. Hypochlorite Storage

It is recommended that a storage capacity is provided to suit a minimum of seven days at peak chlorine demand, and no greater than 28 days at mean chlorine demand. Whilst it is important to allow excess storage for times of high consumption it is also necessary to consider the risks of over-storage regarding sodium hypochlorite degradation, which may result in increased levels of chlorate in treated water. This report recommends a 200L storage tank at each site in accordance with Table 5.

Table 5 Hypochlorite storage volumes

| Item | Value | Unit | Notes |
|-------------------------------|-------|------|-------------------------------------|
| Minimum Storage Volume | 118.9 | L | Value for each site |
| Maximum Storage Volume | 237.8 | L | Value for each site |
| Recommended Tank Size | 200 | L | Operators to fill to a maximum 475L |

It is recommended that the storage and dosing system be procured as a bunded dosing station (refer Figure 7). A typical example is the Grundfos DSA system, however CGRC is advised to seek competitive quotes for conforming equipment.

Deliveries of hypochlorite are recommended to occur in 200L drums and should be sourced from CGRC's preferred chemical vendor. These drums may be received at the Cootamundra depot and driven to the required reservoir for transfer into the onsite hypochlorite storage tank using a decanting pump, such as a Lutz B2 Vario PP-SL. The decanting pump selected must be suitable for hypochlorite service and should not contain carbon steel, mild steel or stainless steel as a wetter component.

Calculations supporting dosing system sizing are provided in Appendix A.

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***4.4. Recirculation System**

It is recommended to dose hypochlorite into the reservoirs using a recirculation style system. This reduces the complexity of flow-pacing dosing with intermittent filling operations and allows continual maintenance of the chlorine residual during low-demand periods.

In addition to providing a transport medium for the hypochlorite, the recirculation system should be suitable for providing mixing within the reservoir. Utilising jet entrainment, it is possible to induce mixing currents within the reservoir to ensure an even distribution of hypochlorite. This is best achieved by providing a crossflow outlet, submerged within the reservoir to approximately 2/3 depth (as shown in Figure 6). A mixing time of less than 18 hours was selected to ensure a suitable buffer to the 27.8-hour minimum detention time in the reservoirs.

Table 6 Reservoir recirculation system requirements

| Item | Value | Unit | Notes |
|----------------------------------|-------|-------|---------------------------------------|
| Duty Flow | 5.00 | L/s | Common to Reservoir 1 and Reservoir 2 |
| Duty Pressure | 200 | kPa | Common to Reservoir 1 and Reservoir 2 |
| Mixing Time – Reservoir 1 | 17.9 | hours | |
| Mixing Time – Reservoir 2 | 16.1 | hours | |

A common duty point for the recirculation system has been selected to reduce procurement complexity, as the similar sizing the reservoirs does not require vastly different mixing flows.

The recirculation system should include the following features as shown in Figure 8:

- duty/standby recirculation pumps
- detection of loss of flow via a flow switch or similar
- a static mixer to ensure homogenous mixing of hypochlorite
- a valve to enable grab sampling
- a load valve to provide a pressure differential across the analyser

Calculations supporting recirculation system sizing are provided in Appendix A.

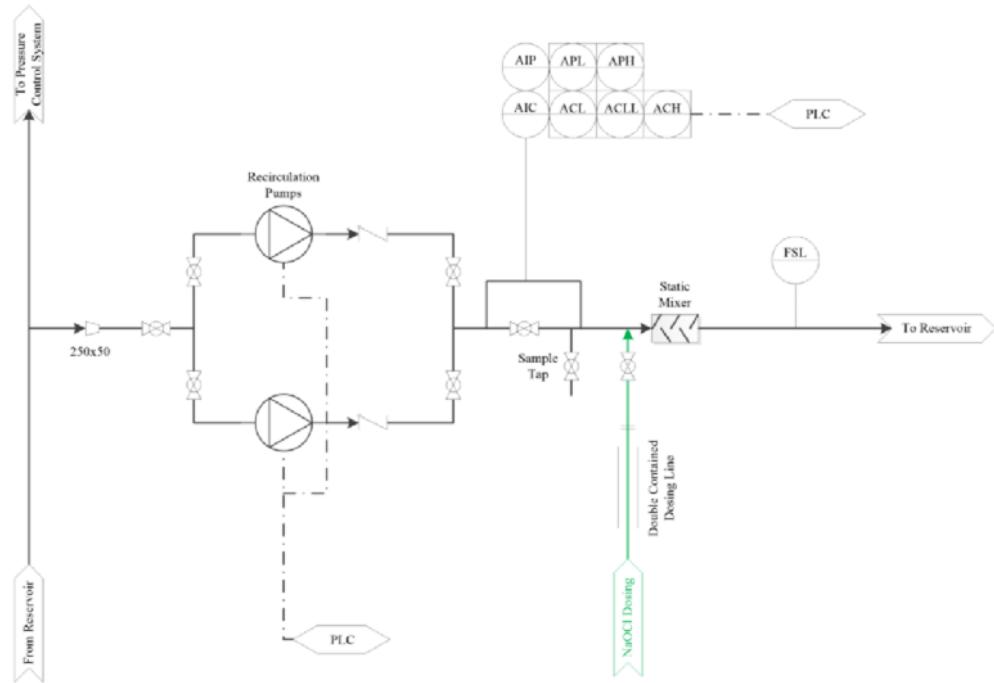
Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Figure 8 Schematic diagram of the recirculation system.

4.5. Power, Control and Analytics

The system requires a standalone PLC to manage the operation of the dosing and recirculation system. Alarms raised by the system as well as the parameters below are to be passed to the ClearSCADA system (under development by the Department of Public Works) via the preferred RTU protocol.

Analytics are required for the parameters in Table 7. All parameters should be inspectable on the ClearSCADA system through an appropriate HMI page. Trending should be provided for all analogue parameters. It is recommended that a historian function is included as a part of the ClearSCADA system.

Table 7 Monitoring parameters at each reservoir chlorination system

| Location | Parameter | Analogue Range | Alarms | Output Controls | Instrument |
|----------------|-------------------|----------------|----------------------|--|--|
| Recirc Systems | Free Chlorine | 0 – 5 mg/L | ACL, ACLL | Dosing Pump Flow | Evoqua Depolox 700M or similar |
| Recirc Systems | Total Chlorine | 0 – 10 mg/L | ACH | Dosing Pump State | |
| Recirc Systems | pH | 2 – 12 | APL, APH | | |
| Recirc Systems | Flow Switch | N/A | FSL | Dosing System State Recirc System State | Kelco F or similar |
| Dosing Systems | Tank Level Switch | N/A | LSL, LSLL | Dosing System State | IFM KQ6005 or similar |
| Dosing Systems | Flow Switch | N/A | FSL | Dosing Pump State | Integral to pump |
| Dosing Systems | Bund Level Switch | N/A | LSH | Dosing System State | IFM KQ6005 or similar |
| Reservoirs | Level | 0-100% | LSLL, LSL, LSH, LSHH | Nil | Ultrasonic level or pressure as per installed condition. |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

| Location | Parameter | Analogue Range | Alarms | Output Controls | Instrument |
|------------|-------------|----------------|----------------|-----------------|-----------------------------|
| Reservoirs | Valve State | N/A | State Mismatch | Nil | As per installed condition. |

Power requirements were reviewed for the system. Supply of power to the system is critical for the implementation of the rechlorination system, as power is not currently available at either reservoir site. A life-cycle cost analysis was undertaken to compare solar power (photovoltaic cells with Lithium Polymer battery storage to allow 24-hour and standby operation) with the installation of pole-mounted grid power to the site. As shown in Table 8, the connection of this system to the grid represents a significantly better cost, both in terms of CAPEX and life-cycle cost expenditure.

Table 8 Cost comparison of solar power and grid power

| Option | CAPEX | 25-year OPEX | Estimated Cost per kWh |
|--------------------------------|--------------|--------------|------------------------|
| <i>Reservoir 1</i> | | | |
| Solar PV + LiPo Storage | \$146,439.82 | \$233,672.23 | \$1.26/kWh |
| Pole-Mounted Grid Power | \$44,547.00 | \$75,182.22 | \$0.40/kWh |
| <i>Reservoir 2</i> | | | |
| Solar PV + LiPo Storage | \$146,439.82 | \$233,672.23 | \$1.26/kWh |
| Pole-Mounted Grid Power | \$37,981.00 | \$75,182.22 | \$0.37/kWh |

Note: Analysis assumes a fixed supply price, and inflation and NPV discounting are not applied. 25-year OPEX includes asset replacement for solar assets at end of design life. Pole assets assumed owned and maintained by power supplier. Calculations are available in Appendix A.

4.6. System Layout

The system is proposed to be located adjacent to the reservoir, inside the reservoir compound. Equipment (especially the hypochlorite tank) should be protected from direct sunlight with a roofed shed. The shed should be protected from vandalism with a chain-link fence or similar. A typical layout of this system is provided in Figure 9.

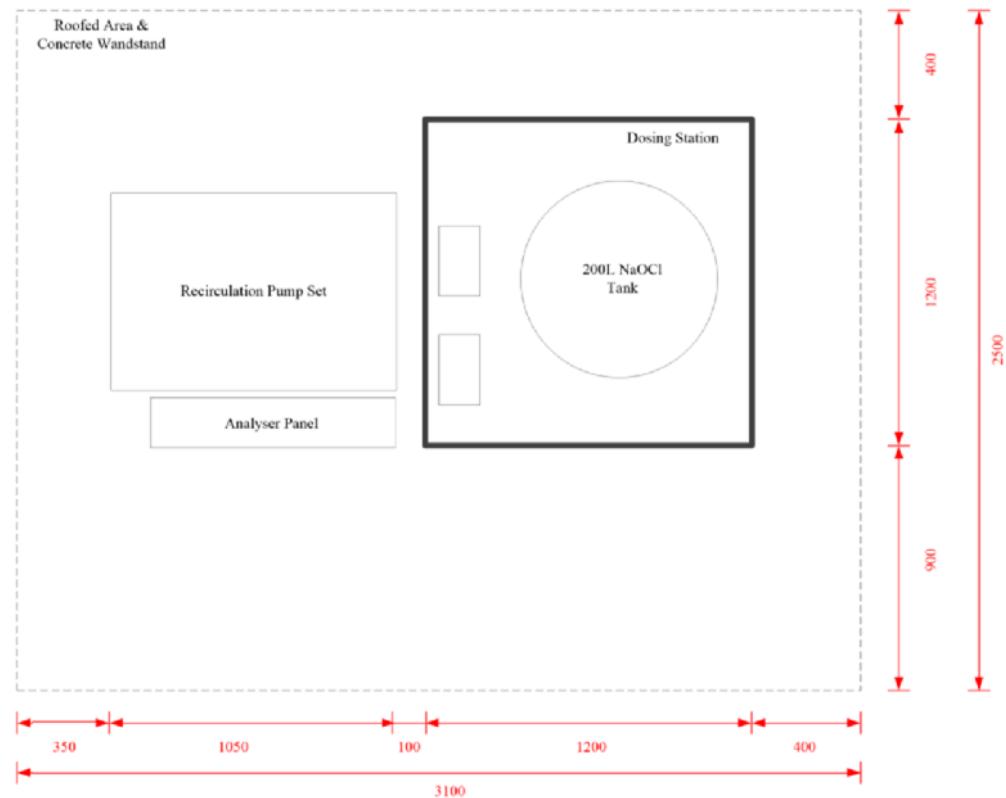
Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Figure 9 Typical chlorination system layout

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***4.7. Estimated CAPEX Requirements**

Capital expenditure was assessed for the proposed design solution. Figures are provided at a 'Budget Estimate' basis (-10%/+25%) and are excluding GST. The project is assumed structured as a 'Design and Construct' package, let to a single contractor. It is expected that the implementation of two rechlorination systems will require capital expenditure of \$264,162.

Table 9 Capital cost estimate

| Item | Qty | Unit | Cost per Unit | Total Cost |
|--|------|----------------|---------------|---------------------|
| <i>Preliminaries</i> | | | | |
| Project Management | 40 | hrs | \$160.00 | \$6,400.00 |
| Detailed Design | 40 | hrs | \$160.00 | \$6,400.00 |
| Training | 8 | hrs | \$160.00 | \$1,280.00 |
| Handover | 8 | hrs | \$160.00 | \$1,280.00 |
| <i>Equipment</i> | | | | |
| Dosing Station | 2 | ea | \$12,000.00 | \$24,000.00 |
| Recirculation Pump Set | 2 | ea | \$15,000.00 | \$30,000.00 |
| Chlorine/pH Instrument | 2 | ea | \$10,000.00 | \$20,000.00 |
| Injection Quill, Static Mixer | 2 | ea | \$1,200.00 | \$2,400.00 |
| Local Control Panel | 2 | ea | \$12,000.00 | \$24,000.00 |
| Drum Decanting Pump | 1 | ea | \$1,500.00 | \$1,500.00 |
| <i>Integration</i> | | | | |
| Mechanical Installation Materials & Sundry | 2 | ea | \$4,000.00 | \$8,000.00 |
| Mechanical Installation Labour | 60 | hrs | \$110.00 | \$6,600.00 |
| Electrical Installation | 24 | hrs | \$150.00 | \$3,600.00 |
| SCADA/Programming | 16 | hrs | \$150.00 | \$2,400.00 |
| Concrete Slab | 7.75 | m ² | \$250.00 | \$1,937.50 |
| Roofed Structure | 7.75 | m ² | \$120.00 | \$930.00 |
| Chain-Link Fence and Gate | 11.5 | m | \$120.00 | \$1,380.00 |
| M&E Pre-Commissioning | 8 | hrs | \$160.00 | \$1,280.00 |
| M&E Commissioning | 12 | hrs | \$160.00 | \$1,920.00 |
| Subtotal | | | | \$145,307.50 |
| Administration | 5 | % | | \$7,265.38 |
| Contingency Reserve | 5 | % | | \$7,265.38 |
| Overheads & Margin | 15 | % | | \$21,796.13 |
| Contractor Total | | | | \$181,634.39 |
| Energy Supplier Charges | | | | \$82,528.00 |
| Total | | | | \$264,162.39 |

4.8. Future Expansion

The proposed rechlorination system is focused on controlling free chlorine and providing water quality information for free/total chlorine and pH for water within the reservoir. Turbidity is another important water quality parameter, and this installation should contain necessary enabling works (e.g. PLC inputs and packaging space) to allow future installation of an online turbidity meter.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

5. Handover Water Quality Monitoring

5.1. Background

The Cootamundra scheme receives water from Goldenfields Water, treated at Jugiong WTP. While the volume of water is monitored at the handover point, CGRC does not receive online monitoring data of important water quality parameters. It is proposed to monitor free chlorine, total chlorine and pH at each handover point by constructing 'Handover Monitoring Stations' as described in this section. Monitoring of these parameters allows early warning of issues where quality of water from Jugiong has degraded, and also provides an opportunity for CGRC to verify that water from Jugiong WTP is being provided in accordance with the Bulk Water Supply Agreement.

Siting for the monitoring stations is recommended adjacent to the handover locations to provide an accurate representation of water handed over to the Cootamundra scheme.

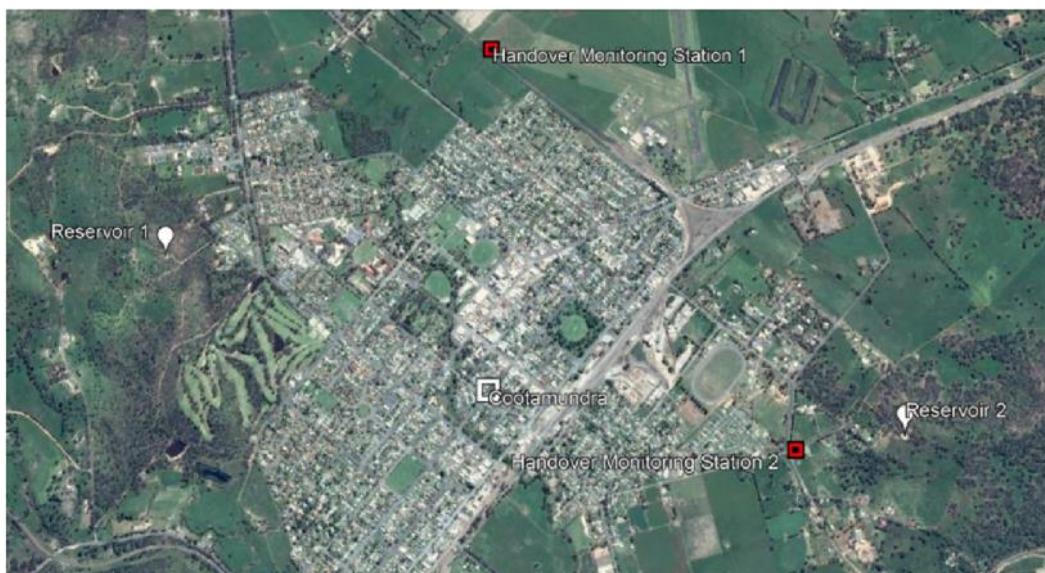


Figure 10 Handover monitoring station siting

5.2. Analytics and Control

Analytics are required for the parameters in Table 10. All parameters should be inspectable on the ClearSCADA system through an appropriate HMI page. Trending should be provided for all analogue parameters. It is recommended that a historian function is included as a part of the ClearSCADA system.

No controls are recommended as a part of this system.

Table 10 Monitoring parameters at each handover monitoring station

| Location | Parameter | Analogue Range | Alarms | Output Controls | Instrument |
|-----------------|----------------|----------------|-----------|-----------------|--------------------------------|
| Handover Points | Free Chlorine | 0 – 5 mg/L | ACL, ACLL | Nil | |
| Handover Points | Total Chlorine | 0 – 10 mg/L | ACH | Nil | Evoqua Depolox 700M or similar |
| Handover Points | pH | 2 – 12 | APL, APH | Nil | |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

5.3. Configuration and Communication

The monitoring station is recommended to be configured as per Figure 11. As there is no pressure differential at either monitoring location, conservation of the sample requires a recirculation pump. Sample water is recommended for wastage at the monitoring site, as pumping is required to preserve the sample which will increase capital and operational cost of the project. Preparation of the sample is recommended with a strainer, pressure reducing valve and a rate controlling valve.

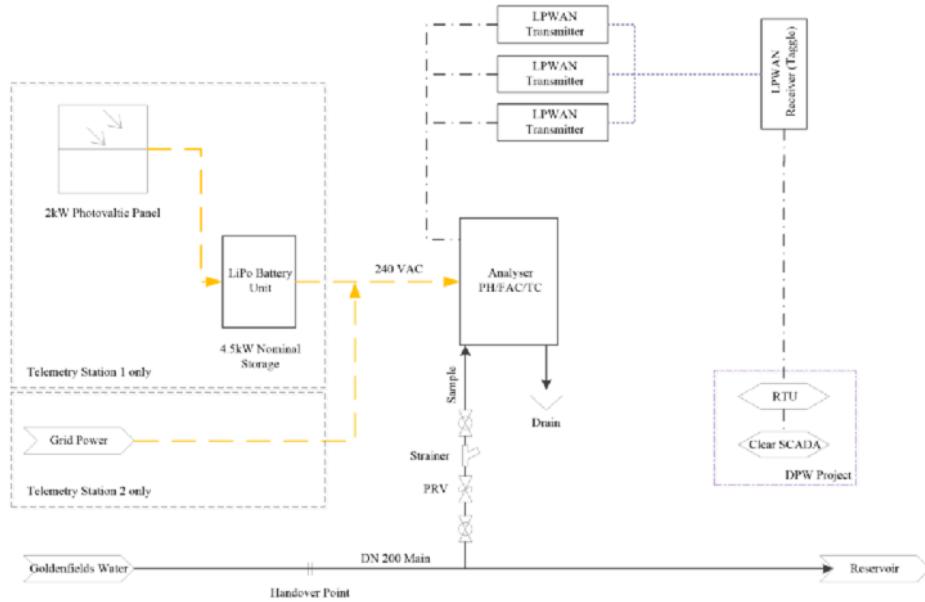


Figure 11 Configuration of the monitoring station

Communications are recommended for transmission via a LPWAN system, such as Taggle. Taggle maintains a receiver network throughout the Cootamundra area and represents a cost-effective solution for a managed data transmission network (ongoing cost estimated at \$68.40 per year). The Taggle LPWAN implementation includes an API suitable for integration into the proposed ClearSCADA system for data capture.

Installation of the monitoring station is recommended within a lockable, vented field enclosure with an internal dimension of at least 1200mm x 620mm x 350mm (HxWxD).

5.4. Power

Power requirements were reviewed for the monitoring stations. Supply of power to the system is critical for the implementation of the monitoring system, as power is not currently available at the proposed site for Monitoring Station 1. A life-cycle cost analysis was undertaken to compare solar power (photovoltaic cells with Lithium Polymer battery storage to allow 24-hour and standby operation) with the installation of pole-mounted grid power to the site. As shown in Table 11, the connection of this system to the grid represents a significantly better cost for Monitoring Station 2, while Monitoring Station 1 should be powered via solar power.

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***Table 11 Cost comparison of solar power and grid power**

| Option | CAPEX | 25-year OPEX | Estimated Cost per kWh |
|--------------------------------|-------------|--------------|------------------------|
| <i>Monitoring Station 1</i> | | | |
| Solar PV + LiPo Storage | \$14,661.05 | \$5,123.26 | \$1.28/kWh |
| Pole-Mounted Grid Power | \$37,981.00 | \$18,640.84 | \$2.02/kWh |
| <i>Monitoring Station 2</i> | | | |
| Solar PV + LiPo Storage | \$14,661.05 | \$5,123.26 | \$1.28/kWh |
| Pole-Mounted Grid Power | \$1,500.00 | \$18,640.84 | \$0.72/kWh |

Note: Analysis assumes a fixed supply price, and inflation and NPV discounting are not applied. 25-year OPEX includes asset replacement for solar assets at end of design life. Pole assets assumed owned and maintained by power supplier. Calculations are available in Appendix A.

5.5. Estimated CAPEX Requirements

Capital expenditure was assessed for the proposed design solution. Figures are provided at a 'Budget Estimate' basis (-10%/+25%) and are excluding GST. The project is assumed structured as a 'Design and Construct' package, let to a single contractor. It is expected that the implementation of both monitoring stations will require capital expenditure of \$76,114.

Table 12 Capital cost estimate

| Item | Qty | Unit | Cost per Unit | Total Cost |
|--|-----|----------------|---------------|--------------------|
| <i>Preliminaries</i> | | | | |
| Project Management | 24 | hrs | \$160.00 | \$3,840.00 |
| Detailed Design | 12 | hrs | \$160.00 | \$1,920.00 |
| Training | 4 | hrs | \$160.00 | \$640.00 |
| Handover | 2 | hrs | \$160.00 | \$320.00 |
| <i>Equipment</i> | | | | |
| Chlorine/pH Instrument | 2 | ea | \$10,000.00 | \$20,000.00 |
| Sample Preparation Panel | 2 | ea | \$1,500.00 | \$3,000.00 |
| Solar PV + LiPo Storage | 1 | ea | \$14,661.05 | \$14,661.05 |
| Field Enclosure | 2 | ea | \$2,500.00 | \$5,000.00 |
| LPWAN Transmitters | 6 | ea | \$495.00 | \$2,970.00 |
| Power Distribution Board | 2 | ea | \$500.00 | \$1,000.00 |
| <i>Integration</i> | | | | |
| Mechanical Installation Materials & Sundry | 2 | ea | \$1,200.00 | \$2,400.00 |
| Mechanical Installation Labour | 8 | hrs | \$110.00 | \$880.00 |
| Electrical Installation | 8 | hrs | \$150.00 | \$1,200.00 |
| Concrete Footing | 3 | m ² | \$300.00 | \$900.00 |
| M&E Commissioning | 6 | hrs | \$160.00 | \$960.00 |
| Subtotal | | | | \$59,691.05 |
| Administration | 5 | % | | \$2,984.55 |
| Contingency Reserve | 5 | % | | \$2,984.55 |
| Overheads & Margin | 15 | % | | \$8,953.66 |
| Contractor Total | | | | \$74,613.81 |
| Energy Supplier Charges | | | | \$1,500.00 |
| Total | | | | \$76,113.81 |

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***5.6. Future Expansion**

The proposed telemetry system is focused on providing water quality information for free chlorine, total chlorine and pH for water at the handover locations. Turbidity is another important water quality parameter, and this installation should contain necessary enabling works (e.g. PLC inputs and packaging space) to allow future installation of an online turbidity meter.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

6. Reticulation Chlorination Issues

6.1. Background

During a review of the chlorination system at Cootamundra, it was identified that consistently low chlorine was found at the saleyards and at Old Binowee Road (Viridis, 2018). These locations are marked in Figure 12, and are both low consumption, dead end areas of the reticulation network, where water age is likely a significant factor in the poor chlorine results.

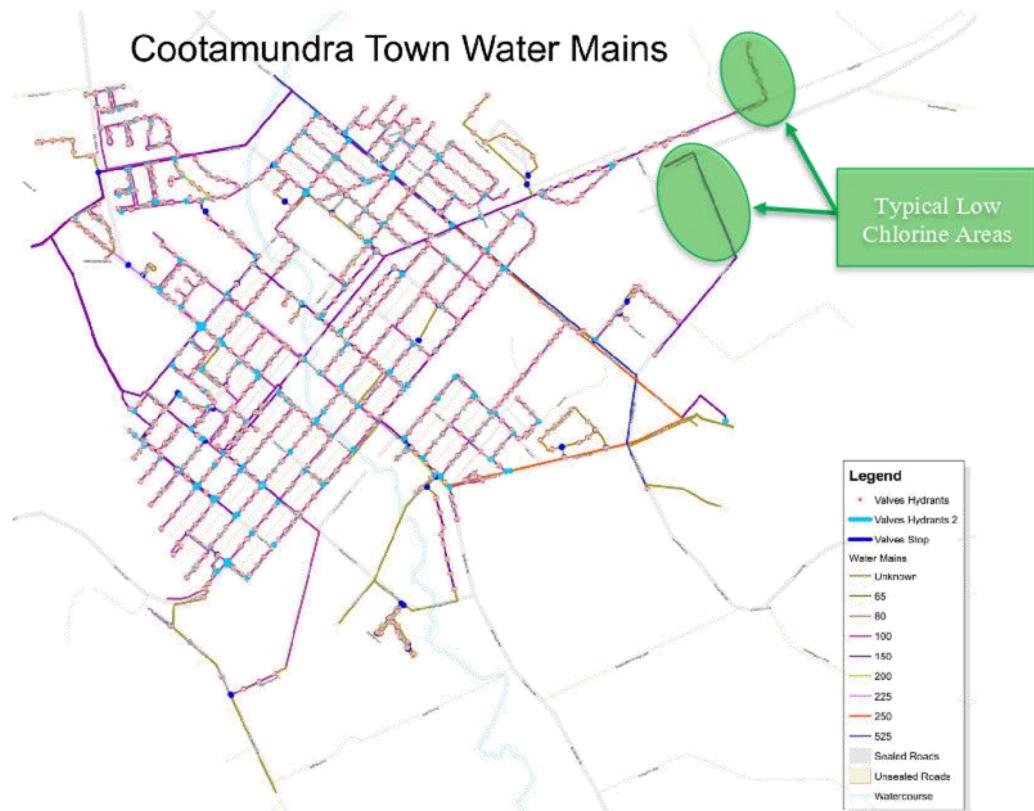


Figure 12 Cootamundra reticulation network with problem areas shown

The condition of metallic pipework within the reticulation network is also likely to be a significant factor, with both of these areas reporting a large number of dirty water events. Inspection of typical removed pipework segments found significant corrosion (Figure 13). In addition to providing a protected location for biofilm to grow and contributing to consumption of chlorine through oxidation, these areas trap settled detritus which is released during flushing events. This is consistent with reports that flushing events result in an increase in dirty water complaints.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Figure 13 Typical metallic pipe condition

CGRC is currently undertaking a number of improvements which are expected to improve chlorination in these locations. In addition to the reservoir rechlorination noted in section 4 (which is expected to improve chlorination results throughout the network), CGRC is also undertaking a major reticulation renewal program, which is expected to improve dirty water complaints, chlorine residual in these locations as well as the frequency of line breaks.

It is not known whether these initiatives will resolve the chlorination issues, however this section provides an overview review of potential initiatives for consideration after mains replacement and reservoir rechlorination activities have been completed.

6.2. Potential Solutions

A number of potential solutions exist to alleviate the poor chlorination performance at these sites, including:

- *Direct Rechlorination*, where hypochlorite is dosed through additional rechlorination stations into the main
- *Rechlorination Tanks*, where hypochlorite is dosed through additional rechlorination stations into recirculated tanks
- *End Reconnection*, where the dead-ends are connected to another part of the network to facilitate throughput
- *Increased Flushing*, where flushing in these locations is periodically increased
- *Continual Bleed*, where water is continually wasted to increase throughput.

It is noted that line sizes in these areas appear larger than what would be expected for the small number of connections. The scope of this report does not include a hydraulic network analysis, and it is assumed that these line sizes have been maintained during the upgrade to service anticipated future network requirements.

A summary of the options is provided in Table 13. This report finds a trial of increased flushing to be the most viable option where an improvement of chlorine at these locations is required once mains replacements and rechlorination system have been implemented. It is noted however, that this requires an increase in the wastage of water, which is an issue both in terms of water use and public perception during a drought period. It is recommended to collect data after the implementation of mains repairs and the reservoir rechlorination project to better inform rectification actions.

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***Table 13 Options summary**

| Description | Resolution of Chlorination Issue | CAPEX Requirement | OPEX Impact | EI&C Complexity | Operational Impact | Expected Reliability | Other Factors |
|------------------------------|---|-------------------|---------------|-----------------|--------------------|--------------------------------------|------------------|
| Direct Rechlorination | Likely hampered by control issues | Moderate-High | Moderate-High | High | Moderate-High | Poor due to Control Issues | Siting Issues |
| Rechlorination Tanks | Yes | High | High | Moderate-High | Moderate-High | Moderate | Siting Issues |
| End Reconnection | Potentially hampered by additional storage volume | Very High | Low | Nil | Very Low | Very High | N/A |
| Increased Flushing | Yes, although dependant on flushing interval | Very Low | Moderate | Nil | Moderate-Low | Potential for Dirty Water Complaints | Wastage of water |

6.2.1. Rechlorination

Two potential options are presented for rechlorination, both involve introducing additional hypochlorite into the system:

- *Direct Rechlorination*, where hypochlorite is dosed through additional rechlorination stations into the main
- *Rechlorination Tanks*, where hypochlorite is dosed through additional rechlorination stations into recirculated tanks

Implementation of direct rechlorination is not advised for this system. Flows through these areas are likely very low, and intermittent. A flow-paced dosing system would in these locations experience significant difficulty in achieving a stable chlorine residual and has a high risk of over chlorination and a breach of the ADWG health limit for total chlorine.

This issue can be somewhat improved with the introduction of a recirculation tank. Conceptually, this system would work similarly to the system described in section 4, and comprise of:

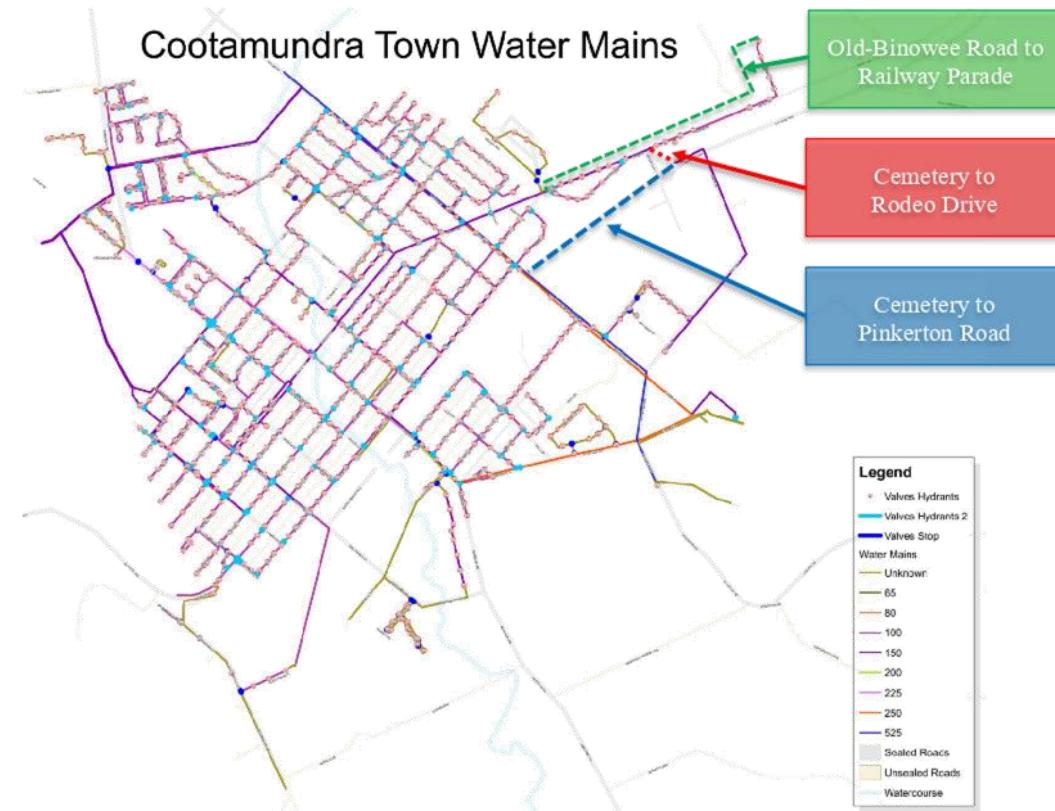
- a tank to provide buffer volume for chlorine addition, including a filling system
- a recirculation system for this tank
- a dosing system for this tank.
- booster pumps to transfer chlorinated water downstream of the tank.

Implementation of this system is somewhat complex, and likely to be significantly costly considering the small number of connections it is servicing. Similar to the reservoir rechlorination system, this system would require operators to intermittently inspect and replenish the system. Additionally, this system would require siting a 10-20m² compound in the affected area. As such, it is considered impractical to implement this solution and it is not recommended for implementation.

6.2.2. End Reconnection

Both affected areas are dead ends, which is likely the major contributor to the chlorination issues. Potential reconnections (shown in Figure 14) include two options to connect the dead end at the cemetery, while only one option is available for Old-Binowee Road. These locations are hampered by their remoteness to the rest of the network, either by distance (Old-Binowee Road) or by blocking infrastructure (rail network separating Rodeo Drive and Olympic Highway near the cemetery).

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

**Figure 14** Cootamundra reticulation network with potential dead-end loops shown

These options were reviewed (see summary in Table 14), although no option is recommended for implementation.

Table 14 Summary of reconnection options

| Reconnection | Approx. Length | Feasibility | Likelihood of Resolution of Issues |
|------------------------------------|----------------|---|---|
| Old-Binowee Road to Railway Parade | 1800m | No technical barriers to execution. | Due to the long reconnection length this solution adds significant volume to the system, which may hamper resolution. |
| Cemetery to Rodeo Drive | 250m | Service must cross the railway line. Permission is unlikely to be granted by Transport NSW/JHR. | This connection will only connect two low-usage areas together, which may hamper resolution. |
| Cemetery to Pinkerton Road | 1100m | No technical barriers to execution. | Connection to a likely higher usage area of the network means provides a higher likelihood of resolution, although a significant additional volume may hamper resolution. |

*Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review***6.2.3. Increased Flushing**

Increasing flushing in these areas has a high likelihood of improving chlorine residuals, particularly once mains replacement works are completed. The flushing interval required to maintain an appropriate chlorine residual will vary based on consumption, temperature, and must be determined on a trial and error basis after completion of the mains replacement and reservoir rechlorination works.

An alternative implementation, it is possible to introduce a bleed at the end of each line, which allows for continual wastage to maintain chlorine residual. Where this is implemented, an appropriate backflow protection device should be incorporated.

It is noted that that flushing and bleed solutions require\ an increase in the wastage of water, which is an issue both in terms of water use and public perception during a drought period. It is recommended to collect data after the implementation of mains repairs and the reservoir rechlorination project to better inform rectification actions.

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

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Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Glossary

| Notation | Description |
|-----------------|--|
| ADD | Average Daily Demand |
| CAPEX | Capital Expenditure |
| CGRC | Cootamundra-Gundagai Regional Council |
| DoHWA | Washington State Department of Health |
| EI&C | Electrical, Instrumentation and Control |
| ES | Equalising Storage |
| FSS | Fire Suppression Storage |
| FY | Financial Year |
| GST | Goods and Services Tax |
| HMI | Human Machine Interface |
| JHR | John Holland Rail |
| kL | Kilolitre |
| L | Litre |
| MDD | Maximum Daily Demand |
| mg/L | Milligrams per litre |
| ML | Megalitre |
| NaOCl | Sodium Hypochlorite |
| NSW | New South Wales |
| OPEX | Operational Expenditure |
| OS | Operational Storage |
| PCV | Pressure Control Valve |
| PLC | Programmable Logic Controller |
| PHD | Peak Hourly Demand |
| RTU | Remote Telemetry Unit |
| SB | Standby Storage |
| SCADA | Supervisory Control and Data Acquisition |
| WTP | Water Treatment Plant |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Appendix A

Supporting Calculations

19NS09-REC-19-141-1.0
November 2019

A



Reservoir Sizing

Project Details

| | | | |
|-----------------|-----------------------------|--------|------------|
| Project: | Cootamundra Reservoir Study | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 5/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

Consumption Details

| Item | Value | Unit | Notes |
|-----------------------------|--------|----------|--|
| Projection Year | 2059 | | |
| Current Consumption | 617.17 | ML/annum | Based on CGRC data |
| Projected Consumption (Cxn) | 751.48 | ML/annum | As per Demand Est. WrkSht per connection |
| Projected Consumption (PP) | 784.84 | ML/annum | As per Demand Est. WrkSht per person |
| Maximum Consumption | 1800 | ML/annum | BWSA - Maximum agreement consumption |
| Average Daily Demand (ADD) | 2.15 | ML/day | Considers max consumption of Cxn or PP |
| Average Flowrate | 24.89 | L/s | Considers max consumption of Cxn or PP |
| Peaking Factor (MDD:ADD) | 2 | - | Assumed value |
| Peaking Factor (PHD:ADD) | 4 | - | Assumed value |
| Maximum Daily Demand (MDD) | 4.30 | ML/day | Considers max consumption of Cxn or PP |
| Maximum Hourly Flowrate | 99.55 | L/s | Peak hourly flow considering average consumption |
| Maximum Flowrate (BWSA) | 98.17 | L/s | Peak flow considering allowable rate under BWSA |

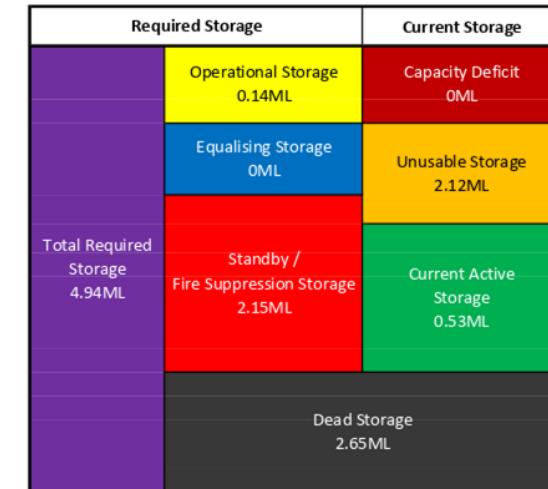
Storage Components

Detention Time

| Item | Value | Unit | Notes |
|-------------------------------|-------|-------|-------|
| Mean Detention Time (2019) | 2.92 | days | |
| Mean Detention Time (2059) | 2.30 | days | |
| Minimum Detention Time (2059) | 27.58 | hours | |

Standby/Fire Suppression

| Item | Value | Unit | Notes |
|--------------------------------|-------|-------|---------------------------------------|
| Maximum Outage | 24 | hours | BWSA, maximum planned outage. |
| Standby Storage | 2.15 | ML | Based on a Mean Day |
| Fire Flow | 48.33 | L/s | FRNSW Pump Performance Guide Sheet #3 |
| Hours of Firefighting Supply | 4 | hours | AS2419.1 |
| Firefighting Storage | 0.70 | ML | Based on a Mean Day |
| Standby/Fire Suppression Reqd. | 2.15 | ML | Only the largest event is required. |



Balancing Storage

| Item | Value | Unit | Notes |
|---------------------------------|--------|------|------------------------|
| Maximum Supply Flow (Res 1) | 44.17 | L/s | DN150 Supply @ 2.5 m/s |
| Maximum Supply Flow (Res 2) | 78.53 | L/s | DN200 Supply @ 2.5 m/s |
| Total Peak Inflow | 122.70 | L/s | |
| Peak Hour Deficit | 0.00 | L/s | |
| Peak Hour Recovery Factor | 1.50 | - | |
| External Balancing Storage Reqd | 0.00 | ML | |

Operational Storage

| Item | Value | Unit | Notes |
|-------------------------------|-------|-------|---------------------------|
| Total Non-Operational Storage | 2.85 | ML | |
| Operational Range | 5.00% | - | |
| Operational Storage Required | 0.14 | ML | |
| Operational Control Time | 1.59 | hours | Based on 2059 Consumption |

Dead Storage

| Item | Value | Unit | Notes |
|--------------------------|-------|------|-------|
| Reservoir 1 Dead Storage | 1.50 | ML | |
| Reservoir 2 Dead Storage | 1.15 | ML | |
| Total Dead Storage | 2.65 | ML | |

Results*Summary*

| Item | Value | Unit | Notes |
|---------------------------|-------|------|-------|
| Operational Storage | 0.14 | ML | |
| Balancing Storage | 0.00 | ML | |
| Standby/Fire Suppression | 2.15 | ML | |
| Dead Storage | 2.65 | ML | |
| Total Storage Requirement | 4.94 | ML | |
| Current Active Storage | 0.53 | ML | |
| Unusable Current Storage | 2.12 | ML | |
| Capacity Deficit | 0.00 | ML | |

Mixing Time

Project Details

| | | | |
|-----------------|-----------------------------|--------|------------|
| Project: | Cootamundra Reservoir Study | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 03/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

Application Details*System Details*

| Item | Value | Unit | Notes |
|-------------------------------------|-------------------------|------|---|
| Reservoir | Cootamundra Reservoir 1 | | |
| Reservoir Diameter (D) | 27.5 | m | |
| Reservoir Height (H) | 5.05 | m | |
| Inlet Nozzle Diameter (d_n) | 0.05 | m | |
| β | 7.5 | - | |
| a | 2.3 | - | |
| b | 0.9 | - | |
| Dimensionless Mixing Time (T_m) | 3.28E+06 | - | Shivaram 2007, Mixing in Water Supply Service Tanks and Reservoirs, UWA |
| Recirculation Flowrate | 5.00 | L/s | |
| Inlet Jet Velocity (u_n) | 2.55 | m/s | |
| Mixing Time (t_m) | 17.87 | h | Shivaram 2007, Mixing in Water Supply Service Tanks and Reservoirs, UWA |

$$T_m = 7.5 \left(\frac{D}{d_n} \right)^{2.3} \left(\frac{H}{D} \right)^{0.9}$$

Where: $T_m = \frac{u_n t_m}{d_n}$.

Shivaram 2007, Mixing in Water Supply Service Tanks and Reservoirs, UWA

Power Requirements

Project Details

| | | | |
|-----------------|---|--------|------------|
| Project: | Cootamundra Reservoir Study - Reservoir 1 | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 5/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

*Note: All figures are per station***Consumption Details**

| Item | Qty | Value | Unit | % Duty | Notes |
|--------------------------------|----------------------------------|-------|-------|--------|----------------------------------|
| Loads | Circulation Pump | 2 | 0.714 | kW | 50% Grundfos Hydro MPC-E CRIE3-5 |
| | Dosing Pump | 2 | 0.024 | kW | 100% Grundfos DDA 7.5-16 FCM |
| | Analyser | 1 | 0.048 | kW | 100% Evoqua Depolox 700M |
| | Flow Switch | 1 | 0.005 | kW | 100% IFM SI5000 |
| | Reservoir Level Element | 1 | 0.001 | kW | 100% E&H FMU30 |
| | Automated Valve Operation | 1 | 0.080 | kW | 80% Electrotorque EOM-6 |
| | Hypochlorite Tank Level Switches | 3 | 0.001 | kW | 100% |
| | Controls and Misc | 1 | 0.500 | kW | 100% |
| | Average Load | 1.38 | kW | | |
| | Peak Load | 1.37 | kW | | |
| Daily Consumption | | | | | |
| Required Standby Time | | | | | |
| Maximum Battery Discharge | | | | | |
| Storage Capacity | | | | | |
| Avg. Eq. Hours Full Production | | | | | |
| Storage Efficiency | | | | | |
| Required Generation Capacity | | | | | |
| Solar Capacity Required | | | | | |

Cost Estimation*Solar*

| Item | Qty | Unit | Notes |
|-----------------------------|---------------|---------|---|
| Storage Unit Capacity | 8.8 | kWh | LG Chem Resu 10 |
| Cost per Storage Unit | \$ 6,959.09 | \$/unit | LG Chem Resu 10 |
| Storage Units | 10 | ea | |
| Storage Cost | \$ 69,590.91 | | |
| PV Unit Capacity | 0.3 | kW | LG LG300S1C-A5 |
| Cost per PV Unit | \$ 243.00 | \$/unit | LG LG300S1C-A5, July 2019 |
| PV Units | 95 | ea | |
| PV Cost | \$ 23,085.00 | | |
| Inverter Cost | \$ 9,357 | | Estimated per kW from Fronius Symo 10kW |
| Estimated Installation Cost | \$ 20,000.00 | | Includes shelter required for battery system (IP55) |
| Contractor Overhead/Margin | 20% | | |
| Total CAPEX | \$ 146,439.82 | | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 1.0% | pa | |
| Storage LCC | \$ 173,977.27 | | 2019 Dollars only - no discount/inflation applied |
| PV LCC | \$ 23,085.00 | | 2019 Dollars only - no discount/inflation applied |
| Maintenance LCC | \$ 36,609.95 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 380,112.05 | | 2019 Dollars only - no discount/inflation applied |
| Total Energy Consumption | 302504.70 | kWh | |
| Energy Cost per kWh | 1.26 | \$/kWh | |

Grid Supply

| Item | Qty | Unit | Notes |
|--------------------------|--------------|-------|---|
| New Pole Service Length | 0.45 | km | Estimated for Res1/Res 2 |
| Pole Service Cost per km | \$ 65,660.00 | \$/km | https://www.energy.vic.gov.au/safety-and-emergencies/powerline |
| Fixed Pole Service Cost | \$ 15,000.00 | \$/km | Estimated preliminaries and enabling works |
| New Pole Service Cost | \$ 44,547.00 | ea | |
| TCO Analysis Period | 25 | years | |

| | | | |
|---------------------------------|---------------|--------|---|
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 0% | pa | Grid managed asset |
| Supply Tariff | 0.206 | \$/kWh | Peak rate used only - conservative. |
| Daily Supply Charge | 1.41 | \$/day | |
| Total Energy Consumption | 302504.70 | kWh | |
| Total Tariff and Supply Charges | \$ 75,182.22 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 119,729.22 | | 2019 Dollars only - no discount/inflation applied |
| Energy Cost per kWh | 0.40 | \$/kWh | |

Power Requirements

Project Details

| | | | |
|-----------------|---|--------|------------|
| Project: | Cootamundra Reservoir Study - Reservoir 2 | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 5/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

*Note: All figures are per station***Consumption Details**

| Item | Qty | Value | Unit | % Duty | Notes |
|--------------------------------|----------------------------------|-------|-------|--------|----------------------------------|
| Loads | Circulation Pump | 2 | 0.714 | kW | 50% Grundfos Hydro MPC-E CRIE3-5 |
| | Dosing Pump | 2 | 0.024 | kW | 100% Grundfos DDA 7.5-16 FCM |
| | Analyser | 1 | 0.048 | kW | 100% Evoqua Depolox 700M |
| | Flow Switch | 1 | 0.005 | kW | 100% IFM SI5000 |
| | Reservoir Level Element | 1 | 0.001 | kW | 100% E&H FMU30 |
| | Automated Valve Operation | 1 | 0.080 | kW | 80% Electrotorque EOM-6 |
| | Hypochlorite Tank Level Switches | 3 | 0.001 | kW | 100% |
| | Controls and Misc | 1 | 0.500 | kW | 100% |
| | Average Load | 1.38 | kW | | |
| | Peak Load | 1.37 | kW | | |
| Daily Consumption | | | | | |
| Required Standby Time | | | | | |
| Maximum Battery Discharge | | | | | |
| Storage Capacity | | | | | |
| Avg. Eq. Hours Full Production | | | | | |
| Storage Efficiency | | | | | |
| Required Generation Capacity | | | | | |
| Solar Capacity Required | | | | | |

Cost Estimation*Solar*

| Item | Qty | Unit | Notes |
|-----------------------------|---------------|---------|---|
| Storage Unit Capacity | 8.8 | kWh | LG Chem Resu 10 |
| Cost per Storage Unit | \$ 6,959.09 | \$/unit | LG Chem Resu 10 |
| Storage Units | 10 | ea | |
| Storage Cost | \$ 69,590.91 | | |
| PV Unit Capacity | 0.3 | kW | LG LG300S1C-A5 |
| Cost per PV Unit | \$ 243.00 | \$/unit | LG LG300S1C-A5, July 2019 |
| PV Units | 95 | ea | |
| PV Cost | \$ 23,085.00 | | |
| Inverter Cost | \$ 9,357 | | Estimated per kW from Fronius Symo 10kW |
| Estimated Installation Cost | \$ 20,000.00 | | Includes shelter required for battery system (IP55) |
| Contractor Overhead/Margin | 20% | | |
| Total CAPEX | \$ 146,439.82 | | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 1.0% | pa | |
| Storage LCC | \$ 173,977.27 | | 2019 Dollars only - no discount/inflation applied |
| PV LCC | \$ 23,085.00 | | 2019 Dollars only - no discount/inflation applied |
| Maintenance LCC | \$ 36,609.95 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 380,112.05 | | 2019 Dollars only - no discount/inflation applied |
| Total Energy Consumption | 302504.70 | kWh | |
| Energy Cost per kWh | 1.26 | \$/kWh | |

Grid Supply

| Item | Qty | Unit | Notes |
|--------------------------|--------------|-------|---|
| New Pole Service Length | 0.35 | km | Estimated for Res1/Res 2 |
| Pole Service Cost per km | \$ 65,660.00 | \$/km | https://www.energy.vic.gov.au/safety-and-emergencies/powerline |
| Fixed Pole Service Cost | \$ 15,000.00 | \$/km | Estimated preliminaries and enabling works |
| New Pole Service Cost | \$ 37,981.00 | ea | |
| TCO Analysis Period | 25 | years | |

| | | | |
|---------------------------------|---------------|--------|---|
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 0% | pa | Grid managed asset |
| Supply Tariff | 0.206 | \$/kWh | Peak rate used only - conservative. |
| Daily Supply Charge | 1.41 | \$/day | |
| Total Energy Consumption | 302504.70 | kWh | |
| Total Tariff and Supply Charges | \$ 75,182.22 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 113,163.22 | | 2019 Dollars only - no discount/inflation applied |
| Energy Cost per kWh | 0.37 | \$/kWh | |

Power Requirements

Project Details

| | | | |
|-----------------|--|--------|------------|
| Project: | Cootamundra Reservoir Study - Monitoring Station 1 | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 5/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

*Note: All figures are per station***Consumption Details**

| Item | Qty | Value | Unit | % Duty | Notes |
|--------------------------------|-------|-------|---------|--------|--|
| Analyser | 1 | 0.048 | kW | 100% | Evoqua Depolox 700M |
| Transmitters | 3 | 0.010 | kW | 100% | Estimate on Taggle Transmitters |
| Miscellaneous | 1 | 0.050 | kW | 100% | |
| Average Load | 0.128 | | kW | | |
| Peak Load | 0.108 | | kW | | |
| Daily Consumption | 3.07 | | kWh | | |
| Required Standby Time | 18 | | hours | | |
| Maximum Battery Discharge | 60% | | | | Typical LiPo max discharge |
| Storage Capacity | 3.84 | | kWh | | |
| Avg. Eq. Hours Full Production | 4.3 | | h/day | | Clean Energy Council, 2019. Value taken for Canberra |
| Storage Efficiency | 97.0% | | | | Soltaro 4.5 |
| Required Generation Capacity | 7.13 | | kWh/day | | |
| Solar Capacity Required | 1.66 | | kW | | |

Cost Estimation*Solar*

| Item | Qty | Unit | Notes |
|-----------------------------|--------------|---------|---|
| Storage Unit Capacity | 4.05 | kWh | Soltaro 4.5 |
| Cost per Storage Unit | \$ 4,200.00 | \$/unit | Soltaro 4.5 |
| Storage Units | 1 | ea | |
| Storage Cost | \$ 4,200.00 | | |
| PV Unit Capacity | 0.3 | kW | LG LG300S1C-A5 |
| Cost per PV Unit | \$ 243.00 | \$/unit | LG LG300S1C-A5, July 2019 |
| PV Units | 6 | ea | |
| PV Cost | \$ 1,458.00 | | |
| Inverter Cost | \$ 1,560 | | Estimated per kW from Fronius Symo 10kW |
| Estimated Installation Cost | \$ 5,000.00 | | Includes shelter required for battery system (IP55) |
| Contractor Overhead/Margin | 20% | | |
| Total CAPEX | \$ 14,661.05 | | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 1.0% | pa | |
| Storage LCC | \$ 10,500.00 | | 2019 Dollars only - no discount/inflation applied |
| PV LCC | \$ 1,458.00 | | 2019 Dollars only - no discount/inflation applied |
| Maintenance LCC | \$ 3,665.26 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 30,284.32 | | 2019 Dollars only - no discount/inflation applied |
| Total Energy Consumption | 23652.00 | kWh | |
| Energy Cost per kWh | 1.28 | \$/kWh | |

Grid Supply

| Item | Qty | Unit | Notes |
|--------------------------|--------------|--------|---|
| New Pole Service Length | 0.35 | km | Estimated for Res1/Res 2 |
| Pole Service Cost per km | \$ 65,660.00 | \$/km | https://www.energy.vic.gov.au/safety-and-emergencies/powerline |
| Fixed Pole Service Cost | \$ 15,000.00 | \$/km | Estimated preliminaries and enabling works |
| New Pole Service Cost | \$ 37,981.00 | ea | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 0% | pa | Grid managed asset |
| Supply Tariff | 0.206 | \$/kWh | Peak rate used only - conservative. |
| Daily Supply Charge | 1.41 | \$/day | |

| | | | |
|---------------------------------|--------------|--------|---|
| Total Energy Consumption | 28032.00 | kWh | |
| Total Tariff and Supply Charges | \$ 18,640.84 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 56,621.84 | | 2019 Dollars only - no discount/inflation applied |
| Energy Cost per kWh | 2.02 | \$/kWh | |

Power Requirements

Project Details

| | | | |
|-----------------|--|--------|------------|
| Project: | Cootamundra Reservoir Study - Monitoring Station 2 | | |
| Project Number: | 19NS09 | Client | CGRC |
| Author: | Glen Luscombe | Date: | 5/07/2019 |
| Checked: | Stacey Edwards | Date: | 16/07/2019 |

*Note: All figures are per station***Consumption Details**

| Item | Qty | Value | Unit | % Duty | Notes |
|--------------------------------|-------|-------|---------|--------|--|
| Analyser | 1 | 0.048 | kW | 100% | Evoqua Depolox 700M |
| Transmitters | 3 | 0.010 | kW | 100% | Estimate on Taggle Transmitters |
| Miscellaneous | 1 | 0.050 | kW | 100% | |
| Average Load | 0.128 | | kW | | |
| Peak Load | 0.108 | | kW | | |
| Daily Consumption | 3.07 | | kWh | | |
| Required Standby Time | 18 | | hours | | |
| Maximum Battery Discharge | 60% | | | | Typical LiPo max discharge |
| Storage Capacity | 3.84 | | kWh | | |
| Avg. Eq. Hours Full Production | 4.3 | | h/day | | Clean Energy Council, 2019. Value taken for Canberra |
| Storage Efficiency | 97.0% | | | | Soltaro 4.5 |
| Required Generation Capacity | 7.13 | | kWh/day | | |
| Solar Capacity Required | 1.66 | | kW | | |

Cost Estimation*Solar*

| Item | Qty | Unit | Notes |
|-----------------------------|--------------|---------|---|
| Storage Unit Capacity | 4.05 | kWh | Soltaro 4.5 |
| Cost per Storage Unit | \$ 4,200.00 | \$/unit | Soltaro 4.5 |
| Storage Units | 1 | ea | |
| Storage Cost | \$ 4,200.00 | | |
| PV Unit Capacity | 0.3 | kW | LG LG300S1C-A5 |
| Cost per PV Unit | \$ 243.00 | \$/unit | LG LG300S1C-A5, July 2019 |
| PV Units | 6 | ea | |
| PV Cost | \$ 1,458.00 | | |
| Inverter Cost | \$ 1,560 | | Estimated per kW from Fronius Symo 10kW |
| Estimated Installation Cost | \$ 5,000.00 | | Includes shelter required for battery system (IP55) |
| Contractor Overhead/Margin | 20% | | |
| Total CAPEX | \$ 14,661.05 | | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 1.0% | pa | |
| Storage LCC | \$ 10,500.00 | | 2019 Dollars only - no discount/inflation applied |
| PV LCC | \$ 1,458.00 | | 2019 Dollars only - no discount/inflation applied |
| Maintenance LCC | \$ 3,665.26 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 30,284.32 | | 2019 Dollars only - no discount/inflation applied |
| Total Energy Consumption | 23652.00 | kWh | |
| Energy Cost per kWh | 1.28 | \$/kWh | |

Grid Supply

| Item | Qty | Unit | Notes |
|--------------------------|--------------|--------|---|
| New Pole Service Length | 0 | km | Estimated for Res1/Res 2 |
| Pole Service Cost per km | \$ 65,660.00 | \$/km | https://www.energy.vic.gov.au/safety-and-emergencies/powerline |
| Fixed Pole Service Cost | \$ 1,500.00 | \$/km | Estimated preliminaries and enabling works |
| New Pole Service Cost | \$ 1,500.00 | ea | |
| TCO Analysis Period | 25 | years | |
| Storage Unit Design Life | 10 | years | |
| PV Unit Design Life | 25 | years | |
| Maintenance Allowance | 0% | pa | Grid managed asset |
| Supply Tariff | 0.206 | \$/kWh | Peak rate used only - conservative. |
| Daily Supply Charge | 1.41 | \$/day | |

| | | | |
|---------------------------------|--------------|--------|---|
| Total Energy Consumption | 28032.00 | kWh | |
| Total Tariff and Supply Charges | \$ 18,640.84 | | 2019 Dollars only - no discount/inflation applied |
| Total Life Cycle Cost | \$ 20,140.84 | | 2019 Dollars only - no discount/inflation applied |
| Energy Cost per kWh | 0.72 | \$/kWh | |

Concept Design Report - Cootamundra Supply System Rechlorination and Reservoir Review

Appendix B

Proposed Equipment Datasheets



DEPOLOX® 700 M ANALYZER FOR POTABLE WATER

WALLACE & TIERNAN® ANALYZERS/CONTROLLERS

The DEPOLOX® 700 M is designed for measurement and limited control tasks in the drinking and process water industry. The analyzer can incorporate up to six well proven measurement parameters: free chlorine, total chlorine, pH, oxidation reduction potential, conductivity and temperature.

The system includes four single feedback controllers that can be used in constant process flow applications. In case of drinking water as well as other variable flow disinfection applications four milliamp outputs and fieldbus modules can be utilized to transmit the measurement data to a plant logic control system for chemical feed automation.

The DEPOLOX 700 M device uses a 7" color touch panel for an intuitive user interface and an LED lit flow cell that can be programmed to change color in case of an alarm condition. The user interface can be replicated on a smart phone or tablet via the standard Ethernet communication port.

All measurement parameters are shown on the main screen and a single touch of any of the configured parameters leads to a trend graph, parameter set-up and calibration detail.

The flow cell, with either pressurized or non-pressurized sample water outlet, can be fitted with up to six measurements. The well proven bare electrode cell is integral to the flow cell and can be configured to measure either free chlorine, chlorine dioxide, ozone or potassium permanganate.

The flow cell includes a small electronics where all analog sensor signals are converted to a digital signal which allows it to be separated from the electronics up to 3000 feet without risking the loss of the sensitive sensor signal.

Benefits

- Intuitive operation as well as easy visualization of all measured parameters via a 7" color touch panel
- State of the art communication possibilities via an Ethernet interface as well as a RS 485 connection
- LED lit flow cell that can be programmed to change to color in case of an alarm condition
- External USB port for a number of integrated functions including data downloading of up two years of measurement data
- Digital communication between the flow cell and electronics allows the two components to be separated up to 3000 feet without a loss in sensor signal

ELECTRONIC MODULE**Touchpanel:**

7 inch graphic display with backlight
Resistive touch screen; resolution 800 x 480 Pixel

Measurement inputs:

1x DEPOLOX® 5 for free chlorine, ClO_2 , O_3 , KMnO_4 ,
1x pH, 1x Redox, 1x Conductivity, 1x temperature
1x total chlorine; 1x dosing quantity display (feedback
signal of positioner)

Digital inputs:

3 x freely definable, e.g. controller stop, operating mode
switch, external set-point

Output contacts:

Max. eight freely definable alarm contacts/general fault
messages as well as controller outputs for the
measured parameter. Expandable as an option with an
internal 4 x relay module

Relay status is depicted on the display;
max. 6 A/250 V AC; 0.2 A/220 V DC

Special outputs:

Time-controlled contact (timed dosing)

Analog outputs (optional):

4 x 0/4 - 20 mA, freely configurable
Load \leq 1000 Ohm, accuracy $< 0.5\%$ FS
Galv. isolated up to 50 V relative to earth

Interfaces:

Ethernet interface

RS 485 to connect to the Wallace & Tiernan® Process
Monitoring System (option)

External fieldbus converter (option)

Power supply:

100 - 240 V AC $\pm 10\%$, 50/60 Hz, 48 VA
24 V DC $\pm 20\%$ 30 W

Ambient temperature: 0 - 50 °C (32 - 122 °F)

Protection: IP 66

Certifications: CE, CSA

Weight (incl. packaging): 4.5 kg (9.9 lbs)

Dimensions (W x H x D):

320 x 311 x 153 mm (12.6 x 12.2 x 6.0 ")

FLOW CELL MODULE

It is possible to install up to five sensors, up to five
sensors in a non-pressurized cell whereas the
pressurized cell excludes the total chlorine sensor.
Stable measuring signals are achieved with
hydrodynamic grit cleaning together with optimised
flow around all sensors. The following components are
integrated into the flow block module:

Flow control valve:

- Controlled sample water flow: 33 l/h (0.15 USgpm)
- Control range: 0.25 - 3.0 bar (3 - 60 psi at valve inlet)
- Back-pressure: max. 1.5 bar (21.7 psi) for press. model
- Sample water temperature: max. 50 °C (122 °F)

Multi-sensor:

- Monitoring of correct sample water flow
- Switching point: 21 l/h +/- 3 l/h Switching hysteresis: 2 l/h
- Measurement of sample water temperature with sensor
Pt 1000 for the temperature compensation of the
chlorine and possibly the pH measurement
- Sample water earthing with stainless steel sleeve

Sample water connections:

PVC hose 6 x 3 mm or PE hose 6 x 1 mm hose
connector adaptors to 1/2 " threaded hose connection

Weight (incl. packaging): approx. 2.5 kg (5.5 lbs)

Dimensions (W x H x D):

253 x 375 x 163 mm (9.9 x 14.7 x 6.4 ")

MEASURING RANGES

free chlorine, ClO_2 , O_3 , KMnO_4 : 0 to 20 mg/l
min 200 $\mu\text{S}/\text{cm}$

Conductivity: 1 $\mu\text{S}/\text{cm}$ to 300 mS/cm

pH: pH 0 to 12 (short time to 14)

pH compensation: within the pH range of 5.0 - to 8.0
according to the HOCl relationship

ORP: 0 to 1000 mV

Membrane sensors TC2 CAN and TC2-S CAN:

Total chlorine: 0.05 to 10 mg/l

For applications with salt water and conductivity values
from 2.5 to 60 mS/cm (approx. 4 % salt) the TC2-S CAN is
required.



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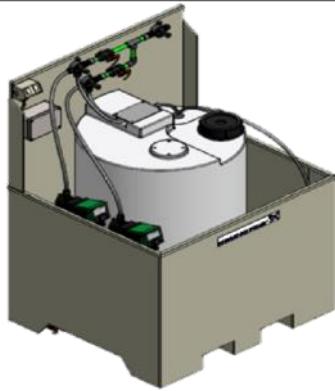
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**GRUNDFOS WATER TREATMENT
DOSING STATION DSU**

Dosing Station DSU Storage and Dosing of Liquid Chemicals

Grundfos has a renowned reputation for designing and manufacturing high quality dosing pumps and accessories, and the Dosing Station DSU is no exception. Made from high quality materials, this compact, traditional style dosing station is capable of storing and dosing a wide range of liquid chemicals. The bunded station features low pump mounting and can be calibrated online for added convenience.

PRODUCT OVERVIEW

- Pallet base LDPE containment bund with sump and drain valve
- Translucent LLDPE tanks available in 200 & 500 L
- Chemical pumps from our Smart Digital DDA/DDI range up to 60 L/hr
- Calibration column for on-line calibration
- Suction manifold in rigid grey uPVC pipe fitting
- In-line suction strainer
- Isolation ball valves for duty/standby selection
- Pressure loading & relief valves
- Signal cables & junction box
- Chemical level float switch
- Manual to automated control modes
- Injection valve and 10 m of hose

FEATURES

Complete package

- Supplied with complete set of accessories

Easy installation

- The compact, preassembled and tested design means minimised installation—just plug & play

Versatile

- Configurable setup and flexible systems to fit many different applications
- The calibration column allows for easy on-line calibration
- A wide range of chemical compatibility due to high quality materials
- Flow rates of 2.5 mL/h up to 60 L/h available in the Smart Digital DDA/DDI pump range

Certified

- Meets Australian standards

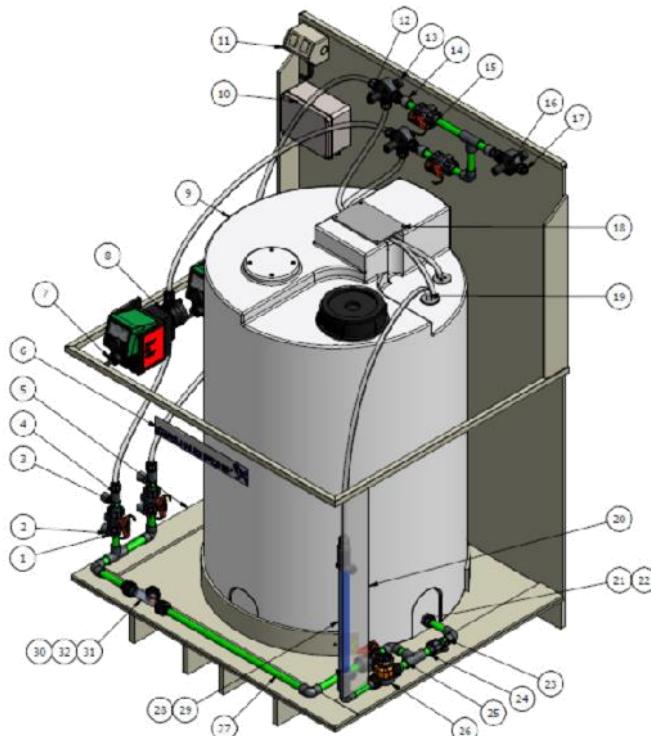
APPLICATIONS

- Water treatment chemical disinfection
- Biocides, anti-scalants and corrosion inhibitors
- Coagulants for waste water
- CIP Disinfection
- pH Correction

**GRUNDFOS WATER TREATMENT
DOSING STATION DSU**

PARTS LIST AND AS-BUILT DRAWING

| ITEM | QTY | PART NUMBER | DESCRIPTION |
|------|---------------------|-------------|--|
| 1 | 6 | 97629270 | Clip Pipe 1/2" GoemA |
| 2 | 4 | N/A | Spacer 25 mm x 25 mm UPVC |
| 3 | 2 | 95712554 | Socket 1/2" SWJ PVC-U |
| 4 | 3 | 95710053 | Connector DN8 Male Th x 1/2" SWJ Spg UPVC |
| 5 | 1 | 98721652 | Bund Suit 500L Tank (10 mm HDPE) Black |
| 6 | 1 | 91341368 | Grundfos Logo - 600 Long |
| 7 | 4 | 97629446 | Spacer 25 mm x 6 mm UPVC |
| 8 | 2 | 97722862 | DDA 7.5-16 FCM-PV/T/C-F-31U2U2IG pump |
| 9 | 1 | 98149266 | Tank, 500 L, PE-transp./black |
| 10 | 1 | 98726294 | Junction Box - 2 Pump 20 Terminals IP65 |
| 11 | 1 | 97629794 | GPO x 2 Weather Protected IP53 |
| 12 | 2 | 95730759 | PRV-G5/8-10 PVC/T U2 |
| 13 | 8 | 97648635 | Spacer 25 mm x 10 mm UPVC |
| 14 | 3 | 95710924 | Connector Dn8 Cap x 1/2" SWJ Socket UPVC |
| 15 | 5 | 97629003 | Valve Ball 546 1/2" SWJ PVC-U Viton |
| 16 | 1 | 95730743 | PLV-G5/8-3 PVC/T U2 |
| 17 | 4 | 97691903 | Kit, connector PVC-U2, metric tubing comb. |
| 18 | 2.97 m ² | 97632928 | Hose Guide Plate - 6 mm PVC Sheet |
| 19 | 2 | 98070967 | FV-2L-G5/8 PE/T/C U2 |
| 20 | 1 | 98429221 | 500 L Cal Cyl Mount - 3 mm PVC Sheet (830 x 110) |



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Regency Park SA 5010
Australia

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Fax (08) 8340 0155
contact-au@grundfos.com
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17 Beatrice Tinsley Crescent
Albany, North Shore City 0632
New Zealand

Phone (09) 415 3240
Fax (09) 415 3250
contact-nz@grundfos.com
www.grundfos.co.nz

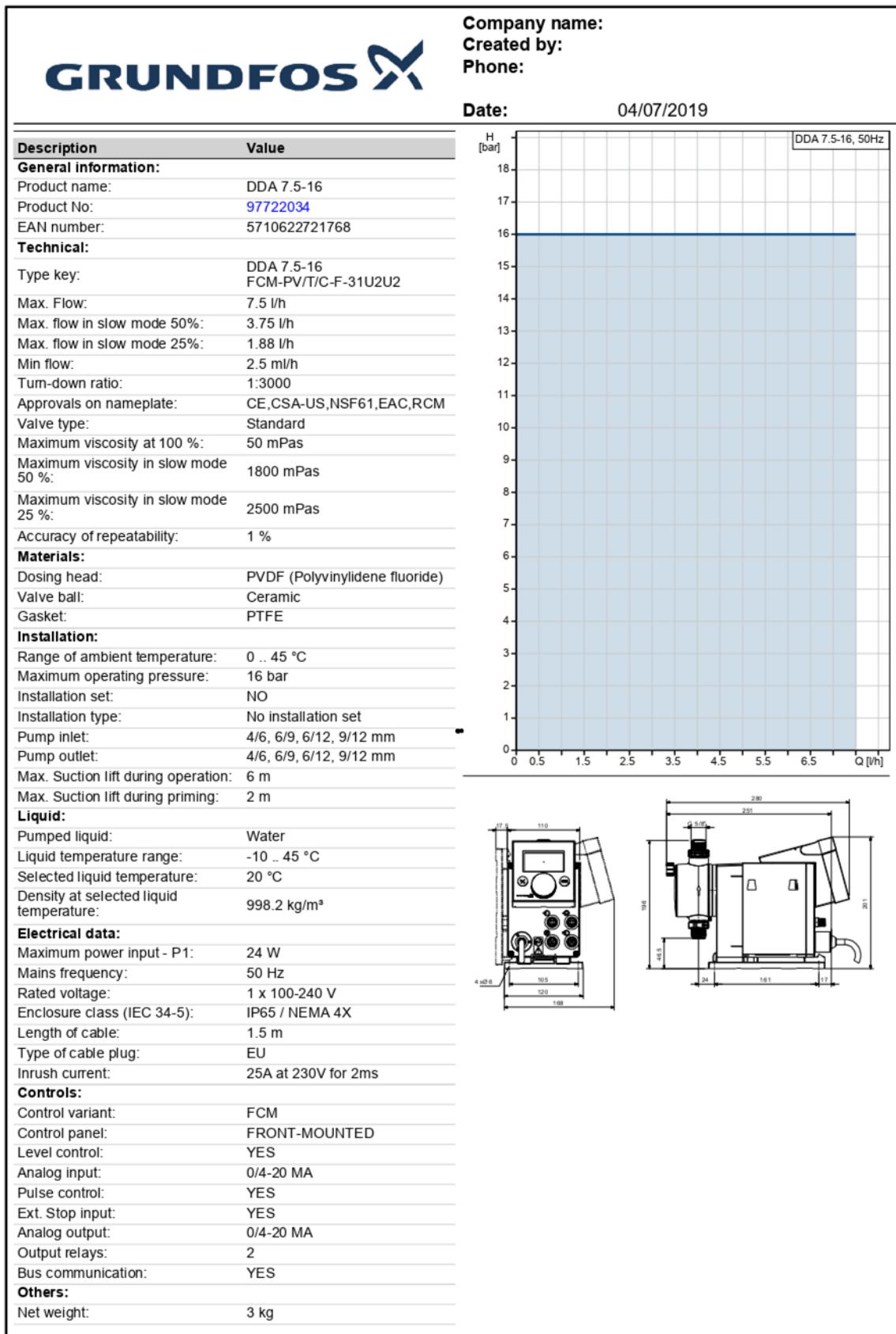
|  | | Company name: Created by: Phone: |
|---|-------------|--|
| | | Date: 04/07/2019 |
| Qty. | Description | |
| 1 | DDA 7.5-16 |  <small>Note! Product picture may differ from actual product</small> |
| Product No.: 97722034 DDA 7.5-16 FCM-PV/T/C-F-31U2U2 | | |
| <p>The SMART Digital DDA is a compact positive displacement, diaphragm dosing pump with variable-speed drive (stepper motor) and intelligent control electronics with minimum energy consumption. The SMART Digital Dosing series operates at full stroke length to ensure optimum accuracy, priming and suction, even for high-viscosity or degassing liquids. The duration of each discharge stroke varies according to the capacity set, resulting in optimum smooth and continuous discharge flow.</p> <p>The click-stop mounting plate allows installation in three different positions without using any additional accessories. The control cube can be turned easily into front, left or right position. The click wheel and the multi-coloured backlit graphical, plain-text LC display make commissioning and operation intuitive. The control elements are protected by a transparent cover.</p> <p>The sensor-based FlowControl (FC) system detects malfunctions directly in the dosing head and displays them in plain text in the alarm menu, e.g. air bubbles, line burst, overpressure. The integrated flow measurement function (only FCM) measures the actual flow and makes additional monitoring and control equipment redundant (accuracy of ± 1.5 % of set value in case of trouble-free process). The measured flow is displayed and can be integrated in the process control, e.g. SCADA. Furthermore, the AutoFlowAdapt function (only FCM) automatically adjusts the pump speed according to the process conditions to maintain target flow even at e.g. varying backpressure or air bubbles foaming (degassing drive strategy).</p> | | |
| <p>The dosing head is composed of:</p> <ul style="list-style-type: none"> - Long lifetime and universal, chemically resistant full-PTFE diaphragm. - Double ball valves for highest dosing accuracy. - Deaeration valve for easy start-up. - Pressure sensor. <p>Operation modes:</p> <ul style="list-style-type: none"> - Manual dosing in ml/h, l/h or gph. - Pulse control in ml/pulse (incl. memory function). - Analog control 0/4-20 mA (scalable). - Pulse-based batch function in ml, l or gal. - Timer-based batch function (Dosing timer, cycle or week). - Fieldbus control (Genibus prepared for ProfibusDP E-box). <p>Other features:</p> <ul style="list-style-type: none"> - Auto deaeration during pump standby to avoid breakdowns due to air-locking. - Two SlowMode steps (anti-cavitation), 50 % (maximum flow: 3.75 l/h) and 25 % (maximum flow: 1.88 l/h), e.g. for high-viscosity or degassing liquids. - Service information display to show when service and which wear-part order number is required. - Two-step key lock function to protect the pump against unauthorised access. - Additional display function to provide further information, e.g. the actual mA input signal. - Counter for total dosed volume (resettable), operating hours, etc. - Save and load customised settings as well as reload of factory settings. <p>Signal inputs/outputs:</p> | | |

| | | |
|---|---|---|
|  | | Company name: Created by: Phone: |
| | | Date: 04/07/2019 |
| Qty. | Description | |
| | <ul style="list-style-type: none"> - Input for pulse, analog 0/4-20mA, external stop. - Input for low-level and empty-tank signal. - Two potential-free output relays for max. 30 V AC/DC (configurable, e.g. alarm, stroke signal, pump dosing, timer etc.) - Output analog 0/4-20mA. - Fieldbus communication interface (GeniBus, also for additional Profibus DP E-box to retrofit). | |
| | Technical: | |
| | Type key: DDA 7.5-16 FCM-PV/T/C-F-31U2U2 Max. Flow: 7.5 l/h Max. flow in slow mode 50%: 3.75 l/h Max. flow in slow mode 25%: 1.88 l/h Min flow: 2.5 ml/h Turn-down ratio: 1:3000 Approvals on nameplate: CE, CSA-US, NSF61, EAC, RCM Valve type: Standard Maximum viscosity at 100 %: 50 mPas Maximum viscosity in slow mode 50 %: 1800 mPas Maximum viscosity in slow mode 25 %: 2500 mPas Accuracy of repeatability: 1 % | |
| | Materials: | |
| | Dosing head: PVDF (Polyvinylidene fluoride) Valve ball: Ceramic Gasket: PTFE | |
| | Installation: | |
| | Range of ambient temperature: 0 .. 45 °C Maximum operating pressure: 16 bar Installation set: NO Installation type: No installation set Pump inlet: 4/6, 6/9, 6/12, 9/12 mm Pump outlet: 4/6, 6/9, 6/12, 9/12 mm Max. Suction lift during operation: 6 m Max. Suction lift during priming: 2 m | |
| | Liquid: | |
| | Pumped liquid: Water Liquid temperature range: -10 .. 45 °C Selected liquid temperature: 20 °C Density at selected liquid temperature: 998.2 kg/m³ | |
| | Electrical data: | |
| | Maximum power input - P1: 24 W Mains frequency: 50 Hz Rated voltage: 1 x 100-240 V Enclosure class (IEC 34-5): IP65 / NEMA 4X Length of cable: 1.5 m Type of cable plug: EU Inrush current: 25A at 230V for 2ms | |
| | Controls: | |
| | Control variant: FCM Level control: YES Analog input: 0/4-20 MA Pulse control: YES Ext. Stop input: YES Analog output: 0/4-20 MA Output relays: 2 | |

| | | |
|---|--------------------|---|
|  | | Company name: Created by: Phone: |
| | | Date: 04/07/2019 |
| Qty. | Description | |
| | Bus communication: | YES |
| | Others: | |
| | Net weight: | 3 kg |
| | Gross weight: | 4 kg |
| | Color: | RED |

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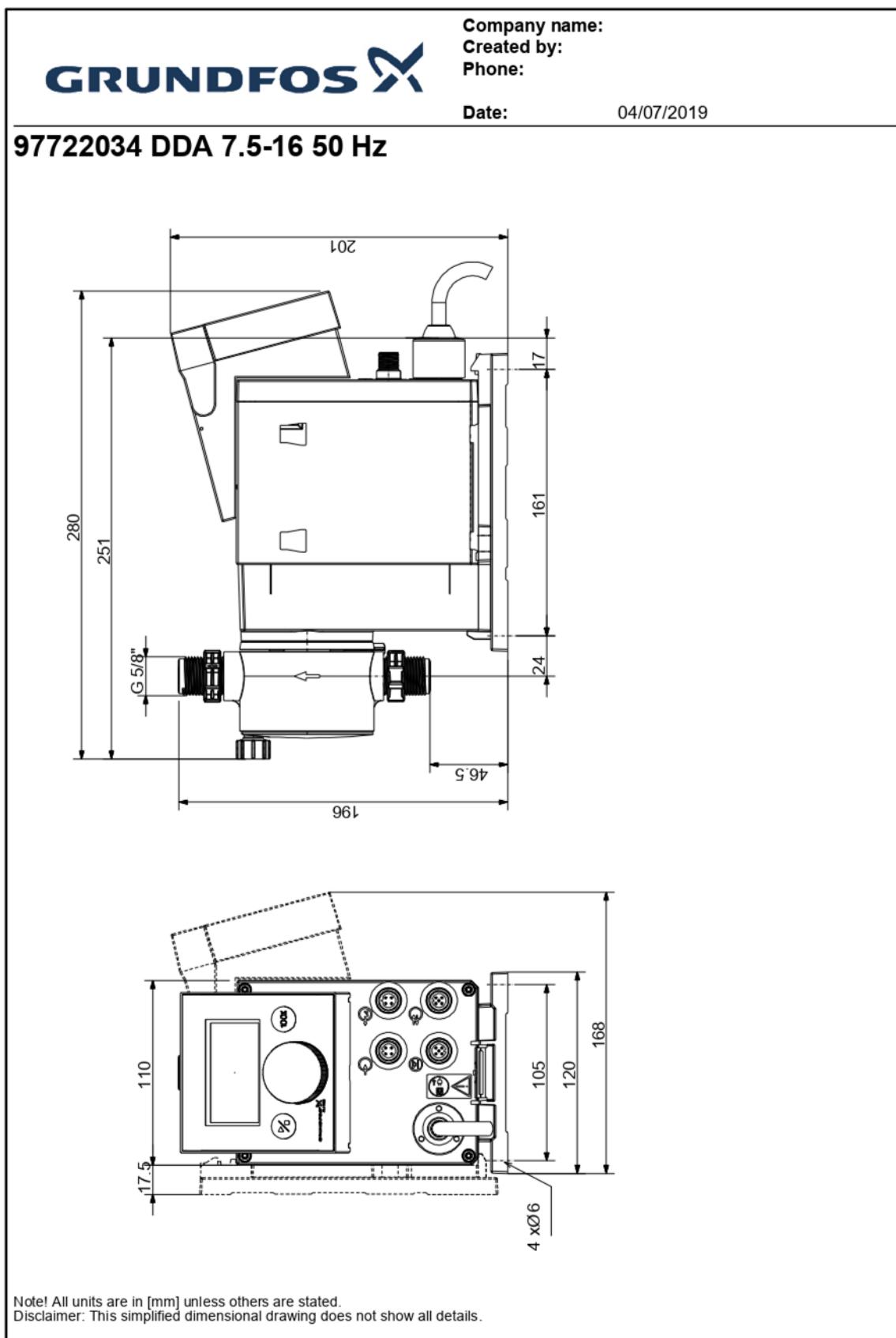
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|  | Company name: Created by: Phone: |
|---|---|
| | Date: 04/07/2019 |
| Description | Value |
| Gross weight: | 4 kg |
| Color: | RED |

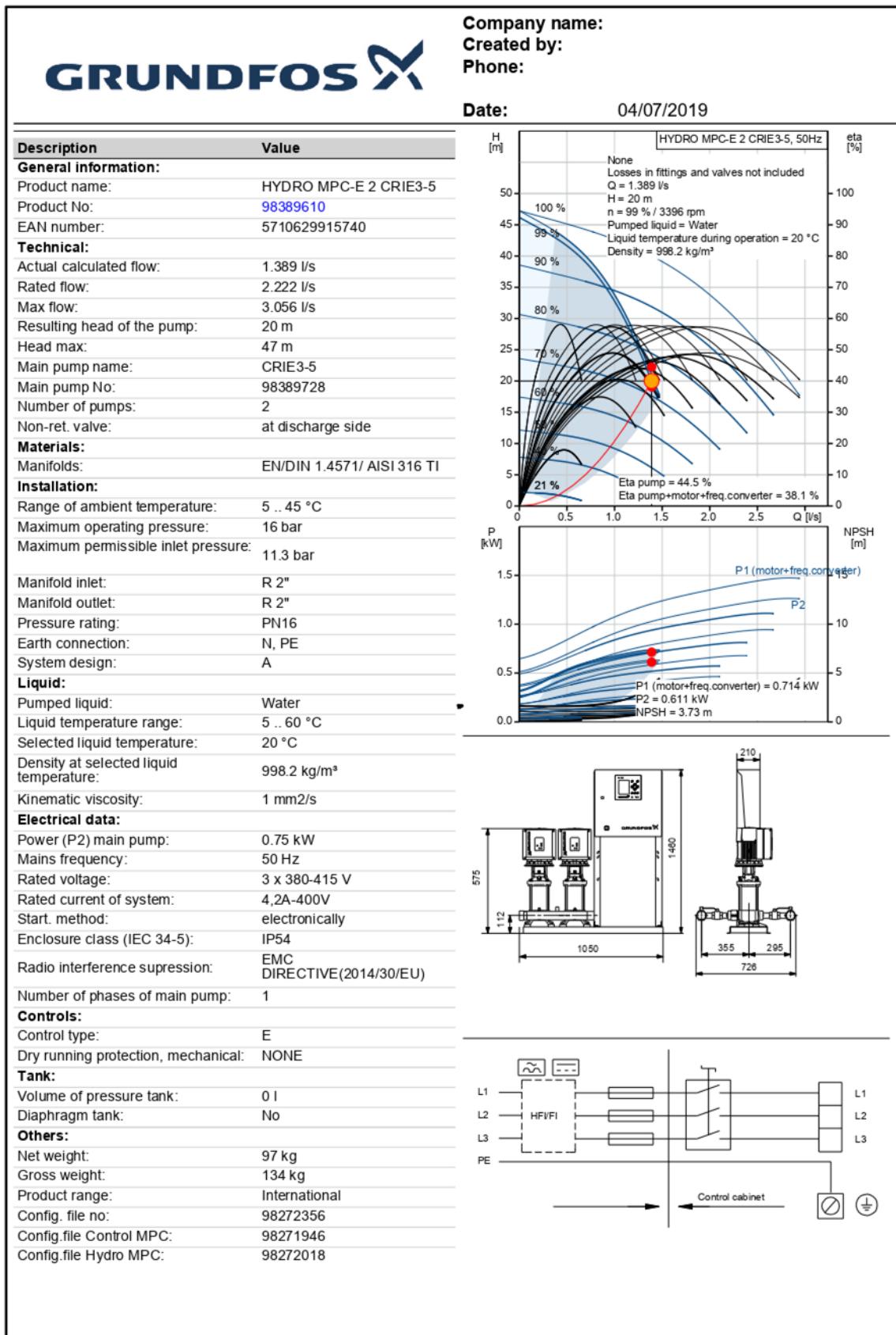
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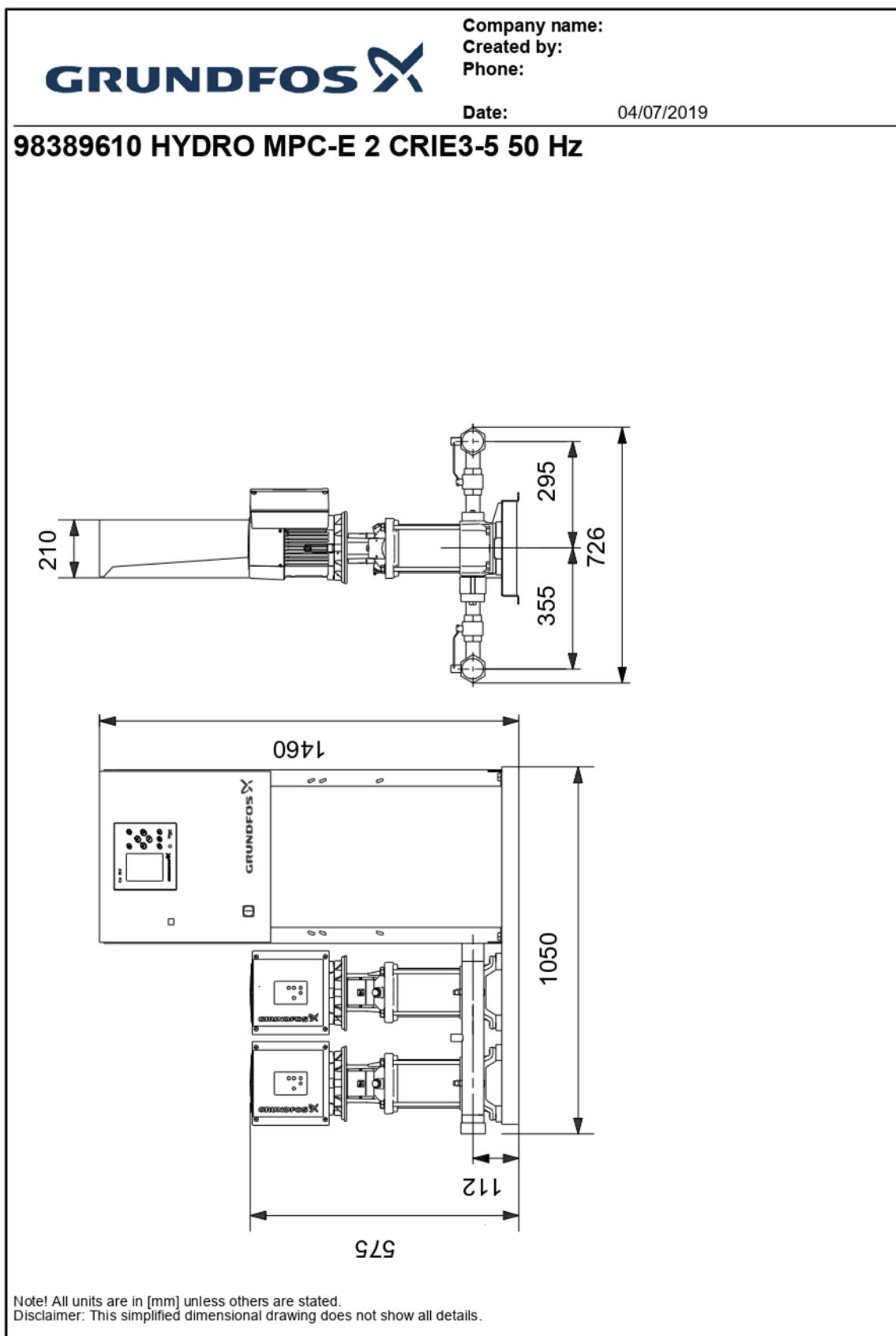
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|  | | Company name: Created by: Phone: |
|--|-----------------------|--|
| | | Date: 04/07/2019 |
| Qty. | Description | |
| 1 | HYDRO MPC-E 2 CRIE3-5 |  <small>Note! Product picture may differ from actual product</small> |
| Product No.: 98389610 | | |
| <p>Pressure booster system supplied as compact assembly according to DIN standard 1988/T5.</p> <p>All pumps are speed-controlled.</p> <p>From 0.37 to 11 kW, the booster system is equipped with CR, CRE, CRI, CRIE pumps with electronically commutated permanent-magnet motors with extremely high efficiency. The total efficiency of the motor including the frequency converter applies to IE5 level in IEC60034-31.</p> <p>From 15 to 22 kW, the booster system is equipped with CR, CRE, CRI, CRIE pumps with motors with integrated frequency control. The total efficiency of the motor including the frequency converter is better than the IE3 level in IEC60034-31, even though this standard only applies to the motor.</p> <ul style="list-style-type: none"> * Hydro MPC-E maintains a constant pressure through continuous adjustment of the speed of the pumps. * The system performance is adapted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation. * Pump changeover is automatic and depends on load, time and fault. <p>The system consists of these parts:</p> <ul style="list-style-type: none"> * Pump parts in contact with the pumped liquid are made of stainless steel EN DIN 1.4301 * Pump bases and heads are of either cast iron/stainless steel (CRI) or cast iron EN-GJS-500-7 (CR), depending on pump type; other vital parts are made of stainless steel EN DIN 1.4301 * The pumps are equipped with a service-friendly cartridge shaft seal, HQQE (SiC/SiC/EPDM) * Two stainless steel manifolds to EN DIN 1.4571 * Stainless steel base frame to EN DIN 1.4301 up to CR 64. Above CR 64 the pumps are placed on a galvanized C-profile frame * One non-return valve (POM) and two isolating valves for each pump * Non-return valves are certified according to DVGW, isolating valves according to DIN and DVGW * Adapter with isolating valve for connection of diaphragm tank * Pressure gauge and pressure transmitter (analog output 4-20 mA) * Control MPC in a steel cabinet, IP54, including main switch, all required fuses, motor protection, switching equipment and microprocessor-controlled CU 352. <p>Dry-running protection and diaphragm tank are available according to the list of accessories.</p> <p>Pump operation is controlled by Control MPC with the following functions:</p> <ul style="list-style-type: none"> * Intelligent multipump controller, CU 352. * Constant-pressure control through continuously variable adjustment of the speed of each individual pump. | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|-------------|-------|-----------------------|---------------|-----------------------|--------|---------------|-----------|--------------|-----------|-------|------|---------------|-----------|------------------------|-----------|----------------|---------|-------------|-------|
|  | | Company name: Created by: Phone: | | | | | | | | | | | | | | | | | | | | |
| | | Date: 04/07/2019 | | | | | | | | | | | | | | | | | | | | |
| Qty. | Description <p>PID controller with adjustable PI parameters (Kp + Ti). Constant pressure at setpoint, independent of inlet pressure. Soft pressure build-up (To prevent water hammer during startup). On/off operation at low flow. Automatic cascade control of pumps for optimum efficiency. Selection of min. time between start/stop, automatic pump changeover and pump priority. Automatic pump test function to prevent idle pumps from seizing up. Possibility of standby pump allocation. Possibility of backup sensor (redundant primary sensor). Secondary sensor (Possible to switch to another sensor/setpoint). Multi-sensor (up to 6 sensors to influence the setpoint). Manual operation. Possibility of external setpoint influence. Log function. Setpoint ramp. Possibility of digital remote-control functions: System on/off. Max., min. or user-defined duty. Up to 6 alternative setpoints. Digital inputs and outputs can be configured individually. Pump and system monitoring functions: Minimum and maximum limits of current value. Inlet pressure. Non-return valve monitoring. Motor protection. Sensors and cables monitored for malfunction. Alarm log with the previous 24 warnings/alarms. Display and indication functions: Colour screen display. Green indicator light for operating indications and red indicator light for fault indications Potential-free changeover contacts for operation and fault. Grundfos bus communication.</p> <p>It is possible to add CIM communication modules for communicating with Scada/BMS.</p> <p>Pumps, piping, cabling complete as well as Control MPC are mounted on the base frame. The booster system has been preset and tested.</p> <table> <tr> <td>Flow media:</td> <td>Water</td> </tr> <tr> <td>Allowed liquid temp.:</td> <td>5 °C .. 60 °C</td> </tr> <tr> <td>System pressure max.:</td> <td>16 bar</td> </tr> <tr> <td>Flow (Plant):</td> <td>3.056 l/s</td> </tr> <tr> <td>Flow (Pump):</td> <td>1.389 l/s</td> </tr> <tr> <td>Head:</td> <td>20 m</td> </tr> <tr> <td>Mains supply:</td> <td>380-415 V</td> </tr> <tr> <td>Nom. current of plant:</td> <td>4,2A-400V</td> </tr> <tr> <td>Nominal power:</td> <td>0.75 kW</td> </tr> <tr> <td>Net weight:</td> <td>97 kg</td> </tr> </table> <p>Maximum head: 47 m Maximum flow: 3.056 l/s</p> | | Flow media: | Water | Allowed liquid temp.: | 5 °C .. 60 °C | System pressure max.: | 16 bar | Flow (Plant): | 3.056 l/s | Flow (Pump): | 1.389 l/s | Head: | 20 m | Mains supply: | 380-415 V | Nom. current of plant: | 4,2A-400V | Nominal power: | 0.75 kW | Net weight: | 97 kg |
| Flow media: | Water | | | | | | | | | | | | | | | | | | | | | |
| Allowed liquid temp.: | 5 °C .. 60 °C | | | | | | | | | | | | | | | | | | | | | |
| System pressure max.: | 16 bar | | | | | | | | | | | | | | | | | | | | | |
| Flow (Plant): | 3.056 l/s | | | | | | | | | | | | | | | | | | | | | |
| Flow (Pump): | 1.389 l/s | | | | | | | | | | | | | | | | | | | | | |
| Head: | 20 m | | | | | | | | | | | | | | | | | | | | | |
| Mains supply: | 380-415 V | | | | | | | | | | | | | | | | | | | | | |
| Nom. current of plant: | 4,2A-400V | | | | | | | | | | | | | | | | | | | | | |
| Nominal power: | 0.75 kW | | | | | | | | | | | | | | | | | | | | | |
| Net weight: | 97 kg | | | | | | | | | | | | | | | | | | | | | |







300,000
sq. kms of
network
coverage

Taggle BYRON
A31-11

130,000+
Taggle smart
meters &
sensors

1.3 Billion
readings
delivered to
customers
annually

taggle X

We light up dark assets

IoT sensors & analytics providing data and insight for visionary cities, utilities, industries and agri-business to make smart decisions.





Index

| | |
|--|-----|
| Introduction | p5 |
| Prepare for a digital future | p7 |
| Sensor to Software - The Taggle System explained | p8 |
| Sensors for Data Acquisition | p10 |
| Communication Module | p12 |
| Taggle Network | p14 |
| Internet of Things (IoT) Cloud | p16 |
| Data Portal | p17 |
| Analytics Software and Customer Portal | p18 |
| Taggle Customers | p20 |
| Smart Water & Utilities | p22 |
| Smart Cities & Communities | p30 |
| Smart Agriculture & Farming | p32 |
| Industrial & Commercial IoT | p36 |
| Taggle Product Range | p38 |
| Taggle Certified Technology Partners | p46 |
| Taggle Software Solutions | p54 |



**Australia's
leading IoT
provider.
Smart cities
connected by
Taggle.**

Taggle partners with innovative cities, utilities, industries and agri-business to provide the sensors, devices and analytics that make up the Internet of Things. It is these IoT systems that provide new information and insights to help make smarter decisions.

The benefits of collecting data include improved water resource management, better customer engagement and a more sustainable future.

Smart Water & Utilities

Taggle Systems provides simple, robust, cost-effective and proven smart meters, sensors, communications and analytics. These provide solutions to the problems of leak detection, demand management, infrastructure planning, network operations and customer engagement.

Smart Cities & Communities

Smart Cities and Communities are now utilising sensors, communications and analytics to make cities more livable, vibrant and efficient than ever before

Smart Agriculture

Digital assistance giving farmers increased productivity and efficiency through the use of sensing technology and data analytics.

Industrial & Commercial IoT

Industrial IoT is transforming companies and industries, opening up new opportunities for economic growth and competitiveness through data-driven decisions and better management of assets.



Prepare for the digital future with intelligent networks and data

The digital future is now. Smart Cities projects are already moving from the concept stage into full roll-out providing benefits at city and region-wide scale.

Taggle is at the forefront of this with the value of information and communication as the driving force to solve problems within cities, industries and agriculture.

32+ Australian councils and water utilities around are using Taggle's Low Power Wide Area Network (LPWAN) to collect massive amounts of data from thousands of meters and sensors installed across their regions.

On a daily basis Taggle delivers more than 3 million readings to their customers; data which they are using in billing systems, SCADA, GIS, hydraulic models, meter data management software and customer portals.

Customer portals are an important new channel for customers to engage with councils in which both parties benefit greatly.

Managing infrastructure and delivering services to the community are core business for a local council, and doing so more efficiently is a high priority.

Councils are being pushed to provide more and more services with little or no increases in rates revenue, so councils are looking for every opportunity to reduce their service delivery costs and extract maximum value from resources.

Taggle is ready to deploy its network in your area at very short notice and we have devices to help you start collecting data and getting results straight away.

Within hours of connecting your water meters to our network, for example, we can send data which will identify potential leaks on your customers' properties. Once repaired, they'll save water and money and your council will have happy customers.

From Sensor to Software

The Taggle System Explained



1. Sensor for data acquisition - A wide variety of open-standard sensors gather information about infrastructure and the environment.

2. Taggle modules ("Tags") read the data from sensors and transmit these to base stations kilometers away.

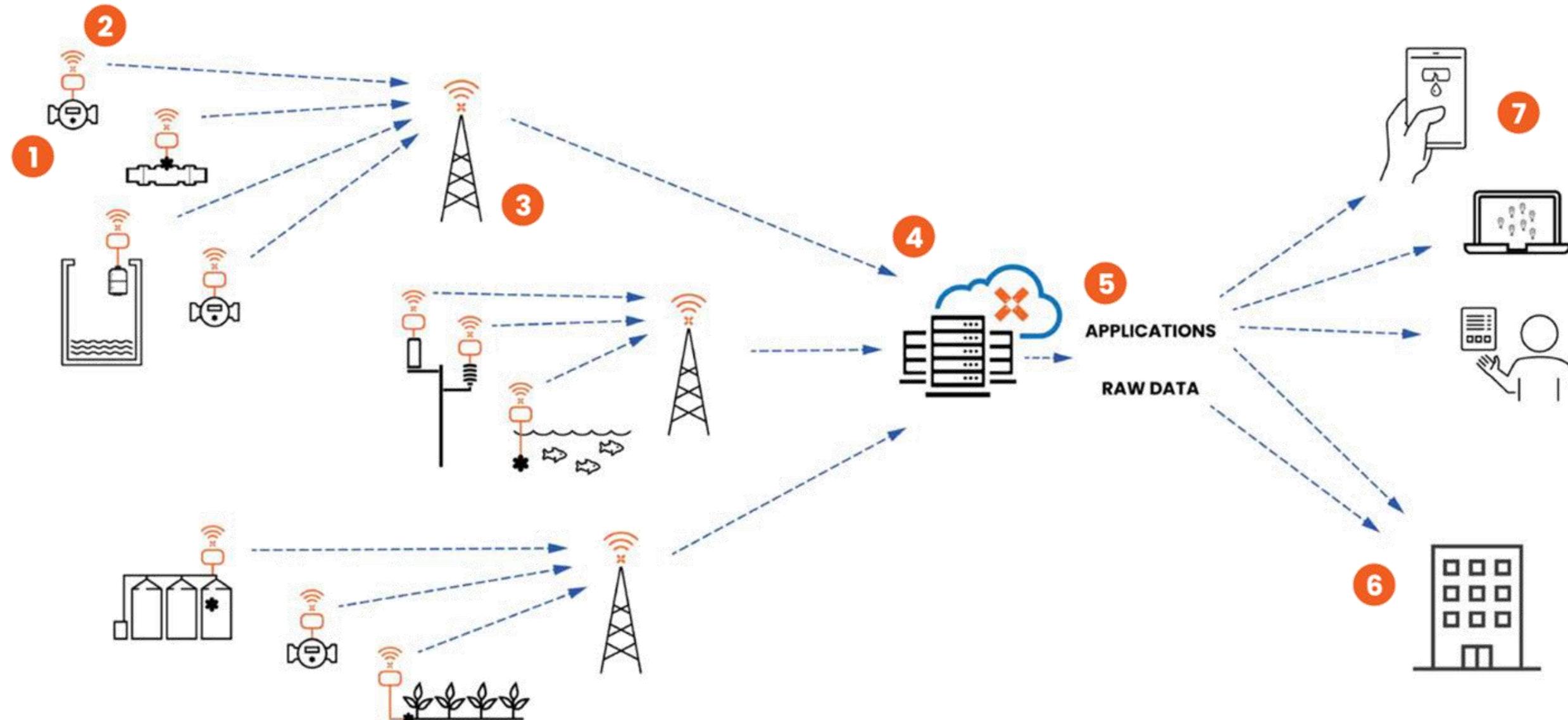
3. Taggle Base Stations receive the data from all the sensors across the region and forward this to the secure IoT platform in the cloud.

4. The IoT cloud collects the data from all the base stations.

5. The IoT Platform process transforms raw signals into meaningful sensor readings such as level measured in meters and volume measured in liters.

6. Operational and Analytics software turns data from hundreds or thousands of sensors and meters into usable information and insight to support better decisions.

7. Customer portals and apps make data available to customers and residents to help them engage with this new information.



From Sensor to Software

The Taggle System Explained (Continued)

1

Sensors for data acquisition

Most of Taggle's customers are deploying low cost, long life sensors and meters to install permanent systems for monitoring assets and the environment.

Taggle modules support a wide range of common commercial and industrial protocols, enabling a wide range of sensors to be easily deployed.

Sensor interface standards include:

- Pulse output
- Modbus
- RS485
- RS232
- SDI-12
- UART
- 4-20mA

Examples of sensors on the Taggle Network:

- Pressure
- Flow
- Level
- Water and Air Quality
- Electricity Consumption
- Weather
- Odour
- Gas



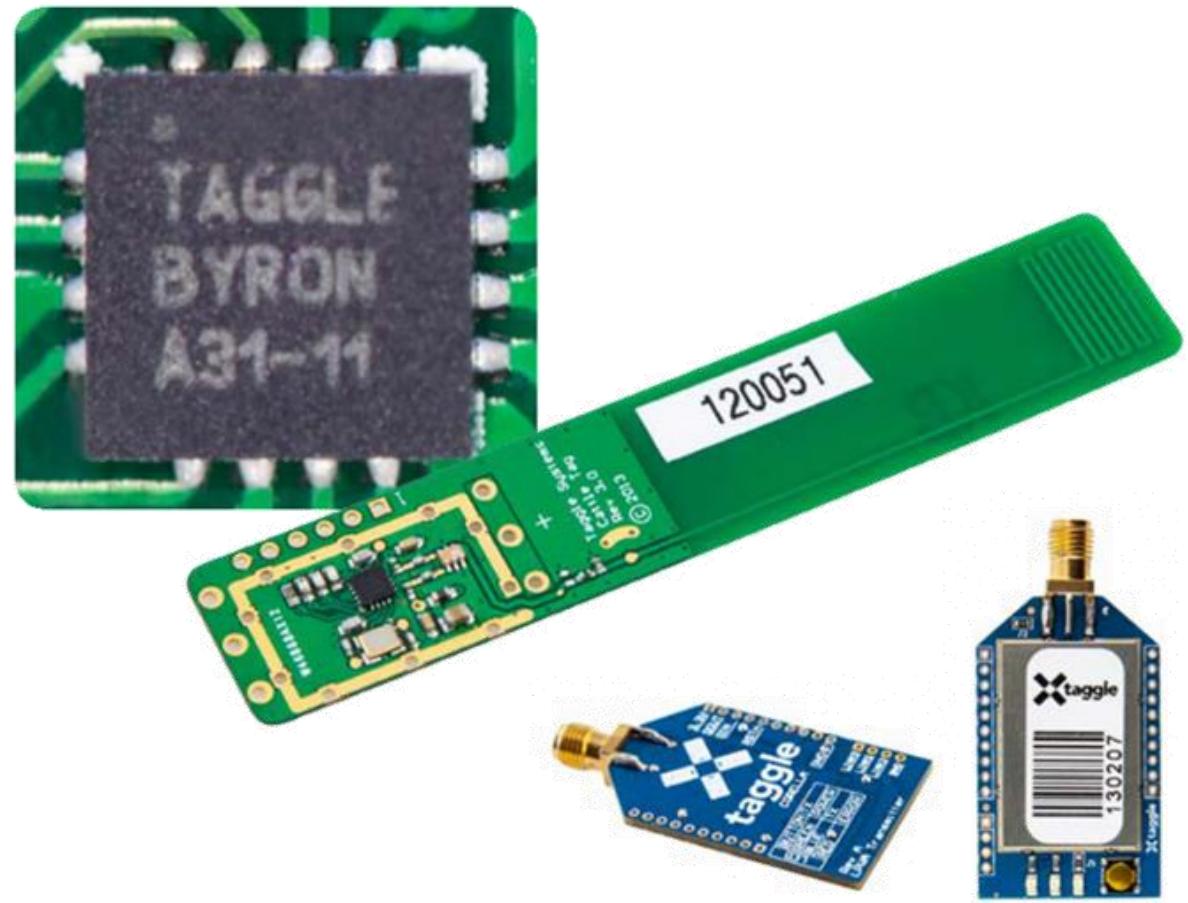
Certified Technology Partners

Taggle has also developed an open development ecosystem where other companies can leverage the low-power, long-range technology benefits of the Byron wireless system to build their own Internet of Things (IoT) applications.



Taggle partners utilise Taggle modules including the Corella Development Module to develop products in environmental monitoring such as water quality, agricultural technology and industrial IoT monitoring such as temperature and vibration of motors and other equipment.





2

Communication module Byron Wireless Communication

Taggle uses a variety of technologies for wireless communication depending on the application.

For one way applications such as sensors and meter reading, Taggle has standardised on the Byron A31 chip and wireless communications protocol.

This approach provides unparalleled benefits in terms of scale, cost and battery life.

The Byron chip was specifically designed for transmit-only applications such as meter reading where its simplicity minimises power consumption and build cost. This helps to keep the cost of very large numbers of devices to an absolute minimum.

Byron modules transmit over very long distances (2-20km depending on geography) which when combined with the very high capacity of the receivers, means that the number of receiver base-stations is kept to a minimum.

Designed by a team that also worked on the development of WiFi in Australia, Byron is Australia's most widely deployed LPWAN technology with over 135,000 devices deployed with Australian companies, providing them with 1.3 Billion meter readings every year.

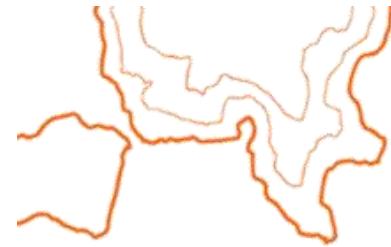
Byron utilises the 915-928MHz LPD Band and employs Direct Sequence Spread Spectrum (DSSS) for optimal range and noise rejection.

Taggle telemetry modules typically transmit once an hour. More frequent transmissions can be made to suit specific applications.



12

13



3

Taggle network base stations with antennas and receivers



Taggle's Byron network is comprised of base stations that include extremely sensitive radio receivers fitted with a high gain antenna.

Each base station has an effective range of 2-20km and a capacity of up to 30,000 sensor readings per hour. As such, Taggle's network scales easily for both city and region-wide use.

Taggle uses lightweight antennas and low-footprint receivers, which has enabled Taggle to deploy a network of over 300 base stations and 320,000 square kilometers of coverage.

Consumer telco standards such as 2G, 3G & 4G become obsolete and are replaced by newer, faster technology on a regular basis.

Other IoT technologies work well for building management systems, but do not necessarily scale to cover cities and regions.

Taggle recognises that many city or region-wide IoT investments are based on business cases that require systems to operate 10 years or more, and has designed the Byron network for just this purpose.

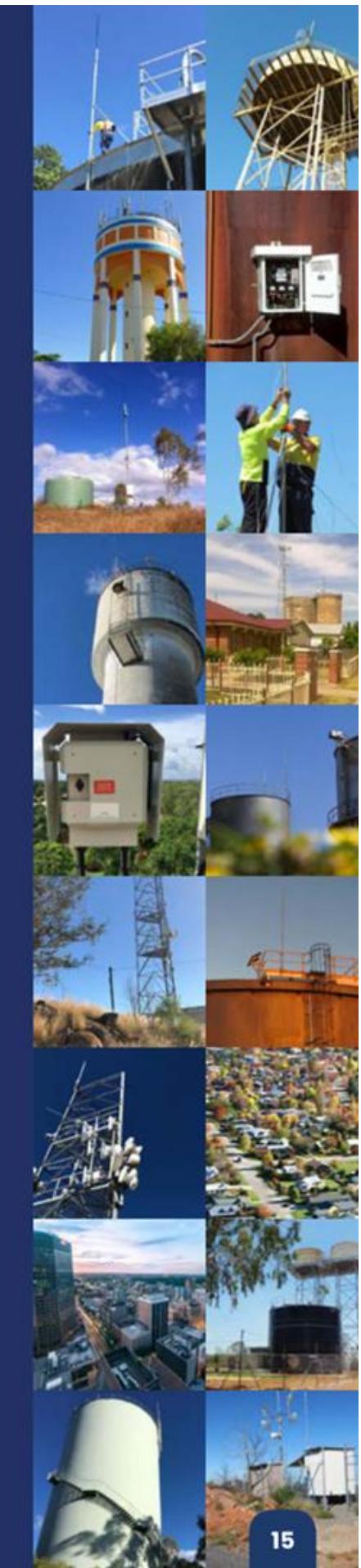
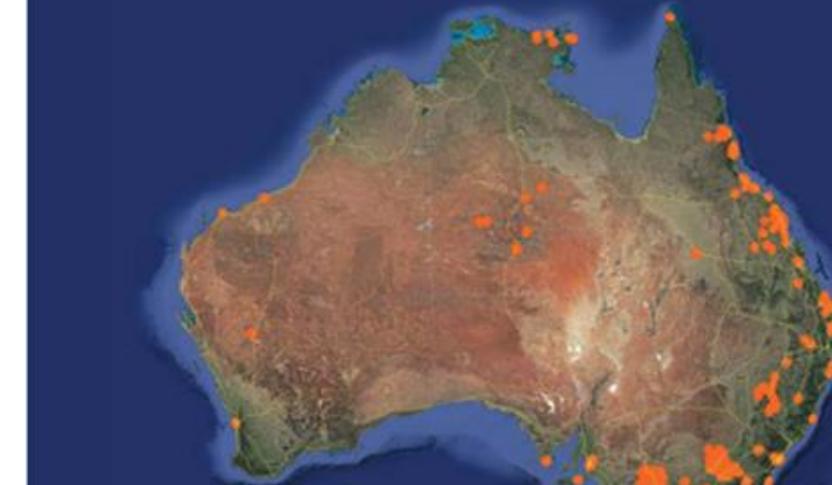
14



Australian customers and network spread

Taggle's low power wide area (LPWA) radio technology offers low-cost, low-power, long range communications for many types of sensors and devices.

Taggle deploys Australia's only dedicated m2m (machine-to-machine) network to enable the cost-effective collection of data from thousands of devices across very wide areas.



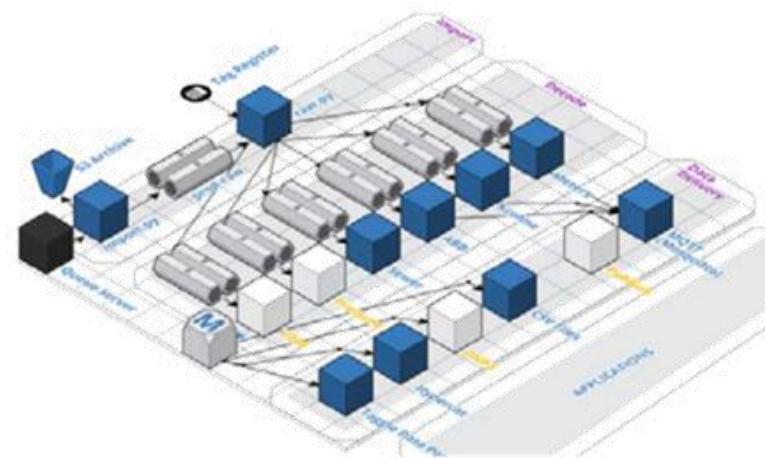
15



4

IoT Cloud

The IoT cloud collects the data from all the base stations and consolidates this into the Taggle data centres ready for processing.



5

IoT Platform

Taggle's data processing platform is built on Amazon Web Services which provides the performance, security and reliability required for utility-scale applications.

The platform collects data from the network of receivers, and decrypts and decodes data from meters and other sensors.

Data is delivered to utility customers either via real-time interfaces or via nightly batch jobs depending on the Utility's specific requirements.

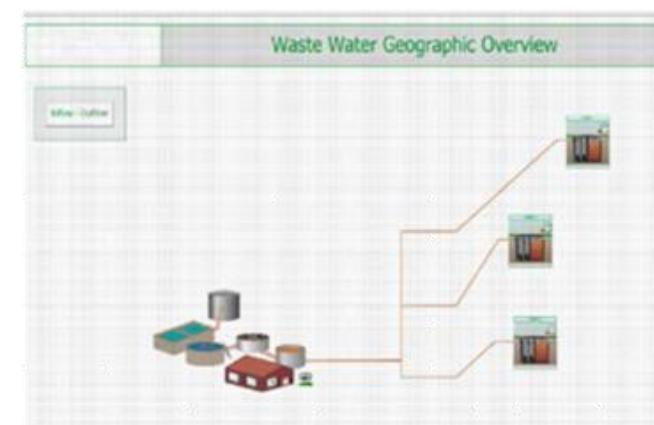
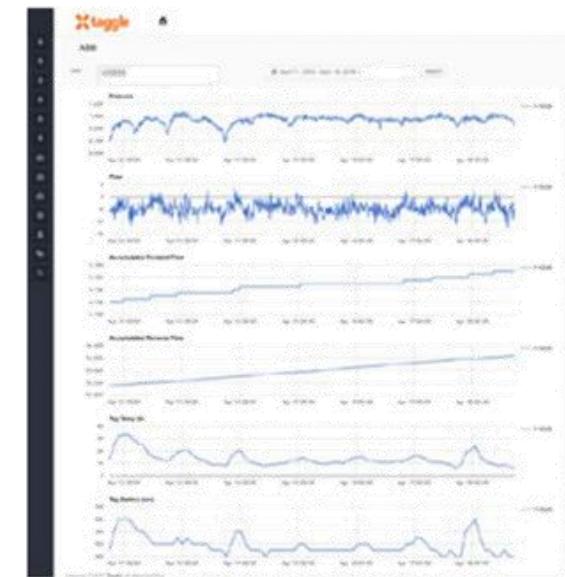
16

6

Operational and Analytic Software

The Taggle Data Portal provides utility users with real-time access to any meter or sensors operating on the Taggle network.

The chart to the right shows the data being received from an ABB Magflow meter, reporting forward and reverse volume, instantaneous flow, pressure, as well as diagnostic information from the module about battery and temperature.



DNP3 is a widely used SCADA system communications protocol.

Taggle supports SCADA via DNP3, providing key sensor data in real-time for operational management. Any Taggle module can be presented to SCADA via DNP3 as if were a traditional RTU.

Taggle's DNP3 interface supports both Polled and Unsolicited data modes and Counter, Analog and Binary data types.



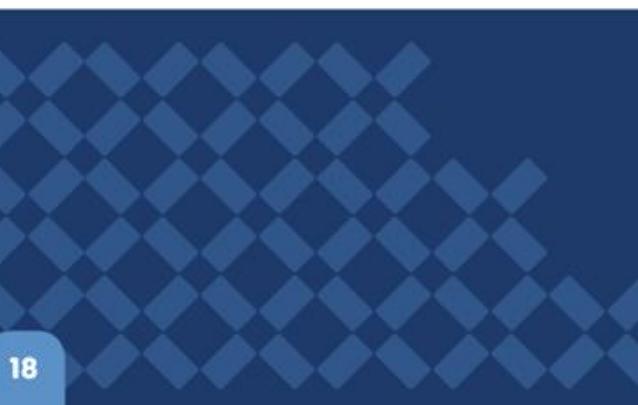
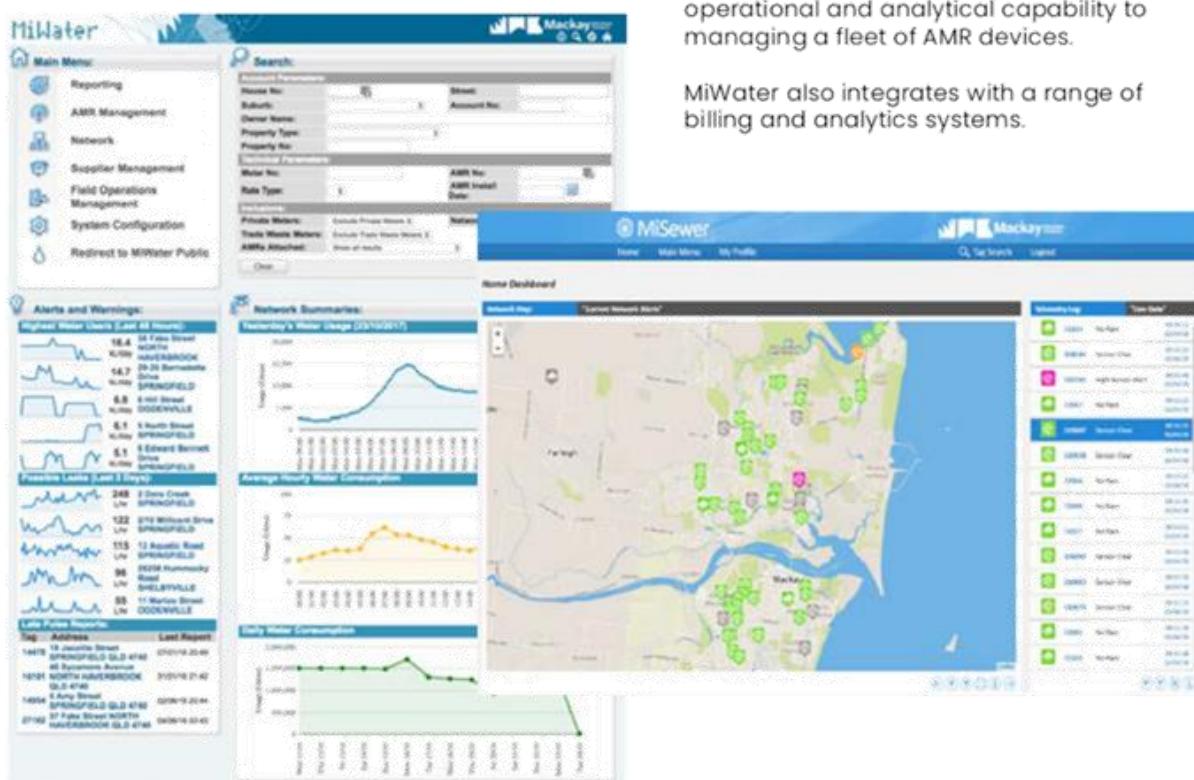
17

6 (Continued)

Meter Data Management

Software for Utilities

Meter data collected from Taggle modules and receiver networks is decrypted, decoded and delivered to the utility customer in a variety of open-standard data interfaces.



18

7

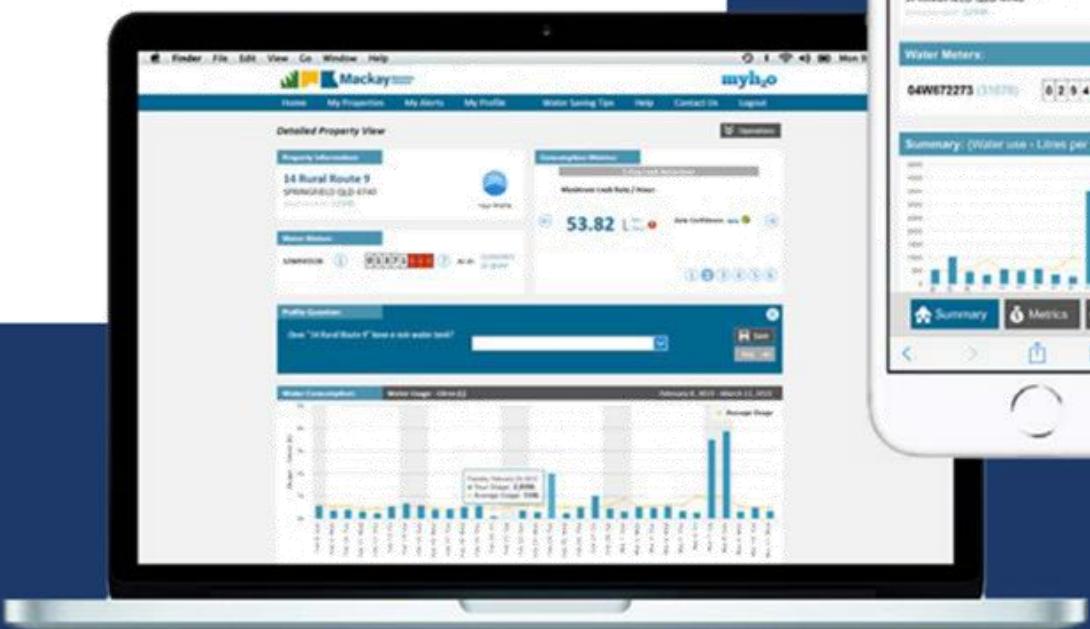
Customer Portals & Apps

Software for Customers

Put the power of information into your customers hands.

MiWater includes a customer-facing portal called MyH2O, that provides end-consumers near real-time access into their own consumption data via web browser and mobile device.

By providing feedback about high consumption and possible leaks, the Utility is able keep customers informed about their consumption patterns, avoiding bill-shock and empowering consumers to change their own behaviours accordingly.



19

Customer Portals

MyH2O

Application Ecosystems

MiWater
ClearSCADA
Visenti
OpenSpatial
ESRI
TechOne
Civica

Open Data Standards

MQTT
AMQP
Web Services
Hypercat
DNP3
ODBC
CSV/FTP



Taggle Customers

Utilities, councils, universities,
airports, agriculture and
private business





Smart Water & Utilities



Smart Meter Reading
Smart Water Networks
Sewer Network Management
Sub-Metering Management



22

Smart Water technology provides a wide range of business benefits that spans asset management, planning, operations and customer engagement.

Whether it's a network wide rollout of Automatic Meter Reading or the

installation of Smart Network devices such as Sewer Overflow Sensors, Pressure Sensors and Mass-flow sensors, the benefits can be seen immediately and well into the future.

The drivers of change and benefits of knowledge



Reduce operating costs and non revenue water losses



Reduction in residential leakage rebates



Educate customers empowering them to change their own behaviors



Enhanced customer engagement via online portal



Automatic monitoring with alarms if changes occur within the system that require attention



Reduce safety and security concerns associated with manual readings



Extend the lifespan of the network through optimised operations and proactive maintenance



Identify and repair underground bursts that could run indefinitely and could cause infrastructure damage



Avoid bill shock with near real-time data on consumption and excess use alarms

23



Automatic Meter Reading (AMR)

A smart water meter is a digital device that measures, in real time, the amount of water in use, then via a low frequency radio transmitter securely sends data to the cloud for processing.

The ability to analyze and monitor the information collected from smart water meters on every household, business and public space within the community is incredibly powerful.

Non-revenue water, in the form of network leaks, on property leaks and water theft can now be identified and addressed.

Utilities are building positive customer relations with the ability to proactively alert them to high water consumption and potential leaks.

Whole community attitudes towards water consumption is changing with the use of online portals where customers can monitor and manage their own usage.

With hourly data points Utilities can learn what is happening within the network, reduce costs associated with pumping, the cost of lost water and

rebates claimed for concealed leaks as these are now quickly identified.

Leaks can cause serious damage to infrastructure if not quickly addressed. Targeting maintenance to minimise disruption and network downtime adds to greater customer satisfaction.

Water is our most valuable asset, utilities lose large amounts of water each year to water theft. With Taggle technology you have the tools to help pinpoint possible theft instances identifying when, where and how to support investigations.

Reducing the water consumption across the network and throughout the community has the possibility of delaying major infrastructure upgrades to deal with growing population and water requirements.

Another benefit of smart meters is employee safety. Eliminate the risk of dog and snake bites from being out in the field manually reading meters.

Having a clear understanding of what is occurring in the network opens a world of opportunity.



24



Smart Sewer Networks

With the range of information now available with the use of low cost IoT Sensors and Networks, we can get a clear picture of what is happening across the Sewer System with alerts to abnormalities and preset parameters indicating problems.

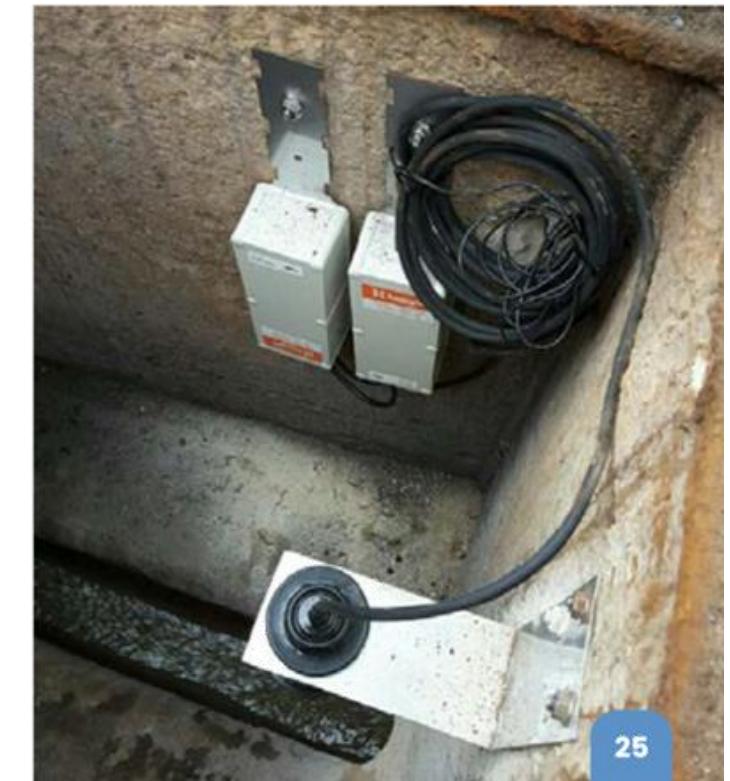
Many factors influence and impact the sewer network including rainfall, wind, rising ground water and blockages. We can now monitor the effects of rainfall and predict sewer overflow events as well as the effect wind and weather has on odours within the system.

From the sensor through all stages of processing and analysis to the software, Taggle has the complete solution to manage your network.

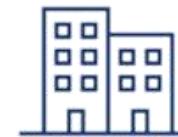


The benefits of a Smart Sewer Network

- Measure the impact of rain and groundwater on overflows and odour build up
- Predict changes due to environmental influences
- Alerts to developing blockages and problem areas requiring maintenance
- Reduce flooding and overflow events
- Improve network performance
- Detect unsafe gas and odour build up
- Increases predictability and early warning for sewer overflows
- Monitor if the water level is outside of an expected normal range



25



Sub-metering

Apartment buildings, shopping centres and commercial properties

Many apartment buildings, shopping centres and commercial properties receive water through one "master" meter, with water and heating bills often divided based on floor-area.

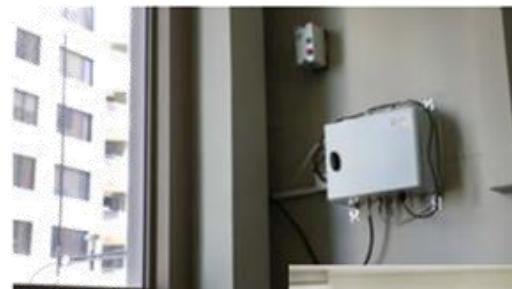
This removes accountability for water use from tenants who have the most control over water use.

Installing meters at each tenancy, often referred to as "sub-metering", ensures a user-pays approach and provides an economic benefit to those tenants who are more frugal with their water consumption.

Installing automated meter reading technology on these sub-meters provides the ability to provide real-time data to consumers allowing them to take control of their water and energy consumption.



Sub-metering to equitably distribute utility bills



Taggle worked with the building manager of a modern 38-storey apartment building to more equitably manage the water and energy billing system for the owners.

Many apartment owners lived overseas and used their apartment for only a month or two each year and did not want to pay for water they did not use.

Taggle's smart metering technology is used on 534 hot and cold water meters to measure consumption and equitably distribute the utility bills amongst residents.



Smart Water Networks

In addition to Automatic Meter Reading, Taggle's technology is being used to collect data from a wide range of other sensors.

Examples include sewer overflow sensors, water level sensors (float switch and pressure types), pressure sensors, water quality, rain gauges, temperature and humidity sensors and others which have digital, analog and serial interfaces.

Data from such sensors can provide a new level of information for SCADA systems, allowing operators to get a more complete picture of what is happening across their networks.

Once a receiver is in place the opportunity to further expand the network is always there. If your utility is facing any challenges it could be possible that with more information a solution can be found.





Applications of Taggle Technology for Utilities



Adelaide CBD Smart Water Network & Mains Pipeline Fault Detection



SA Water invested more than \$4 million in smart technology to help manage the water supply network in Adelaide's CBD.

The smart water network includes a vast range of sensors providing near real-time information to monitor and detect weaknesses and leaks in the aging network.

Alerts to any incidents assist maintenance teams in providing swift response times to deliver a better experience to customers with as little disruption as possible.

Sensors include;

- 400 Digital water meters
- 25 Mass-flow meters
- Pressure sensors
- 3 Air quality sensors
- 86 Gas detection sensors
- 5 Water Quality Sensors
- 111 Sewer level sensors
- 6 Sewer Flow Sensors
- 11 Weather stations
- MiWater and MyH2O Portal

Reduction in water losses to reduce non-revenue water



Narrabri Shire Council had recorded the third highest unallocated water losses across NSW and had to do something about it.

Narrabri's losses were reduced significantly. Where previously they had around 40% non-revenue water they've managed to decrease that by half to 20% non-revenue water and expect to recover another 10% within two years' time.

The project has helped to generate more revenue even though they delivered less water!

Sensors include;

- 4,400 Digital water meters
- MiWater and MyH2O Portal
- Sewer overflow alarms
- Rain gauges



28

Reduce meter reading and pumping costs



GWMWater serves a population of approximately 72,000 people.

The Rural Pipeline Intelligence Project involved the roll out of Taggle devices for the remote reading of approximately 13,600 rural customers' water meters.

The valuable information collected from the devices allows GWMWater to operate the pipeline more efficiently while also giving rural customers greater knowledge of their water use patterns and helping them to identify leaks quickly.

Sensors include;

- 13,600 Digital water meters
- 350 Pressure sensors



Defer major investments in new infrastructure



The council was facing the challenges and impact of rapid population increase and demand for water, requiring a significant investment in capacity expansion which would, in turn, result in unsustainable increases in water tariffs.



Mackay Regional Council was the first water service provider in Australia to install/employ network-wide Automated Metering Infrastructure.

With the installation of digital water meters and processing the data using MiWater and MyH2O, the council has deferred the need for a new \$100M water treatment plant from 2020 until at least 2032.

Sensors include;

- 42,000 Digital water meters
- Sewer overflow sensors
- Rain gauges
- MiWater and MyH2O Portal

29



Smart Cities & Communities

Smart Buildings
Smart Infrastructure
Smart Networks

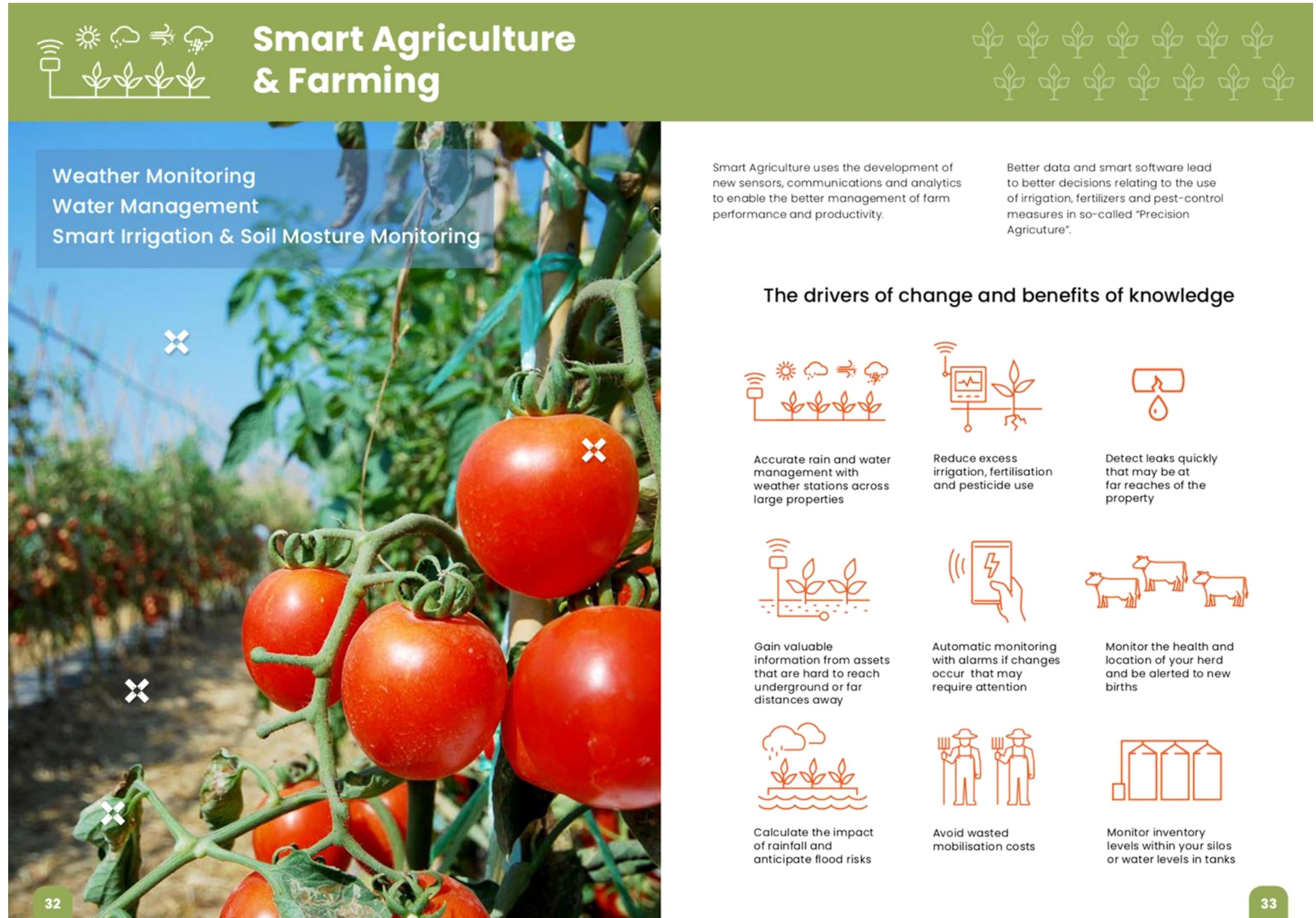
Cities and communities are faced with the challenge of improving the liveability and prosperity of their regions. Smart technologies such as sensors and communications are providing new sources of data, information and insight. This data allows cities and communities to respond to ever-changing situations, allocate resources wisely and plan for the future. Furthermore, putting real-time data into the hands of the community and local businesses enables everyone to be more connected and make better decisions with the information that is available.

The drivers of change and benefits of knowledge

| | | |
|---|--|--|
|  Monitor the health and conditions of waterways |  Reduce energy and water consumption |  Enhance Public Safety |
|  Cut down traffic and congestion (and in turn carbon emissions) |  Identify faults and improve infrastructure before failure |  Improve emergency services response times |
|  Improve the efficiency of city operations and services |  Improve the efficiency of waste management |  Measure air quality and noise pollution |

30

31



Smart Agriculture & Farming

Weather Monitoring
Water Management
Smart Irrigation & Soil Moisture Monitoring

Smart Agriculture uses the development of new sensors, communications and analytics to enable the better management of farm performance and productivity.

Better data and smart software lead to better decisions relating to the use of irrigation, fertilizers and pest-control measures in so-called "Precision Agriculture".

The drivers of change and benefits of knowledge

- Accurate rain and water management with weather stations across large properties
- Reduce excess irrigation, fertilisation and pesticide use
- Detect leaks quickly that may be at far reaches of the property
- Gain valuable information from assets that are hard to reach underground or far distances away
- Automatic monitoring with alarms if changes occur that may require attention
- Monitor the health and location of your herd and be alerted to new births
- Calculate the impact of rainfall and anticipate flood risks
- Avoid wasted mobilisation costs
- Monitor inventory levels within your silos or water levels in tanks

32

33

Smart Agriculture & Farming



Smart Agriculture & Farming



Detecting leaks and breaks on farms



In 2013, Barwon Water recognised that supplying potable water to farmers in the Colac region for on-farm use was unsustainable. Working with the Larpent and Irrewarra Farmcare groups, Taggle's Low Power Wide Area Network was installed and transmitters attached to almost 200 water meters.

On-farm water reticulation, mainly by polypipe, was found to suffer from cracks and breaks caused by frost, vehicles and

cattle, leading to very substantial water losses. Leaking troughs and faulty ball-valves also contributed to the losses.

With only 73 farms involved, the loss of more than 65 million litres of water has been avoided. One farmer, Bruce Bilney, said he'd saved about \$2000-3000 in the first year.

Sensors include;

- 193 Digital water meters

Weather stations to avoid mobilisation costs



Birchip Cropping Group, an agricultural co-operative based in western Victoria, took advantage of Taggle network deployed for neighboring GWMWater by installing a number of Taggle-connected weather stations around the region.

Data from these has helped farmers to harvest their crops more efficiently by providing real-time local weather information. Knowing when not to harvest

has avoided the mobilisation of men and equipment, saving hundreds of thousands of dollars in wasted mobilisation costs.

Sensors include;

- Weather stations



Irrigation monitoring keeping fertilizer and pesticides on farm

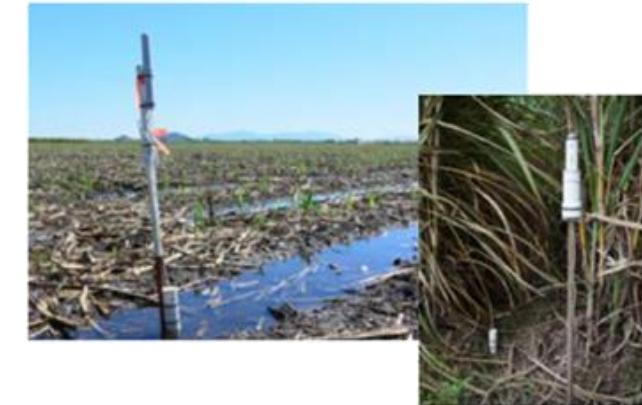


Farmacist is an agronomic solutions provider based in Mackay and Burdekin, North Queensland.

Using low-cost soil-moisture probes fitted with Taggle transmitters, Farmacist is helping local farmers to minimise their use of irrigation water by alerting them when water has reached the end of furrows. In addition to saving water, this initiative is reducing labour costs and ensuring that fertilizer and pesticides remain on-farm.

Sensors include;

- Taggle-equipped soil-moisture sensors



Calf Alert technology provides the date and location of calving



Meat & Livestock Australia (MLA) along with Taggle have developed a calving device that provides the date and location of calving. This is to address the problem of calf loss in extensive beef production systems.

The Calf Alert device is active from insertion during pregnancy testing, sending out

attenuated signals, detected from land-based receivers. There is a spike in reception at calving when the device is expelled, to allow location of the cow and calf.

The device does not require mobile phone signalling or GPS and is powered by a small battery that may last for up to two years. This makes it suitable for inserting in pregnant cows at an early stage of gestation, thus avoiding mustering late-pregnant cows, especially in the northern wet season.

Sensors include;

- Calf Alert sensor



Industrial & Commercial IoT

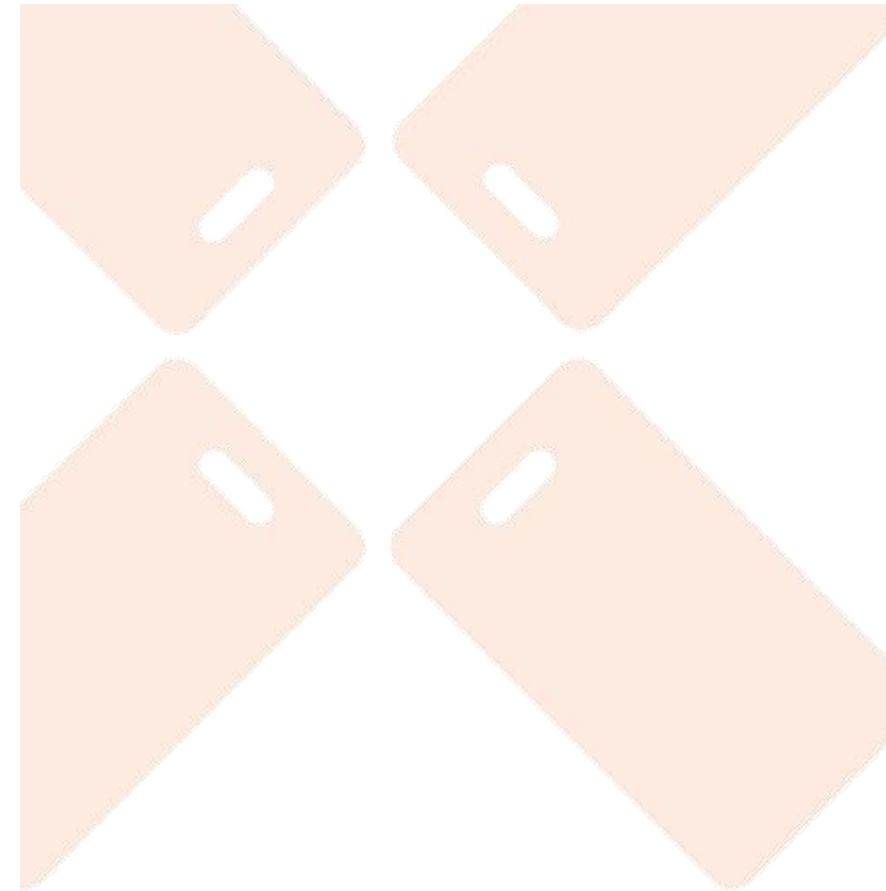
Environment Sensing
Network Monitoring
Level Sensing
Sub-Metering Management

Smart technology in Industrial and Commercial Industries is about utilising technology and the power of data and analytics to increase efficiency and productivity.

Simple mistakes can be prevented with the use of IoT as sensors quickly pick up changes whether it is temperature, moisture levels, gases, wear and tear in the equipment. The advantage lies in using real-time data – a game changer.

The drivers of change and benefits of knowledge

| | | |
|---|---|---|
|  |  |  |
| Reduced downtime as equipment is maintained during off-peak times | Faster and more informed decisions based on near real-time data and information | Higher product quality as faults in product and equipment are detected early |
|  |  |  |
| Lower costs by conserving energy, less downtime and reduced waste | Monitor production line environment for changes that effect the product | Better prediction of project time lines and staffing requirements |
|  |  |  |
| Measure air quality within facilities and around the perimeter | Increased safety and security of workers | Reduce waste and spoilt product |



Taggle Product Range

Find the sensor to start a complete solution



38

Corella Taggle Byron Development Module

The Corella hardware development module from Taggle provides engineers, scientists, researchers and students a development and research module that provides an easy way to get started with Taggle's Byron IoT wireless communications technology.

Utilising the 922MHz LPD band, this module provides low power, one-way, long-range radio communications for telemetry and IoT sensor applications.

This module is designed for use with Arduino, Raspberry Pi and similar devices, using a compatible shield in an XBee Pro format.

Data from the host is sent to the module by using simple AT commands and collected by Taggle's network of receivers. Data is then delivered via the Taggle web portal and a variety of configurable open-standard interfaces including MQTT, Hypercat, HTTPS/REST and more.



Technical details

| | |
|-----------------------|---|
| Dimensions | 50mm (L) x 24mm (W) x 6mm (D) |
| Operating Temperature | 0° C to 50° C |
| Battery Voltage | 3.3V |
| Interface - Pin out | XBee Pro compatible |
| Antenna | SMA Connector |
| Input Type | Simple AT commands over UART, Immediate transmit via pushbutton |
| Message Length | 12 Bytes |
| Output | Web Portal, MQTT, Hypercat, REST |
| Transmission Rate | Rate-limited to 1 message per 10 seconds |

39

Taggle MRC-1

AMR Module

A low-cost, low-power transmitter designed specifically for use with Elster's V100 water meter which is used in the majority of domestic dwellings in Australia.

The MRC-1 is easily retrofitted onto V100 meters in the field and has a 10+ year design life that exceeds the typical life of the meter itself.

Communicating with Taggle receivers, data can be collected over a wide geographical area.

MRC-1 is fitted with a Hall Effect sensor that outperforms the more widely used T-Probe or reed switch sensors, defeating the jitter sometimes experienced with reed switches.

Designed primarily for Automatic Meter Reading (AMR) applications.



Taggle ADC-1

AMR Module

Taggle's ADC-1 pulse-count AMR module is designed to suit all other pulse-output style meters.

Sealed and maintenance free, the ADC-1 also has a 10+ year battery, the ADC-1 is one of Taggle's most widely used products for pulse count applications such as water, gas and electricity meters.

The ADC-1 also monitors consumption continuously and transmits this to the network on an hourly basis, or more frequently if required.

ADC-1 is an extremely versatile device and has been used in a variety of water and environmental sector situations.



Technical details

| | |
|-----------------------|---|
| Dimensions | 89mm (L) x 88mm (W) x 88mm (D) |
| Weight (approx) | 210g |
| Ingress Protection | IP68 |
| Operating Temperature | -10° C to 60° C (Average temperature not to exceed 30° C) |
| Battery Type | Lithium Thionyl Chloride (non-replaceable) |
| Battery Voltage | 3.6V |
| Battery Life | 12 Years+ (1 transmission/hr) |
| Operating Range | 2km - 5km in urban and 5km - 50km in rural areas Ranges achieved will depend on local installation conditions |
| Input Type | Magnetic Pulse (Hall effect sensor) |

Technical details

| | |
|-----------------------|---|
| Dimensions | 235mm (L) x 34mm (dia.) |
| Weight (approx) | 130g |
| Ingress Protection | IP68 |
| Operating Temperature | -10° C to 60° C (Average temperature not to exceed 30° C) |
| Battery Type | Lithium Thionyl Chloride (non-replaceable) |
| Battery Voltage | 3.6V |
| Battery Life | 12 Years+ (1 transmission/hr) |
| Operating Range | 2km - 5km in urban and 5km - 50km in rural areas Ranges achieved will depend on local installation conditions |
| Input Type | Suitable for use with both contact closure (reed switch, relay) and voltage (open collector, FET) pulses |

Taggle HP-1 High Power AMR Module

Taggle's HP-1 high-power AMR module is designed for those difficult radio environments such as pits and basements.

Using a higher-power transmitter, the HP-1 has been tested and certified for Australian and US regulations.

Utilising a larger battery, the HP-1 still retains the long-life maintenance-free profile of the ADC-1 and MRC-1.



Taggle LSTT For Industrial Sensors

The Taggle LSTT is a general purpose telemetry module supporting most common industrial sensors such as pressure, flow, level, volume, weather and environmental sensing and more.



Technical details

| | |
|-----------------------|---|
| Dimensions | 235mm (L) x 65mm (W) x 55mm (D) |
| Weight (approx) | 335g |
| Ingress Protection | IP68 |
| Operating Temperature | -10° C to 60° C (Average temperature not to exceed 30° C) |
| Battery Type | Lithium Thionyl Chloride (non-replaceable) |
| Battery Voltage | 3.6V |
| Battery Life | 12 Years+ (1 transmission/hr) |
| Operating Range | 2km - 5km in urban and 5km - 50km in rural areas Ranges achieved will depend on local installation conditions |
| Input Type | Suitable for use with both contact closure (reed switch, relay) and voltage (open collector, FET) pulses |

Technical details

| | |
|-----------------------|---|
| Dimensions | 240mm (L) x 85mm (W) x 60mm (D) |
| Weight (approx) | 500g including mounting plate |
| Ingress Protection | IP67 |
| Operating Temperature | -10° C to 65° C |
| Battery Type | D Size Lithium Thionyl Chloride (field replaceable) |
| Battery Voltage | 3.6V |
| Battery Life | > 15 Years (hourly data) > 6 years (10 minute data) |
| Operating Range | 2km - 5km in urban and 5km - 50km in rural areas Ranges achieved will depend on local installation conditions |
| Input Type | Digital sensors: Modbus, RS-232, RS-485, SDI-12 Analog sensors: 4-20mA, 0-10V |

Taggle Parakeet AMR Module

Taggle's Parakeet General Purpose Transmitter is the second iteration of the highly successful Taggle ADC-1 transmitter.

Building on the standard cumulative pulse counting, the Parakeet can keep track of forward and reverse directional flows or work over digital communications standards such as RS-232, RS-485 Modbus, SPI or perform analog measurement sensing.

These capabilities allow Parakeet to meet most remote sensing and telemetry needs from tank overflow monitoring, water, gas and electricity meter reading, temperature/humidity and soil moisture monitoring to pressure monitoring using analog sensors.

Parakeet provides an unrivalled 20-year battery life in automatic meter reading applications.



External Power Bank

Taggle's external power pack pairs with the LSTT module to provide extended battery life for higher powered applications and/or frequent data transmissions.

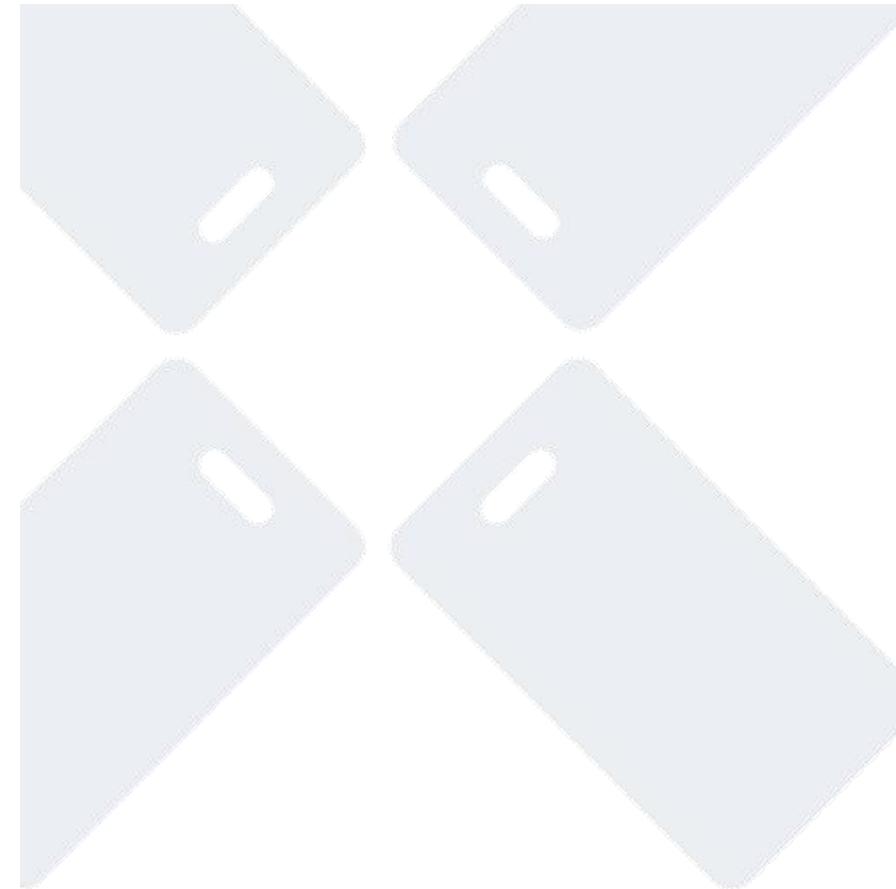


Technical details

| | |
|-----------------------|--|
| Dimensions | 215mm (L) x 45mm (dia.) |
| Weight (approx) | 250g |
| Ingress Protection | IP68; Hermetically sealed |
| Operating Temperature | -10° C to 60° C (Average temperature not to exceed 30° C) |
| Battery Type | Lithium Thionyl Chloride (non-replaceable) C-cell. Contains internal fuse |
| Battery Voltage | 3.6V |
| Battery Life | 20 Years+ (dependent on application and reporting interval) |
| Operating Range | 2km - 5km in urban and 5km - 50km in rural areas. Ranges achieved will depend on local installation conditions |
| Input Type | Suitable for use with both contact closure (reed switch, relay) and voltage (open collector, FET) pulses |

Technical details

| | |
|-----------------------|---|
| Dimensions | 215mm (L) x 45mm (dia.) |
| Weight (approx) | 1.0kg |
| Operating Temperature | -10° C to 65° C (Average temperature not to exceed 30° C) |
| Battery Type | Lithium Thionyl Chloride (non-replaceable) C-cell. Contains internal fuse |
| Battery Voltage | 3.6V or 14.4V |
| Battery Life | Dependent on application |



Taggle Certified Technology Partners

Working together to find a solution

Honeywell

Honeywell V200HT. Taggle Byron-enabled Smart Meter

Combining the high accuracy and extended flow range of the V200 family of water meters, with the latest advances in intelligent metering system capabilities.

The V200HT is integrated with the Taggle Byron Wireless

radio communication with multiple open standards data delivery options for interoperability.

Boasting a battery life of 15+ years with hourly transmissions.



Evoqua ChloroClam Water Quality Sensor

The ChloroClam Water Quality Monitors are battery powered purpose-built systems for monitoring water quality parameters within the potable water distribution system.

The sensor is designed to monitor turbidity, conductivity, pressure and chlorine.

It can be used for targeted water monitoring within identified problem areas or more ideally, located throughout the distribution network to provide a comprehensive view of water quality.



SIEMENS

Siemens Sitrans P200 Pressure Sensor

The Siemens Sitrans Fixed Range Pressure Transmitter range was developed to measure the gauge and absolute pressure of liquids, gases and vapours across a variety of applications.

The ability to measure the pressure of liquids in pipelines gives indication to weaknesses and faults and allows for better network and pumping management.



VAISALA

Vaisala Weather Transmitter WXT530

A compact all-in-one weather instrument providing six of the most important weather parameters: air pressure, temperature, humidity, rainfall, wind speed and wind direction.

The Vaisala WXT530 Weather Transmitters have a unique solid state sensor technology with a focus on maintenance-free operations in a cost effective manner.



bürkert

FLUID CONTROL SYSTEMS

Bürkert Pressure Transmitter

The Bürkert pressure transmitter is designed to cover the majority of industrial applications in the field of pressure measurement technology.

High accuracy, compact design, robust construction and flexibility make the transmitter suitable for different measurement functions.



HYQUEST SOLUTIONS

HyQuest TB4 Tipping Bucket Rain Gauge

The HyQuest Solutions TB4 Model Tipping Bucket Rain Gauge is recognised as the world standard for measuring rainfall and precipitation in remote and unattended locations.

The integrated siphon mechanism delivers high levels of accuracy across a broad range of rainfall intensities.



EH

Endress+Hauser People for Process Automation

Cerabar PMP11, PMP21 Process Pressure Measurement

The Cerabar is a pressure transducer for the measurement of absolute and gauge pressure in gases, vapors, liquids and dust.

The Cerabar can be used internationally thanks to a wide range of approvals and process connections.



DAVIS Instruments Australia

Davis Metric Rain Collector

The Davis Metric Rain Collector is a tipping bucket rain gauge.

The body and base of the Davis rain gauge is constructed of tough, UV resistant plastic. The tipping bucket pivots on bearings that minimize friction

and wear. Stainless steel adjustment screws under each chamber of the tipping bucket allow you to fine-tune the calibration.

Mounting holes are predrilled in the base and a built-in leveling trough aids in installation.



Sewer Overflow Sensor

Taggle's Sewer Overflow Sensor consists of two float switches integrated with a battery-powered Taggle transmitter mounted in an IP68 rated enclosure for easy, in-chamber installation.

It's float switches, mounted at different levels within the chamber, are activated as the level in the chamber rises. Response crews can then be alerted to the possible overflow and called to action.



Submersible Industrial Electrical Conductivity Sensor

High Resolution Submersible EC sensor complete with 25ft cable. Very Low power can accept between 3.3 and 5 volts.

Sensor fully encapsulated and supplied with industrial cable. Low Power, Long Life Submersible Sensor.



Pulsar dBi HART Transducer Series - Level Sensor

Self contained non-contacting ultrasonic level sensor measuring with digital echo processing gives superb performance for solids or liquids particularly suitable for water level monitoring.

Pulsar's dBi Series Transducers are low-power devices

featuring Pulsar's world-leading DATEM echo processing power for robust and reliable measurement from 125mm through to 15m (5 inches to 49 feet) depending on the unit chosen.



Vaisala Air Quality Transmitter AQT410

Sensor for measuring pollution gases and particles.

Cost-effective, air quality and meteorological data solution AQT410 measures up to four most common gaseous pollutants such as nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), and ozone (O₃).



Level Sensor with LSTT Transmitter

The submersible pressure-based level sensor is a simple and reliable way to measure the level of liquids, ideal for monitoring water levels in tanks and bores.

Providing a 4-20mA analog output this sensor is paired with a Taggle LSTT module to power and read the sensor.



Acrulog™ H2S Monitor

The Acrulog™ H2S Parts Per Billions Monitor (PPB) is a portable gas data-logger designed for indoor and outdoor environmental applications, to record low levels (0-2000PPB) of Hydrogen Sulphide (H₂S), at sampling intervals of between 10 minutes and 1 hour. This Model Features built-in sample pump and optional 4-20mA industrial output.





Hach FLO-DAR AV Sensor

Using advanced digital Doppler radar velocity sensing technology, along with ultrasonic level-sensing, the FLO-DAR revolutionizes open channel flow monitoring by measuring from above.

This means it can more effectively provide highly

accurate flow data under a wide range of challenging flow and site conditions, including sensor disturbances, high solids content, high temperature, shallow and caustic flows, large man-made channels, and high velocities of up to 20 ft/s.



Krohne Waterflux 3070

The WATERFLUX 3070 is a battery powered electromagnetic water meter for use in water abstraction wells, district metering areas and custody transfer measurement of potable water.

With optional pressure and temperature sensors, the meter can also be used for

leak detection, quality control and pressure management systems.

Its measuring tube with a rectangular and reduced cross-section enables a stable measurement even at low flow rates.



We are continuously developing our range of supported sensors and finding new partners to achieve solutions so get in touch and we can discuss your requirements.

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Ph: +61 2 8999 1919

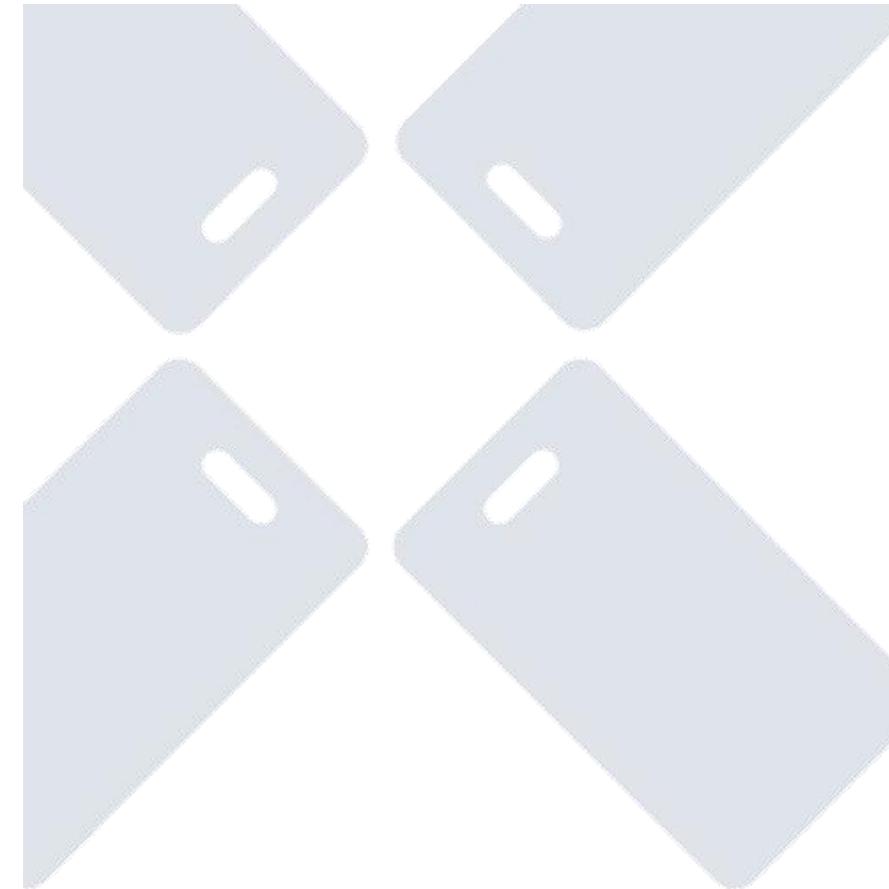


ABB AquaMaster 3 Electromagnetic Flowmeter

AquaMaster 3TM is a range of high performance electromagnetic flowmeters for the measurement of electrically-conductive fluids and is normally supplied as factory-configured, calibrated systems.

The AquaMaster 3 MODBUS interface has been designed for low power consumption so that it can be used with battery or renewable energy supplies.





MiWater

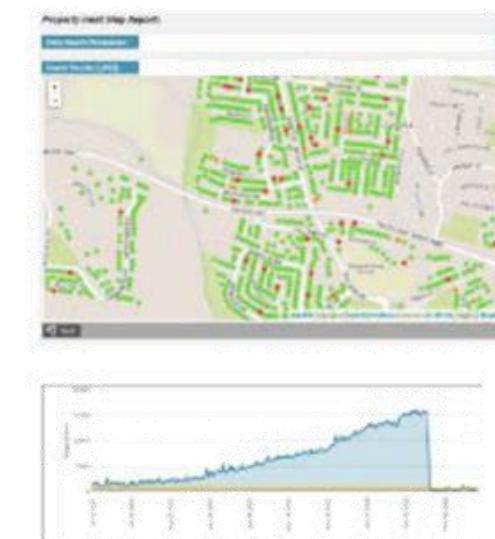
MiWater is an integrated solution to manage and analyse water supply & consumption and related activities across the entirety of a water utility's network. MiWater processes, interprets and integrates data received from Automated Metering Infrastructure (AMI) and other sources to provide water utilities control and oversight over their network infrastructure, from the whole of network perspective down to an individual domestic service.

The MiWater solution has been designed by water industry professionals and developed over a period of time in response to the challenge of managing the large quantity of data that was being generated through AMI.



Taggle Software Solutions

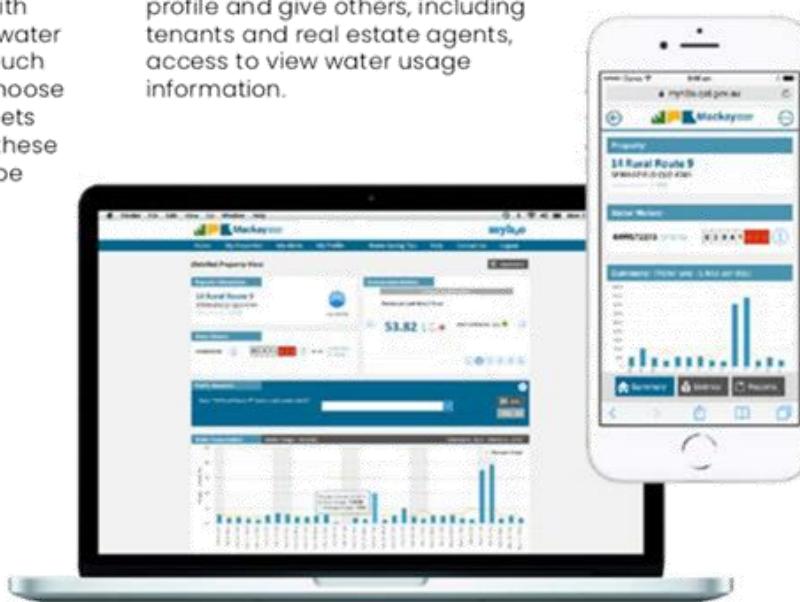
Sorting and analysing data



MyH2O

MyH2O is a customer and community online service offering customers the tools to save water and money. With the ability to track their own daily water usage and keep an eye on how much it's costing. Customers can also choose their own water consumption targets and set up alerts to be warned, if these targets have been or are likely to be exceeded.

Customers can add any of their properties to their MyH2O profile and give others, including tenants and real estate agents, access to view water usage information.



MiSewer

MiSewer is a management tool for monitoring the sewer system within your network. With alerts warning of high levels and overflows, you are quickly notified if there are any problems that need to be addressed.

With data and analytics you can learn the relationships between rainfall and sewer overflow events, enabling for infrastructure planning and development.



56



taggle[®]

Partnering with
Utilities for smart
and sustainable cities



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| | |
|--|--|
|  | <h2 style="text-align: center;">Product Datasheet</h2> <h3 style="text-align: center;">LSTT-SR</h3> <p style="text-align: center;">LPWA Sensor Telemetry Transmitter</p> |
| <p>LSTT-SR (LPWA Sensor Telemetry Transmitter –Standard Range) is a general purpose telemetry transmitter designed to interface to a wide range of low data rate industrial and environmental sensors.</p> <p>The LSTT is a self-contained battery powered device that can operate for up to 15 years depending on the power requirements of the connected sensor and the desired reporting interval.</p> <p>Communicating with Taggle receivers, data can be collected over a wide geographical area. Typical ranges of more than 2km in urban areas and 5km in rural areas are achievable depending on installation and local geography.</p> |  |
| Technical Details | |
| General | |
| Dimensions (approx.) | 240mm (L) x 85mm(W) x 60mm(D) |
| Weight (approx.) | 500g including mounting plate |
| Enclosure Material | ABS Plastic |
| Environmental | |
| Ingress Protection | IP67 |
| Operating Temperature | -10° C to 65° C |
| Battery | |
| Type | D Size Lithium Thionyl Chloride (field replaceable) |
| Voltage | 3.6V |
| Life | > 15 years (hourly data) > 6 years (10 minute data) |
| Sensor Interface | |
| Type | Analog: 4-20mA or 0-2.5v etc. |
| Connector & Plug | RS232, RS485, Modbus, SDI-12 |
| Power supply | 4 pin M12 screw on, IP67 rated |
| | 15V/12V/5V @1W |
| Taggle Systems Pty Ltd | |
| Level 3, 189 Kent Street, Sydney, NSW 2000 | |
| Telephone: +61 2 8999 1919 Email: enquiries@taggle.com.au | |



Product Datasheet

LSTT-SR

LPWA Sensor Telemetry Transmitter

The LSST-SR is designed to interface to a range of analog and digital sensors widely used in industrial automation and environmental monitoring applications. Currently supported interfaces include:

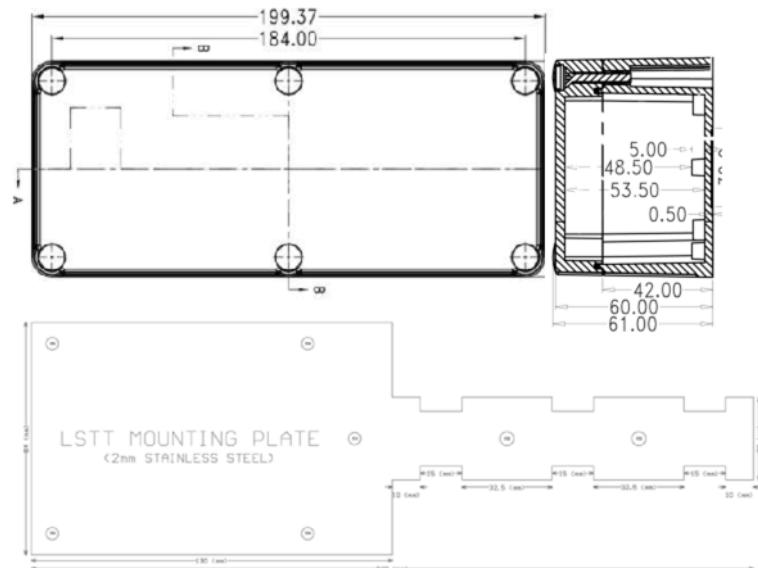
- Analog 4-20mA, 0-2.5V (other ranges available on request)
- RS232, RS485, Modbus, SDI-12

The LSTT-SR includes an internal 1 Watt switch mode power supply to provide power to the attached sensor at either 5, 12, or 15V. The onboard analog to digital converter is a 12-bit 1Msample/s device which provides a minimum measurement precision of 0.1%. While the transmitter reporting interval is factory programmable from 1 minute to 1 month, a reporting interval of 1 hour is generally recommended. The device can store and deliver up to six readings per transmission (for example, using hourly transmissions the device could record data every 10 minutes or, for daily transmissions, the device could take a reading every 4 hours).

The LSTT-SR is powered from a field replaceable D-Size Lithium Battery Pack. The expected battery life is > 15 years for hourly transmissions with 1 data reading per transmission, and > 6 years* for 10 minute transmissions with 1 data reading per transmission.

The LSTT-SR is supplied with a stainless steel mounting plate to secure the device to an antenna mast using screws or Band-It straps.

* assumes the LSTT is powering at 4-20mA sensor for 1 second for each data reading.



NOTE

In order to minimise RF energy emitted into the shared spectrum, Taggle recommends use of the LSTT-ER only in situations where the LSTT-SR output power is inadequate.

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B&R Enclosures
FIELD FC

brenlosures.com.au

B&R

INDUSTRIAL
HAZARDOUS AREAS
DATA ICT
RESIDENTIAL COMMERCIAL

Field FC

Industrial Field Enclosures



- Suitable for housing ITS equipment, GPS receivers / transmitters, road monitoring / traffic management in infrastructure applications.
- Designed to protect electronic equipment in outdoor and isolated locations.
- Has been specifically designed to minimise vandalism.
- Flush front and rear doors with concealed hinges.
- Sunshield roof to minimise the effects of solar radiation.
- Conformity, Approvals:
Lloyds Register #06/10007 (E2)
- Manufactured from 2mm thick zinc coated steel, 1.5mm thick 316 stainless steel or 2mm thick aluminium.
- Powdercoated Smoke Blue T33 or N4 surface finish.

Comes standard with:

- Enclosure frame
- Front and rear door
- Sunshield roof
- 3mm aluminium gland plates
- 100mm high plinth – stainless steel
- Eye bolts
- Vertical mounting posts



ORDERING GUIDE

| | | | Dimensions (mm) | | | | | | | |
|-------------------|---------------------|-------------|-----------------|-----------|-----------|---------------|-----------|--------------|-----------|--|
| | | | External | | | Front Opening | | Side Opening | | |
| Zinc coated steel | 316 stainless steel | Aluminium | Height (A) | Width (B) | Depth (C) | Height (D) | Width (E) | Height (F) | Width (G) | |
| FC130706* | FC130706/S* | FC130706/A* | 1375 | 755 | 620 | 1085 | 640 | 1095 | 440 | |
| FC160706* | FC160706/S* | FC160706/A* | 1675 | 755 | 620 | 1385 | 640 | 1395 | 440 | |
| FC190706* | FC190706/S* | FC190706/A* | 1975 | 755 | 620 | 1685 | 640 | 1695 | 440 | |
| FC220706* | FC220706/S* | FC220706/A* | 2275 | 755 | 620 | 1985 | 640 | 1995 | 440 | |

* Available on Request

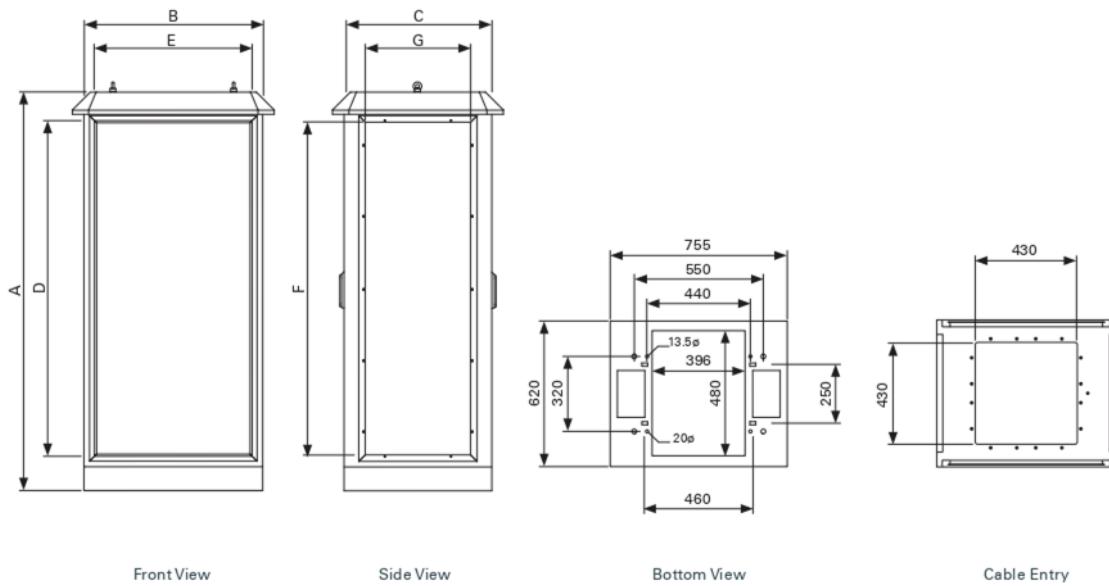
ACCESSORIES QUICK SELECTION GUIDE

| Accessories | Page No. |
|---------------------|----------|
| Cladding | 4 |
| Ventilated shelves | 4 |
| Baying Kit | 5 |
| Rails & Brackets | 5 |
| General Accessories | 5 |

Field FC
Industrial Field Enclosures



TECHNICAL DRAWINGS



Front View

Side View

Bottom View

Cable Entry

1

Select your enclosure size from the ordering guide.
The ordering guide is categorised by depth (with subsequent widths and depths shown in the dimension table). The table is incremented from smallest to largest height.

2

Select your cladding size.
Select from the table (the relevant part numbers are listed for each size enclosure). Please note that side cladding is required to achieve IP66.

3

Select other additional components.
Choose from the range listed in the selected enclosure column in the ordering guides.

4

If additional information is required see catalogue pages or contact your local B&R sales representative to discuss your requirements.

Field FC

Accessories to suit Field Enclosures

Side Cladding

Vented side panels (metalware only). Fan and filters (see page 114 for full range) are required and can be purchased separately.

| Part Number* | Description | Material | To suit enclosure (mm) | |
|--------------|---------------------------|---------------------|------------------------|-------|
| | | | Height | Width |
| FCCP1306▲ | Flush with no ventilation | Zinc coated steel | 1375 | 620 |
| FCCP1606▲ | | | 1675 | 620 |
| FCCP1906▲ | | | 1975 | 620 |
| FCCP2206▲ | | | 2275 | 620 |
| FCCP1306/S▲ | | | 1375 | 620 |
| FCCP1606/S▲ | | 316 stainless steel | 1675 | 620 |
| FCCP1906/S▲ | | | 1975 | 620 |
| FCCP2206/S▲ | | | 2275 | 620 |
| FCCP1306/A▲ | | Aluminium | 1375 | 620 |
| FCCP1606/A▲ | | | 1675 | 620 |
| FCCP1906/A▲ | | | 1975 | 620 |
| FCCP2206/A▲ | | | 2275 | 620 |
| FCCP1306V▲ | Vented with vent hood | Zinc coated steel | 1375 | 620 |
| FCCP1606V▲ | | | 1675 | 620 |
| FCCP1906V▲ | | | 1975 | 620 |
| FCCP2206V▲ | | | 2275 | 620 |
| FCCP1306V/S▲ | | | 1375 | 620 |
| FCCP1606V/S▲ | | 316 stainless steel | 1675 | 620 |
| FCCP1906V/S▲ | | | 1975 | 620 |
| FCCP2206V/S▲ | | | 2275 | 620 |
| FCCP1306V/A▲ | | Aluminium | 1375 | 620 |
| FCCP1606V/A▲ | | | 1675 | 620 |
| FCCP1906V/A▲ | | | 1975 | 620 |
| FCCP2206V/A▲ | | | 2275 | 620 |



Flush with no ventilation



Vented with vent hoods

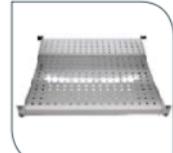
* Includes one side only

▲ Available on request

Ventilated Shelves

Designed for mounting fixed equipment. Available in various options to suit requirements. Rack rails are required for the standard, heavy-duty and telescopic shelves (purchased separately).

| Product | Part Number | Description | RU | Dimensions (mm) | |
|--------------|-------------|-------------------------|----|-----------------|-------|
| | | | | Height | Width |
| Standard | FCSF06/19* | 19 inch, rated to 50kg | 1 | 440 | 480 |
| | FCSF06/21*▲ | 21 inch, rated to 50kg | | 490 | 480 |
| Heavy duty | FCSH06/19* | 19 inch, rated to 100kg | 1 | 440 | 480 |
| | FCSH06/21*▲ | 21 inch, rated to 100kg | | 490 | 480 |
| Telescopic | FCST06/19* | 19 inch, rated to 20kg | 1 | 440 | 480 |
| | FCST06/21*▲ | 21 inch, rated to 20kg | | 490 | 480 |
| Battery tray | FCBT▲ | – | 1 | 410 | 480 |



FCSF – Standard shelf



FCST – Telescopic shelf

* Rack rail required

▲ Available on request

Field FC

Accessories to suit Field Enclosures



Baying Kits

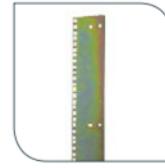
Are a method of joining 19" cabinets together. Side cladding must be removed before baying cabinets together.

| Part Number | Material | To suit enclosures | |
|-------------|---------------------|--------------------|------------|
| | | Height (mm) | Width (mm) |
| FCBK1306* | | 1375 | 620 |
| FCBK1606* | | 1675 | 620 |
| FCBK1906* | Zinc coated steel | 1975 | 620 |
| FCBK2206* | | 2275 | 620 |
| FCBK1306/S* | | 1375 | 620 |
| FCBK1606/S* | | 1675 | 620 |
| FCBK1906/S* | 316 stainless steel | 1975 | 620 |
| FCBK2206/S* | | 2275 | 620 |

* Available on request

Rails and Brackets

| Product | Part Number | Description | Height (mm) | To suit enclosure height (mm) |
|---------------------------|-------------|-------------|-------------|-------------------------------|
| 19" & 21" rail (set of 4) | FCRU24 | 24RU | 1081 | 1375 |
| | FCRU31 | 31RU | 1381 | 1675 |
| | FCRU37 | 37RU | 1681 | 1975 |
| | FCRU44 | 44RU | 1981 | 2275 |



FCRU- 19" / 21" rail

General Accessories

| Product | Part Number | Description | RU |
|---------------------------|-------------|-------------------------------|----|
| 15-way backmount frame | FCCD15/19 | 19 inch | 3 |
| 19-pole load centre | FCLC19/19 | 19 inch | 5 |
| Light kit | FCLK | 8W fluro complete with switch | 1 |
| Door limit switch (alarm) | FCDS | 10A, 250V AC | 1 |
| Additional switch | FCSW* | 10A, 250V AC | - |
| Thermostat | FCTHERM | 10°C to +60°C | - |
| Gland Plate | FCGA0706* | 3mm aluminium | - |
| Plan holder | FCPLN07* | A3 | - |

* Light kit or door limit switch required

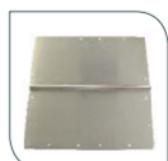
*Available on request



FCCD – Backmount frame



FCTHERM – Thermostat



FCGA0706 – 3mm aluminium gland plate



FCLC – Light kit complete with switch



FCPLN07 – A3 Plan holder

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