

BUNDAMBA ADVANCED WATER TREATMENT PLANT

STAGE 1A

AUTHOR

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ABSTRACT

In 2006, Queensland was in the midst of its worst drought on record. Faced with dwindling water reserves and crippling supply restrictions, the Queensland Government, through the offices of the Coordinator General, turned to Thiess Pty Ltd, one of the state's oldest and most trusted construction companies, and global water engineering giant Black & Veatch to fast track the delivery of a vital infrastructure project.

In a very short and carefully planned 10 months, the Thiess/Black & Veatch Joint Venture (TBJV) designed, constructed, commissioned and operated Stage 1A of the Bundamba Advanced Water Treatment Plant (BAWTP). The project has redefined industry benchmarks and has been widely acknowledged as world best practice for a project of this type in terms of quality of build, quality of product and sustainability.

The project was completed with an excellent safety record: zero LTI (no Lost Time Injury).

The environmental management was challenging. However the project has achieved outstanding results of processing purified recycled water (PRW) and discharging waste as per EPA guidelines with no harm to anyone or the environment.

Working in very close proximity to an active community was a challenge. This was achieved by developing a strong relationship with the community and the project was delivered without complaints.

The successful outcome was due to TBJV's capability through the formation of a hand picked team, experienced with worlds best practice in design innovation, leading the delivery of a world class asset in record time. Our team has achieved the project vision, despite the public scrutiny and media publicity, and in the process generated interest from industry leaders worldwide and government ministers from Australia and many other countries including Singapore, USA, China and Malaysia.

KEYWORDS

ACAA, Western Corridor, recycled water, Bundamba, Alliance, drought, microfiltration, reverse osmosis, advanced oxidation, innovation

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THE PROJECT

Stage 1A of the BAWTP is the first of three major advanced water treatment plants to be built as part of the AU\$2.4 billion Western Corridor Recycled Water (WCRW) Project, the largest water recycling scheme in the Southern Hemisphere.

The WCRW Project will eventually produce purified recycled water (PRW) from existing wastewater treatment plants in the Brisbane and Ipswich areas, providing a secure alternative water source for local industry as well as supplementing the region's stored surface water supplies and guaranteeing cooling water to power supply for South-East Queensland.

Stage 1A of the BAWTP currently has the capacity to produce 20 mega-litres of highly PRW each day, using as a feed stock the entire output of the nearby existing Bundamba and Goodna waste water treatment plants, which previously released waste directly into the Bremer and Brisbane Rivers.

BAWTP Stage 1A uses microfiltration (MF) membranes followed by reverse osmosis (RO) membranes and advanced oxidation, comprising hydrogen peroxide and UV energy to remove contaminants and impurities, resulting in PRW which is of a quality compliant with Australian Drinking Water Guidelines, a first for Australia.

The PRW is currently being pumped to the nearby Swanbank Power Station to be used as cooling water. Previously, this cooling water (enough to supply the daily needs of 140,000 people) would have been drawn from precious water supplies in Wivenhoe Reservoir – adversely affecting the availability of Brisbane's drinking water supply. The Project PRW is of such high quality that it can safely be diverted to water reservoirs, where it would be mixed with catchment run-off and used as drinking water.

THE CONTRACT

The BAWTP Stage 1A contract was delivered through an alliance between the TBJV and the Queensland Government Department of Infrastructure. The TBJV partners were selected based on their capability and commitment to completing the project within a tight schedule. The Alliance leaders defined the scope of work with the following objectives in mind:

- Maximising functionality, water quality and performance of the plant;
- Minimising project schedule while maintaining quality, safety and flexibility to adapt to changes;
- Delivering the project within the agreed Target Cost Estimate.

A Project Alliance Agreement (PAA) was developed, which defined the project requirements, technical specifications, commercial framework and pain/gain share model. An Alliance Leadership Team (ALT) and an Alliance Management Team (AMT) were established to oversee the project. Six weeks after negotiations started, the Alliance contract was signed on 17 November 2006.

CONTRACT MANAGEMENT INNOVATION

For a project of this type with a tight time schedule and many uncertainties, an alliance contract provided the following principal advantages:

- The commercial framework provided the necessary comfort for all parties to cooperate and make 'best-for-project' decisions, allowing collaboration between partners. This enabled all parties to work together to develop and agree to a comprehensive contract in a very short time.
- The non-adversarial administrative arrangement encouraged cooperation between partners and formed one branding team - 'Bundamba Alliance'. Resources and skills were shared among all alliance teams and operated from one office and committed to the set objectives.

- The partners agreed that the AMT were to handle all problems directly, within the mandate of the Alliance Management and Leadership Team, to negotiate best outcome.
- The Owner was fully involved in all stages of the project and the team leaders were committed and outcome focused to deliver this engineering feat in record time.

PROJECT SCOPE

1. SITE PREPARATION

Removal of existing structures and houses from the 50 hectare site and works including mass grading and placement of more than 103,000m³ of engineered fill for the project structures.

2. RAW WATER PUMP STATION AND STORAGE TANK

A new raw water pump station built on the existing Bundamba Waste Water treatment facility off site and connected by 1km of 100mm diameter pipeline which pumps effluent water to the new 15 mega-litre Raw Water Storage Tank at BAWTP 1A.

3. MFRO BUILDING

5000m² MFRO building to house the three treatment processes to remove contaminants and impurities.

- Microfiltration - the first treatment process is microfiltration. Water is forced through a fibre membrane with pores 0.1 to 0.2 microns wide. This process removes particulate matter, protozoa and some viruses, leaving only salts and organic molecules in the filtered water.
- Reverse Osmosis: after microfiltration, the water is passed at high pressure through specialised membranes to remove salts, viruses, pesticides and organic compounds.
- Advanced Oxidation: the advanced oxidation process uses chemicals and ultraviolet light to destroy any remaining organic traces in the water.

4. CHEMICAL AREA

After purification, the water is very soft and has low alkalinity, making it highly corrosive to piping and pumping equipment. In the Chemical Area, calcium and bicarbonate are added to harden the water and increase alkalinity. This area also stores 12 other chemicals used throughout the plant.

5. TREATED WATER STORAGE TANK

Once treatment is complete, the purified water is stored in a 20 mega-litre Treated Water Storage Tank. In total, the plant converts more than 82% of the raw water it receives to class A++ recycled water.

6. OVERFLOW ATTENUATION TANK

An overflow attenuation tank provides redundancy in the facility by collecting spillage from all tanks in the plant.

7. TREATED WATER PUMPING STATION

Treated water is pumped from the Treated Water Storage Tank directly to Swanbank Power Station.

8. RESIDUALS AREA

Residue from the treatment process is clarified and chemically treated to remove nutrients before being released into the Bremer River. The backwash area includes the following structures:

- Microfiltration and Backwash Tanks
- Reverse Osmosis Concentration Tanks and Lamellas
- Solids Contact Clarifiers and Denitrification Tanks

TARGETS AND OUTCOMES

TIME

Of all the challenges faced by the Alliance, time was the most critical. With water supply in the south-east corner nearing exhaustion, the project simply had to be delivered safely within its 10 month schedule.

The project planning was thorough and despite site access only being granted on 29 October 2006, the plant began producing purified water by 8 August 2007. The BAWTP began flowing at design output to Swanbank Power Station on 24 August 2007, ahead of schedule and amazingly 14 months faster than the industry standard practice.

Within this period:

- Parameters for water quality were researched and defined;
- The plant was designed, fully engineered, materials were procured and resources secured;
- The facility was constructed, commissioned, started up; and the Plant was handed over to the operators.

COST

The target cost estimate for Stage 1A of the BAWTP, was AU\$186.6M. Civil and structural works accounted for 55% of this total, mechanical and electrical works 45%. The project cost control was managed through the JD Edwards system and more than \$55M of revenue was processed during project peak month. Through efficient project management and prudent resourcing, the project was completed within the budget.

ALLIANCE CULTURE OUTCOME

Our culture of working collaboratively meant tearing down walls between the different parties in the Joint Venture and the Alliance. We aligned our different organisation cultures, systems and resources in order to execute our set objectives and vision, giving everyone the opportunity to say what was on their mind and offer constructive suggestions. This in turn assisted in the efficiency of the project. Several of our alliance members have worked together on previous projects and this also helped to promote a positive open culture.

COMMUNITY INTERACTION

The location of the BAWTP Stage 1A site border, no more than 50m from residential areas, presented a challenge. Building such a project required diligent care and a strong relationship with the community.

From the start, the project team leaders engaged in face-to-face consultation with the local community, sponsoring functions and hosting BBQs. Our experienced and dedicated project team developed and maintained relationships and open communication with the community through a website, 24-hour telephone hotline and local consultation booth. Mobile coffee vans were organised with free coffee and pastries for locals during day and evening information sessions. In addition, TBJV provided contributions to special schools and sponsored various clubs, providing a public face to the Alliance. All concerns or questions were acknowledged and addressed promptly within one day.

CONSTRUCTION SAFETY

A key aim of the Alliance was to maintain the highest possible safety standards on-site and to deliver the project with no harm to anyone. To achieve this, a HSE Activity Schedule was developed and implemented, inclusive of job observations and workplace inspections. This schedule allowed safety initiatives to integrate seamlessly with the project's tight schedule.

In addition, the project developed and piloted a Fit For Duty screening program, checking for impairment from alcohol/drugs, fatigue, illness or medical conditions. This improved the team's awareness and harnessed a positive safety culture.

The project team worked one million man-hours and completed the project with no Lost Time Injuries (zero LTI's). This is a remarkable achievement considering the compressed project schedule, the cramped dimensions of the site and the large, multidisciplinary project workforce. This was a tremendous milestone and raised expectations for personnel health and safety throughout the construction industry.

OPERATIONAL SAFETY

The BAWTP commissioning and operation teams were trained to deal with the identification of hazards and elimination of risks and the application of operational procedures. This ensured no one was at risk during the commissioning or operation of the plant from incoming effluent water or processed rejected waste. To meet these obligations, multiple redundancies were built into the system to ensure there was no possibility of contamination in either the PRW or harm to the environment from the waste stream discharge.

The 14 different chemicals used during the PRW process are stored in a common 'chemical area' that has been carefully engineered to ensure maximum safety to plant operators and the surrounding environment. The BAWTP met the Environmental Protection Agency (EPA) requirements and the Alliance design specification.

QUALITY

The Alliance had to work within two clearly defined quality constraints; the PRW had to meet the specified quality (Compliance with Australian Drinking Water Guidelines), and the facility itself had to operate efficiently and represent a lasting investment for the people of Queensland. These two constraints were met through having a high-quality facility.

While the PRW was initially earmarked for industrial use, a very real possibility existed that it may need to be diverted to supplement drinking supplies in the future. For this reason, the Alliance aimed to produce the highest quality PRW. The result is the first water recycling plant in Australia to produce water of a quality suitable to be used for indirect potable reuse (IPR). After drinking the BAWTP PRW at the official opening ceremony on the 2 September 2007, then Qld Premier Beattie quoted *"This recycled water is as good as any drinking water people have ever had and perhaps even better."*

The facility itself is of a very high quality, and has been lauded by industry peers. The Alliance has provided quality equipment to produce a plant that that would operate reliably and efficiently for many years.

ENVIRONMENT

The Alliance was committed to delivering the project with minimal effect to the environment and producing a facility that would operate within the defined environmental guidelines. Making this task more complex was the need for the Alliance to research and define these guidelines themselves, educating local authorities as the plan was developed.

Once guidelines were defined, licences and approvals for the plant operation and waste stream discharge were fast-tracked in collaboration with the State Government and local councils. The project was completed without prosecution or harm to anyone or the environment. The BAWTP delivers two major environmental benefits to the community; it reduces by 82% the amount of waste discharged into river systems; and it maximises the reliance of power stations on PRW in lieu of potable water supplies.

CLIENT SATISFACTION

The Queensland Government has been highly impressed with the execution of the project and the quality of the completed facility. The project has been delivered ahead of schedule, within budget, without incident, to an extremely high quality and without negative publicity from the community or media. The client has been using the BAWTP as a showcase: *“The Bundamba Alliance’s achievements in building the Bundamba Advanced Water Treatment Plant have been brilliant”* - Ken Smith, Director General, Queensland Government, Department of the Premier and Cabinet.

As the first completed component of the WCRW Project, BAWTP Stage 1A has demonstrated the viability of the project and has provided confidence to the community that an alternative solution to the water crisis is at hand.

On 3 September 2007, the current Queensland Premier Ms Anna Bligh quoted *“They met a timetable that some said was impossible. It’s a tremendous feat of engineering recognised around the world.”*

TRAINING & PERSONNEL

From the early stages of project planning, it was obvious to the Alliance that only an extraordinary workforce could deliver the results needed. This commitment was realised in the project’s extensive functional and technical skills training program.

Over the duration of the project, 73,500 hours (over 7% of total project work hours) were allocated to competency-based training and up-skilling of project employees and subcontractors. Much of this training was provided through a partnership with the local Bremer TAFE that delivered formal and recognised portable qualifications to project personnel, including Certificate III trade qualifications.

Employees were provided with excellent modern facilities on site including a games room, TV’s and internet access. Numerous team-building events were also organised for project personnel on and off-site and the project soon gained a reputation in the industry as ‘Fundamba’, a positive site where hard work was well rewarded.

RECRUITMENT

Securing resources during a significant shortage of skilled labours and operators presented yet another challenge. The project team used two strategies to attract personnel to site:

- They adopted a professional approach to recruitment, highlighting the project’s location, work environment, excellent facilities and positive culture.
- They offered a comprehensive training program, allowing them to recruit from a wider pool of relatively inexperienced workers who could then be up-skilled to project requirements.

These strategies enabled them to attract staff from inter-state and overseas.

INDUSTRIAL RELATIONS

As a high-profile project the BAWTP had the potential to be derailed through industrial action. The project team had a genuine concern for their workforce and were determined to develop a positive workplace with an emphasis on teamwork, problem solving and interactive communication.

A detailed Industrial Relations Plan was developed and the project leaders drew on their extensive relationships with union officials and on-site delegates to work out potential issues before they impacted on the project schedule. The result was an excellent outcome with no industrial action taken on-site.

MEDIA AND PUBLIC SCRUTINY

As the flagship component of the state government's water infrastructure program, public and media interest in the BAWTP was high. The project team was keen to ensure that the public and all levels of media were kept abreast of project activities and understood the project's key

achievements. The coverage by the media was overwhelmingly enthusiastic due to the stricken drought in SE Queensland adversely impacting on peoples lives. The project was delivered beyond expectations, resulting in positive news to the public about our achievements along the way.

Throughout the project, media were invited to key project milestones and activities. These events including the transportation and installation of large modular components and equipment, the movement of the massive clarifier tanks to the site and the first production of water resulted in very extensive media coverage. In addition, the project received extensive media coverage due to its innovative engineering and official visits from local and international industry dignitaries and experts and government ministers from Australia, Singapore, China, Malaysia, USA and many other countries.

INNOVATION

Major items with long lead times were selected and orders were placed as soon as the contract was awarded. Due to lack of parameters and time constraints the major process equipment design had to be back engineered based on equipment availability from vendors and flexibility to deliver in short timeframes.

The design team anticipated and planned for possible expansion and integration of innovative ideas to suit client requirements for each element of the treatment process.

To expedite the delivery of equipment we accelerated the production by air freighting vendor material to their factories to expedite manufacturing time and embedded our team at the vendor facility to ensure progress.

Some major components were air-freighted from overseas in lieu of sea freight to meet schedule.

To reduce site congestion we maximised off-site fabrication. The most remarkable example was the construction of two clarifier tanks, each more than each more than 12m long, 8.3m wide and 6m high, which became the largest items ever transported by road in Queensland. Furthermore as the site was undergoing site preparation/mass grading, a total of six electrical switchrooms weighing 80 tonnes, were assembled and tested offsite and transported to site under special escort.

To shorten the lengthy process of preparing deep foundations using piling, the innovative use of shallow mat foundations supported on replaced engineering fill reduced the project schedule significantly.

As much of the works consisted of large concrete water storage tanks, innovation was required to avoid lengthy multiple-pour sequences. Instead, we utilised three different formwork systems which combined prefabricated reinforced cages built off-site then installed in large mats allowing single in-situ concrete pours to be done for walls 25m long and 10m high. Each 250m² used 170m³ of concrete and took less than 4 days from form to pour and strip.

Staggered integration of 29 discrete packages allowed commissioning to progressively integrate each treatment barrier into the process, resulting in the shortest possible commissioning time for the project.

THE DESIGN & CONSTRUCTION TASK

While the construction of a world-class water treatment plant is a complex task, the time constraints imposed on the BAWTP Stage 1A magnified the difficulty of the project and created a raft of specific challenges. Navigating a course around these obstacles was possible only through determined cooperation between all project partners.

DESIGN

To meet the BAWTP Stage 1A delivery date, procurement and construction began while the design was still in its early stages, leading to numerous design challenges.

EVOLVING CLIENT REQUIREMENTS

Given the limited initial requirements and the fact that this project was the first step in a much wider scheme, it was inevitable that the client requirements of the project would evolve through the construction process. Therefore a design team for each element of the water treatment process was based in Brisbane. The team was structured to deal with process innovation and plant HAZOP supported by designers from other Black & Veatch offices around the world. Other design teams were focusing on the infrastructure, electrical and mechanical detailing and dealing with construction requirements and changes to fast track the work execution.

Before the project was completed, the client announced upgrades to the plant that would increase capacity to 60 mega-litres per day. The design team's forward planning significantly reduced the complexity and projected cost of these upgrades and this allowed us to build the second plant with the available resources.

MINIMAL DEFINITION

The design was made more complex due to limited time for identifying and agreeing to defined project parameters. The defined parameters were minimal, limited to a site location and overall footprint, feed and product water quality specifications, minimum process treatment steps and redundancy and safety requirements. In terms of the physical works required, this was essentially a blank canvas. To ensure all requirements were met the design team used a combination of treatment technologies that had never before been used on a project of this size.

DESIGN COORDINATION

The compressed timescale of the project prevented TBJV from assembling a dedicated design team in a single location. Instead, Black & Veatch identified resources in their Singapore, Mumbai and United States offices and coordinated them from project offices in Brisbane.

Whilst it was difficult managing resources across different time zones, this approach allowed an experienced design team to be quickly assembled and international expertise in design, problem solving and procurement strategies to be captured. Local designer and engineering expertise was sourced and engaged to fast track and support the construction team on site.

PROCUREMENT OF LONG LEAD TIME ITEMS

Early procurement of components and materials was critical to meeting the tight project schedule. In total, the project team had to secure more than 200 major capital equipment packages and orders, many from overseas and all with long lead times, some quoted with up to 45 weeks delivery.

Items with long lead times had to be ordered and procured from the start of the first week of the project lifecycle, often before relevant components of the design had been finalised. Under special instruction to proceed vendor engineers were engaged to start equipment detailing and collaborated with our designers on a daily basis to expedite design. Close relationships forged between the project team and vendors allowed the design of these components to be flexible so the design could be reverse engineered.

Faced with extremely short lead times, vendors were often unable to guarantee delivery within the required timeframe. The project team worked with the vendors, providing engineering assistance and airfreighted vital raw materials to manufacturers' workshops to expedite production. In other instances components were sent overseas to gain production priority.

Importantly, over \$45M worth of long-lead-time equipment and materials were purchased or secured place in production queue for the project before the design was finalised.

Furthermore, off-the-shelf components were chosen that reduced the amount of related construction. For example, 18" reverse osmosis membranes were chosen instead of the more-common 8" membranes as they offered a quicker delivery schedule and simpler installation, even though they were a relatively new technology and had never been used before in a project of this scale.

MAXIMISING OFF-SITE FABRICATION

A critical function of the design process was to identify opportunities for prefabricating mechanical and electrical components and pipe spools off-site, allowing on-site construction time to be significantly reduced. By using detailed 3D modelling, the design team was enabled to identify clashes and construction tolerances in order to eliminate re-work in the field.

Wherever possible the design team identified opportunities for off-site fabrication. The project team had to source and manage resources to help vendors/fabricators meet the timeframes required. Strategies utilised included:

- Sourcing and providing skilled workers to vendors from interstate to enable round-the-clock production;
- Quickly securing services through pre-existing relationships rather than lengthy tendering processes;
- Pre-booking vendors facilities and fabrication workshops for extended periods;
- Using international vendor experts to produce some of their components at local suppliers and fabricators, where possible, to reduce delivery times and enable short-notice design changes;
- Mobilising international experts to Brisbane to oversee production at local fabrication shops

The most remarkable example of off-site fabrication was the construction of two clarifier tanks, as described above under 'Innovation'. While prefabrication reduced the delivery time of these critical components from 6 months to 10 weeks, the project team had to coordinate a team of 45, including transport escort pilots, Energex and Queensland Rail personnel during the transport of the tanks to site, which required obstacles to be moved and power lines to be raised ahead of the journey. The tanks remain the largest items ever transported by road in SE Queensland. In similar operations, the six electrical switch rooms weighing 80 tonnes were also pre-fabricated off site as described above under 'Innovation'.

CONSTRUCTION

The complexity of the BAWTP Stage 1A construction is reflected in the project statistics. In under 10 months the following was achieved:

- More than 950 project personnel and staff worked on site during construction
- Performed 103,000m³ of mass grading and engineered fill (to a depth of 4m);
- Installed more than 9km of interconnecting pipe work;
- Placed 4,200 tonnes of reinforcement;
- Used more than 20,000m³ of concrete for the plant infrastructure (including reservoirs, buildings, tanks and ancillary works);
- Supplied and installed 1,000 tonnes of structural steel;
- Laid and connected 90km of electrical and instrumentation cables;
- Tested 16,000 electrical functions;

- Procured and installed more than 2,300 instruments and chemical analysers;
- Ordered, delivered, installed, tested and commissioned over 200 major items of electrical and mechanical equipment.

SITE ACCESS

For both logistical and public relations reasons, project personnel, contractors and suppliers needed to access the site without increasing traffic through neighbouring residential areas. The project team gained permission from the Ipswich City Council to open a construction-only road to route traffic directly from the nearby Highway. A traffic management plan was developed and distributed to relevant local councils and the police. This access operated without incident for the duration of the project.

LAND ACQUISITION

To meet the project schedule, properties had to be resumed by the Queensland government and houses and land were cleared in the shortest possible time. Through full and open interaction with the local community, the project team gained the cooperation and trust of affected residents and provided physical support while they were vacating their property. As a result, project works were able to start as soon as access to the site was granted.

FOUNDATIONS

To shorten the lengthy process of preparing foundations due to long lead of piling equipment, the construction team worked with the design team to identify time-saving alternatives. A shallow foundation alternative was identified. Through Thiess plant fleet we were able to mobilise earthwork equipment in record time allowing us to expedite the mass grading. Further we negotiated to obtain material ex-quarry stock, and arranged transport as required for the 103,000m³ of base course material used in lieu of deep foundations and piles.

TANK CONSTRUCTION

With much of the works consisting of large water storage tanks, the project team realised that time could be saved by avoiding lengthy multiple-pour sequences to construct the 10m high concrete walls. We employed a formwork system as described above under 'Innovation'. The tank roof was supported by installing pre-cast panels spanning across the width of the intermediate wall and top finish layer of in-situ concrete. Also, we have utilised mechanical and telescopic platforms and scissor lifts in lieu of traditional scaffolding to minimise congestion, and extra workforce or manual handling for scaffolding work.

ON SITE PLANT

Wherever possible, the project team used plant to expedite project delivery. Scaffolding was minimised by using cranes and elevated work platforms to assemble components and access work areas. One tower crane and six crawler cranes with capacities ranging from 100 to 150 tonnes were chosen for their reach and capacity, ensuring good coverage of the site with minimal crane relocation. During peak works, 21 mobile cranes of 10 to 100 tonnes capacity were used and more than 60 elevated work platforms were operating on the congested site with area less than 250m by 320m.

MECHANICAL WORKS & COMMISSIONING

The structural, mechanical and piping (SMP) team worked very closely with the design, procurement and civil teams. This identified priority of mechanical and piping design, fabrication priority and access to work phases. The SMP teams were integrated with the early mobilised commissioning team, allowing them to liaise closely with the construction team to allow for the earliest possible delivery of treated water. The tight production schedule on the project meant that parts of the plant were being commissioned while other components were still being constructed, and in some cases designed. Also, the client scheme operator was involved in

the project from the design stage to help identify potential problems and to allow for a smooth transition from the operation team when the project was completed.

To facilitate planning, work on the BAWTP the construction activities was split into 29 discrete packages, allowing construction and commissioning of the various project elements to be prioritised. As each treatment barrier was constructed and pre-commissioned water could be introduced for final commissioning. It was then progressively integrated into the treatment process, resulting in the shortest possible commissioning time for the project.

The process performance test of the completed facility was passed successfully on the first attempt, a testament to the outstanding performance of the project team.

SCHEDULE AND PROGRAM

The BAWTP Stage 1A project schedule was nothing short of remarkable, with design, procurement and construction activities beginning almost simultaneously. This schedule achieved in less than 10 months what would typically take two years.

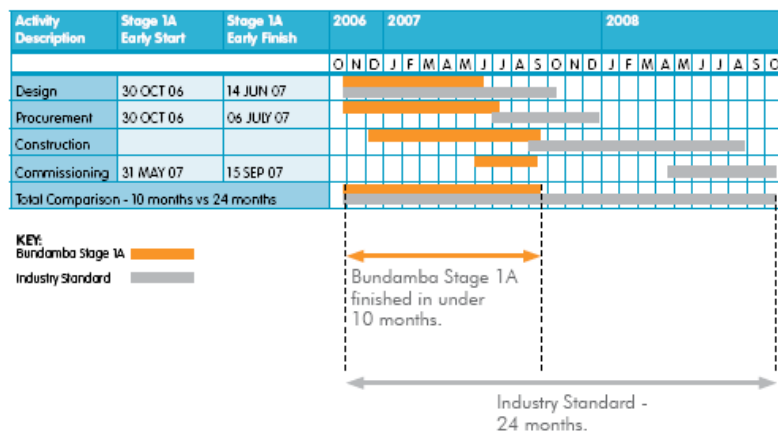


Figure 1: Bundamba Stage 1A program as compared to industry standard program

To meet this schedule, construction continued around the clock for the duration of the project. This intensity of activity required close monitoring to avoid plant and work area conflicts and maintain the project's strict health and safety requirements.

LEADERSHIP & MANAGEMENT

Although assembled rapidly and immersed immediately into an ambitious and challenging project schedule, the project team drew on its collective experience and skills to steer the project to completion in record time.

“It could not have happened without an outstanding team from around the world, three highly committed Alliance partners of WCRW Pty Ltd, Thiess and Black & Veatch and the collaboration that can and does occur only in successful Project Alliances.” Peter Trueman, ALT Member representing the Coordinator General.

THE PROJECT TEAM

Collectively, the project team shared many attributes which contributed to the success of the project:

- They benefited from the guidance, resources, governance and strategy of the AMT leadership and a strong, decisive and industry-respected Project Director
- They had enormous experience with both the type of project and the type of contract, allowing them to accelerate the design process and quickly identify items that needed early procurement
- They shared a drive to complete the job safely and on time, whatever it took
- They had close and credible relationships with relevant government departments and industry bodies

- They remained open to any innovation that could improve the project
- They made decisions with conviction and commitment
- They shared a “no blame” and “best for project” attitude that was quickly adopted by other project members, sub-contractors and suppliers
- They openly shared their expertise and remained totally transparent with other project members, allowing them to easily integrate with project teams

SPECIFIC LEADERSHIP CHALLENGES AND INITIATIVES

The nature of the project created numerous management challenges for the project team, each requiring innovation and experience to keep the project on track. The project team developed strategies to meet the project’s tight schedule and lack of clear regulatory framework:

- An Employee Relations Strategy was developed that allowed maximum flexibility to workforce;
- Where risks were identified, alternative pathways were actively pursued to prevent project delays. Traditional methods were continually challenged while innovation and teamwork actively encouraged;
- Critical materials and equipment were procured with a ‘hands on’ approach, allowing delivery within the project schedule and giving the project focus throughout all stages;
- Major items approval and any issues or problems encountered were handled by upper management, allowing for rapid resolution.

The project team had to manage a relatively large multidiscipline workforce, including direct and indirect trades and skilled personnel, on a small and congested site. The concentration of personnel on the site presented two challenges to the project team:

- They had thorough EPC planning to intensively monitor the project’s extensive schedule to ensure that there were no scheduling clashes;
- They had to apply high execution standard and uphold the project’s immaculate health and safety record.

Careful planning and experience were all that could be relied upon. Therefore we had to empower all personnel at all levels to actively participate in the planning and risk workshops. This ensured all the project teams were accountable and aware of their responsibilities.

SUMMARY OF OUTCOMES ACHIEVED

	Expected	Delivered – redefining what is possible
Safety	Zero Lost Time Injuries (LTIs). Leaders in visible safety leadership on site	Zero LTIs in 1 million man hours within 10 months
Time	10 month onsite delivery schedule where industry standard is 24 months First water expected 30 August 2007	First water was processed on 8 August 2007 and delivered to Swanbank on 23 August 2007 - 9½ months after first access to site
Cost	The TCE Stage 1A - \$186.6 M	The project was completed within the TCE
Quality & Stakeholder Satisfaction	Compliance with Australian Drinking Water Guidelines	Met all treated water quality standards Widely regarded as world’s best practice by industry experts
Environment	No harm to the environment, Seamless environmental approvals	Project delivered within EPA guideline with no fines or notices
Sustainability	Delivery of a world class project	Successful transition of world class asset to 1A plant operators
Community & Cultural Heritage	Project delivered with consideration for cultural heritage and community	The project maintained excellent community relations and ensured no harm to cultural heritage
Training	Provision of functional and technical skills training	Over 73,500 training hours
Industrial Relations	In accordance with the federal requirements	No industrial actions were taken on-site
Media	Key achievements were understood by the media	No negative publicity, always been positive media publicity
Recognition	Expected recognition in the industry	Winner of the Global Water Award “Water Project of the Year - 2008”

CONCLUSION

Climate change, manifested in severe drought, coupled with a rapidly expanding population in South East Queensland, have conspired to force the government to take desperate measures to secure drinking water supplies and hence the regions future.

Delivering a world class Advanced Water Treatment Plant in record time and on budget would not have been possible without a dedicated and highly skilled management team, workforce, suppliers and subcontractors and local and State representative's dedications – people with proven track records, who could see the possibilities, and had the experience to rise to the challenge. Testament of the aforementioned statement, the project success was recognised in the industry through the following achievements:

- The BAWTP project was the winner of the Global Water Awards 'Water Project of the Year - 2008'.
- One of six finalists of the Australian Construction Achievement Award - 2008.

The Alliance partners are very proud of what has been achieved throughout the project phases of design, procurement, construction, commissioning and operation of the BAWTP Stage 1A. Through this tremendous contribution from the project team, they have delivered very evidently delivered on their project outlined vision: *“to provide an innovative long term sustainable solution to the South East Queensland water shortage through the safe delivery of a world class recycled water asset in record time”*. Certainly the project team have delivered the BAWTP engineering feat amazingly in record time and transformed the vision into reality and established a set of new benchmarks in the industry.

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