

Proposal

Oakey Park WTP – Filter upgrade

Lithgow NSW



prepared for:

Lithgow City Council

30 October 30, 2015>



Xylem Water Solutions Australia Limited
48 Leewood Drive
Orange NSW 2800
Mr. David Crowe
Direct: +61 2 9832 6200
Mobile: +61 4 1991 4045
Email: David.Crowe@xyleminc.com

October 30, 2015

Lithgow City Council
180 Mort Street
Lithgow
NSW 2790
Attn Rhys Brownlow
Acting Water & waste Water Engineer

Project name : Oakey Park Water Treatment Plant – Filter Upgrade
Project number :VP38074

Dear Rhys,

Based on your inquiry, we are pleased to forward the following proposal to your attention for upgrade of existing gravity Sand Filters including;

Design Supply, Install and Commission of new Leopold underdrains, air piping, filter sand and anthracite media

We hope that our proposal comes up to your expectation. If you have any questions please do not hesitate to contact us.

Respectfully,

David Crowe

David Crowe
External Sales Engineer

Table of Content

1	Xylem Overview	4
2	General Process Description	6
2.1	Process Description	6
2.2	DESIGN CRITERIA.....	6
3	Technical Description	9
3.1	Leopold® Type SL® Underdrain	9
3.2	I.M.S® 200 Media Retainer	9
3.3	Air Header Piping.....	9
3.4	FILTER Media.....	9
3.5	Options (if any).....	9
3.6	Services	10
3.6.1	Installation.....	10
3.6.2	Commissioning and training	10
4	Technical Clarification & Deviations	11
1.	Exclusions.....	11
5	Price & Scope of Supply	12
5.1	Basis of pricing.....	12
5.2	Pricing.....	13
5.3	Optional scope	13
7	Commercial Terms & Conditions	14
7.1	Delivery schedule.....	14
7.1.1	Delivery time	14
7.1.2	Production schedule (working weeks)	14
7.2	Special T&C's for proposal	14
8	Attachments.....	15
8.1	Brochures / Drawings / others	15

1 Xylem Overview

Xylem is a leading global water technology provider, enabling customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, industrial and agricultural settings. The company does business in more than 150 countries through a number of market-leading product brands, and its people bring broad applications expertise with a strong focus on finding local solutions to the world's most challenging water and wastewater problems.



Xylem's treatment business offers a portfolio of products and systems designed to effectively meet the demands and challenges of treating water and wastewater. From smarter aeration to advanced filtration to chemical-free disinfection, Xylem leverages its well-known Treatment brands, Flygt, Leopold, Sanitaire, and Wedeco, to offer hundreds of solutions backed by a comprehensive, integrated portfolio of services designed to ensure we can meet our customers' needs in a number of different industries including municipal water and wastewater, aquaculture, biogas and agriculture, food and beverages, pharmaceuticals, and mining.

Our scientists and engineers utilize their deep applications expertise and continually listen and learn from our customers' situations to create solutions that not only use less energy and reduce life-cycle costs, but also promote the smarter use of water.



Leopold has long been a worldwide leader in the water and wastewater treatment industry supplying both filtration and clarification systems. Leopold both designs and supplies systems for gravity filtration, clarification, denitrification, sludge collection and backwash water recovery. Leopold solutions are ideal for algae, contaminant, and nutrient removal, desalination pretreatment, reuse, SDI, and taste and odor reduction. Since its establishment in 1924, Leopold has pioneered and acquired a number of innovative technologies aimed at improving the quality of water while reducing costs. With over 8,000 installations, customers from around the world have come to rely on Leopold's expertise and technological leadership in water and wastewater treatment.

Since 1924 Leopold has been designing and manufacturing rapid gravity media filtration and clarification solutions for treating water and wastewater.

Leopold supplies potable drinking water treatment plants with media filtration, backwash water recovery, reuse and desalination pretreatment solutions, while supplying wastewater treatment plants with tertiary filtration and denitrification solutions. They also supply both potable and wastewater treatment plants with dissolved air flotation (DAF) clarification, ozone enhanced biologically active filtration systems and sludge collection solutions.

Leopold engineers are available to help analyze, evaluate and design all aspects of a complete filtration system, including evaluating influent water qualities, determining optimal loading rates and best design configuration, selecting the best media characteristics, and designing the backwash process. Xylem’s Leopold Filterworx performance filter system comes complete with flume, underdrains, integral media support, engineered media, backwash water troughs, and system controls. The result is a cost effective, efficient, high-performance system designed to meet customer requirements.



Leopold Clari-DAF system is used to clarify raw water to remove contaminants such as turbidity, algae, color, iron, manganese, organics, and taste and odor compounds. It’s a highly-effective, proven technology for removing low-density particulates as well as Giardia and Cryptosporidium. Its performance is superior to conventional clarification in providing consistent water quality, producing consistently high sludge solids, and operating at high loading rates— results that can lower customer’s total cost of operation.



Leopold also offers sludge collection solutions with the Clari-VAC floating sludge collector and the CT2 submerged sludge collector. These systems are used in final clarifiers to remove the sludge solids. For those areas where nitrogen and phosphorus removal is required, Leopold provides elimi-NITE denitrification systems which convert the filters to become biologically active so that the effluent meets the mandated nitrate and phosphorus levels.

In desalination systems, Leopold Clari-DAF systems and Filterworx systems are introduced to pretreat water and remove contaminants that could harm reverse osmosis membranes, so that salt can be removed from the seawater to make it potable.



For more information please visit us on our homepage:

<http://www.xylem.com/treatment>

2 General Process Description

2.1 PROCESS DESCRIPTION

The dual-media filter is a gravity-based system which filters out suspended solids through mechanical straining and surface adsorption. Leopold's filter system consists of a filtration bed for retention of suspended solids and a dual/parallel underdrain system for superior air and water distribution during backwash.

As filtration occurs, headloss increases due to the accumulation of solids in the filter media. When the headloss approaches a determined value, a backwash is performed on the filter to wash solids from the filter media and reduce headloss.

The filter system proposed here-in has been designed around a Sequential Wash using existing backwash pumps and blowers and can be upgraded to Concurrent backwash without any change to media or underdrains. The sequential wash sequence is proposed to utilize existing equipment and timings subject to adjustment during commissioning if required. The full recommended Concurrent backwash sequence consists of first closing the influent valve and drawing down the water level in the filter cell to approximately 150mm above the surface of the media, at which time the effluent valve is closed and the waste valve is opened. The blower is started, the air isolation valve is opened, the vent valve is closed, and air only wash is performed for approximately 1 to 2 minutes. Next, the backwash pump is started, the backwash isolation valve is opened, and a concurrent air and water backwash continues for approximately 1 to 2 minutes at a low water rate. After the concurrent wash is complete, the air isolation valve is closed, the vent valve is opened, and the blower is stopped. The filter media is washed at a high backwash rate for approximately 10 minutes to wash solids from the filter bed. Next, the backwash isolation valve is closed, the backwash pump is stopped, the waste valve is closed, and the influent and effluent valves are opened. The filter effluent is sent to waste for a pre-determined amount of time immediately following the backwash before being placed back into normal operation.

Note: Times to be adjusted by the plant operator according to plant specifics.

2.2 DESIGN CRITERIA

This drinking water filtration system described here-in is a water treatment system designed for the removal of particles. The system has been designed to Xylem's best understanding of the project requirements and is subject to change based on more detailed process information being made available.

The design criteria are based on the fact that we are anticipating no more than 5 NTU and/or 10 mg/L TSS into the mono-media gravity filters. Sedimentation and clarification are to be provided by others. Client to clarify if a higher solids loading is anticipated.

Table 1. Filter Design Specifications

Filter Specifications		
Design flow rate		16,000 m ³ /day
Total number of filters		6 no.
Cells per filter		1 no.
Individual filter cell area		10.9 m ²
Total filter area		65.1 m ²
Cell Length		3.5 m
Cell Width		3.1 m
Loading rate		10.2 m/h
Loading rate during BW		12.2 m/h
Underdrain Configuration		
Type of underdrain		Type SL®
Type of flume		Center Flume
Flume length		3.1 m
Flume width		550 mm
Flume depth		600 mm
Length of lateral		3.5 m
Number of laterals		10 no.
Filter Media		
Media type	Anthracite	Sand
Media depth	460 mm	300 mm
Total media volume	29.9 m ³	19.5 m ³
Media size	0.95-1.05 mm; UC<1.4	0.45-0.55 mm; UC<1.4
Media support depth		I.M.S® 200 Media Retainer

Table 2. Backwash System - Initial Specifications

Backwash Rates	
Backwash procedure	Sequential
Design air rate	60 m/h
Concurrent water rate	0m/h
High water rate	50 m/h
Piping	
Air supply piping	100 mm
Air header piping	80 mm
Backwash entrance piping	300 mm
Air Scour Blower Specifications	
Total number	existing units
Number standby	existing units
Flow capacity per blower*	642 m ³ /h
Headloss through the underdrain during air scour**	210 mm
Backwash Pump Specifications	
Total number	existing units
Number standby	existing units
Flow capacity per pump*	576 m ³ /h
Headloss through the underdrain during backwash**	760 mm

Table 3. Backwash System – Future Design Specifications

Backwash Rates	
Backwash procedure	Concurrent
Design air rate	60 m/h
Concurrent water rate	12 m/h
High water rate	50 m/h
Piping	
Air supply piping	100 mm
Air header piping	80 mm
Backwash entrance piping	300 mm
Air Scour Blower Specifications	
Total number	2 units
Number standby	1 units
Flow capacity per blower*	655 m ³ /h
Headloss through the underdrain during air scour**	210 mm
Backwash Pump Specifications	
Total number	2 units
Number standby	1 units
Flow capacity per pump*	220 m ³ /h
Headloss through the underdrain during backwash**	760 mm

Comments:

*The rates for the pumps and blowers are calculated at the entrance of the flume. Total head losses in the system from the pumps and blowers to the flume entry are not included in this number and have to be taken into account when selecting the equipment.

**The headloss values are given for the underdrains and arrangement type specified. Total headloss in the system is not included in these numbers and must be calculated based on the designed lay-out of the filter piping gallery.

3 Technical Description

3.1 LEOPOLD® TYPE SL® UNDERDRAIN

Under this section, we propose to furnish Leopold® Type SL® Underdrain of the Dual/Parallel Lateral type, manufactured from corrosion resistant, high-density polyethylene for installation in six (6) filter cells. Each filter cell measures 3.1m width [flume length] x 3.5m length [lateral length]. The total filter area is 65.1m² utilizing a Center Flume arrangement.

The blocks shall be arranged end-to-end and mechanically joined with an O-ring to form continuous underdrain laterals approximately equivalent to the length of the filter cell. The joints shall be gasketed, bell and spigot type with internal alignment tabs for proper alignment, and be air and water tight. Joints shall be snap-lock type so that the blocks are joined with integral interlocking snap lugs and lug receptors for ease of assembly and installation of the laterals, and supplied with carbon steel "U" anchor rods.

3.2 I.M.S® 200 MEDIA RETAINER

Under this section, we propose to furnish 65.1m² of I.M.S® 200 Media Retainer. The scope includes molded thermoplastic I.M.S® 200 Media Retainer factory installed onto the proposed underdrain block prior to shipment.

3.3 AIR HEADER PIPING

Under this section, we propose to furnish six (6) Leopold Air Header Assemblies, manufactured from schedule 5, Type 304 stainless steel pipe. The air header pipe shall measure 80mm in diameter, and will run the flume length of each filter cell. The air header shall commence with a flanged connection approximately 150mm inside the filter cell. Mating flange and hardware is to be supplied by others.

The air header pipe will have drop legs to provide air to each of the individual filter laterals. Included with the air header pipe are the required Type 304 stainless steel supports with securement hardware, braided PVC flexible hoses, and adjustable type 316 stainless steel band hose clamps.

3.4 FILTER MEDIA

Under this section we propose to supply 20 m³ of graded filter sand in 30x1T bulk bags, and 30 m³ of graded Australian Filter Coal (Anthracite) in 19x1.6m³ bulk bags, delivered to site in one delivery.

3.5 OPTIONS (IF ANY)

Option included for cost to epoxy coat each filter is offered as a price per filter using Fosroc Nitocote EP405 system. Colours available are blue or grey

3.6 SERVICES

3.6.1 Installation

In this section we propose to supply labour and materials to remove existing media, nozzles and air manifolds, prepare the base for underdrain installation, fitting of Leopold underdrains and IMS cap, installing the filter media.

We have allowed for staged installation, completing the first filter and commissioning before commencing the next two filters, and once the first three upgraded filters are operating, commencing on the remaining three filters.

3.6.2 Commissioning and training

The services of a qualified Xylem Water Solutions technical representative to instruct the Council's personnel about the proper operation of the underdrain system will be provided

4 Technical Clarification & Deviations

4.1 EXCLUSIONS

The following items, while not comprehensive, are not included in this drinking water filtration system:

- ◆ Concrete for filter, building/architectural work and engineering thereof.
- ◆ Any concrete repair works (note each filter will need to be assessed after removal of media and cleaning of tank walls)
- ◆ Platforms, ladders, or walkways.
- ◆ Lubricants or servicing of existing mechanical equipment.
- ◆ Instrument air pipe, isolation valves, tubing, and engineering thereof.
- ◆ Electrical starters, circuit breakers, motor control center, conduit, and interconnecting wiring and engineering thereof, and 400 VAC, 3 phase, 50 HZ power.
- ◆ Water supply/disposal for flushing of filter internals, media installation or backwash testing.
- ◆ Lab services for testing.

5 Price & Scope of Supply

5.1 BASIS OF PRICING

Any items and/or accessories not specifically called out in this quotation must be construed as being furnished by others.

This quotation is considered firm for 30 days. Orders received more than 30 days after the date of this quotation is reviewed by Xylem Water Solutions before acceptance and is subject to changes in prices or delivery depending on conditions existing at the time of entry. Quoted prices are firm for delivery within 12 months from the delivery date stipulated in the plans & specifications or mutually agreed upon by Xylem Water Solutions and Purchase Order issuer at time of order placement.

It is the user's responsibility to ensure that recommendations and materials selections will be satisfactory for the intended environment and service; and it is the user's responsibility to determine the applicability and suitability of recommendations offered for the service and operating conditions under its control. End user's should satisfy themselves as to the applicability of service test data and suitability of any material for the proposed end use. The user assumes the entire risk related to use of materials, and each user bears full responsibility for making its own determination as to the suitability of materials, products, design, recommendations, or advice for its own particular use. The end user must identify and perform all necessary tests and analyses to ensure that materials or products will be safe and suitable for use under end-use service conditions. This may include in-situ corrosion testing and evaluation of materials coupons to determine suitability of materials under consideration prior to selection.

We do not include any applicable taxes.

Orders resulting from this quotation should be addresses to Xylem Water Solutions Australia Limited, Orange NSW.

Local Government Procurement pricing policies, terms, and conditions will prevail.

5.2 PRICING

Filter Equipment	Price (AUD)
Filter media including 20m3 graded Filter Sand 30m3 graded Filter Coal	\$48,450
One (1) Filter Rehab including: Type SL® Underdrain & Accessories <u>with</u> I.M.S® 200 Media Retainer (1) Air Header with Drop Pipes Delivery via Air freight Installation Services Manufacturer's supervision and commissioning Service	\$44,250 included included \$9,000 \$50,570 included
Five (5) Filter Rehab including: Type SL® Underdrain & Accessories <u>with</u> I.M.S® 200 Media Retainer (5) Air Headers with Drop Pipes Delivery by seafreight Installation Services Manufacturer's supervision and commissioning Service Allowance for two site mobilisations (2 filters, then 3 filters)	\$124,770 included included Included \$252,850 included Included
Total Price:	\$529,890

5.3 OPTIONAL SCOPE

Filter Equipment	Price (AUD)
Epoxy coating of one (1) filter housing	\$17,000/filter

7 Commercial Terms & Conditions

7.1 DELIVERY SCHEDULE

7.1.1 Delivery time

We have estimated the schedule below based on an anticipated order placement in November and expected Leopold production availability as at the time of tender. Please note that we have included for client approval of submittal drawings within 1 week of submittal, client approval of first filter installation within 2 week of commissioning, and no additional float or lag between filter installations.

In order to complete the works before the end of June 2016, we have included to airfreight the filter blocks for the first filter, however we would require a PO being issued before 6th November as we will lose 2 weeks over the holiday period for plant shutdown.

7.1.2 Production schedule (working weeks)

Design:	Submittals within 4 weeks of order, Client approval +1 week, Fabrication drawings +2 weeks.
Manufacture;	Leopold Underdrains 8 weeks,
Delivery	Media 2 weeks from design approval Filter blocks Airfreight +2 weeks / Sea freight +8 weeks
Installation;	First filter 3 weeks +2 week for client review Second and Third filters, 4 weeks (from sea freight delivery) Filters 4,5&6, 5 Weeks (from Filter 2&3 completion)

Based on the above schedule, completion dates for the filters would be:

Filter 1 in 20 weeks (+ client review)

Filters 2 & 3 in 27 weeks

Filters 4, 5 & 6 in 32 weeks

We would be happy to discuss scheduling should you require further detail.

7.2 SPECIAL T&C'S FOR PROPOSAL

The terms and conditions of this offer are as per the Local Government Procurement agreement.

Payment terms proposed are monthly progress claims based on work completed and the pricing breakdown included in Section 5 of this proposal. Further breakdown and estimated claim schedule can be provided on request.

8 Attachments

8.1 BROCHURES / DRAWINGS / OTHERS

Proposal Drawing I14661.90.01 Rev05

Leopold Underdrain Type S

Leopold IMS Media Retainer