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Lynnwood Bridge Phase 3: **Modelled to perfection**

The latest development phase of Attacq's Lynnwood Bridge Retail and Office Park has achieved a 5-Star Green Star SA Office v1 Design rating, a first for Tshwane

By: Ilana Koegelenberg – assistant editor

The final phase of the Lynnwood Bridge Pretoria precinct has earned the proud green badge for two A-grade office buildings, Kaaimans and Bloukrans, having a combined 12 000m² with a shared podium, parking basement, visitor parking and security site. Each building comprises six storeys, served by five basement levels and a central atrium.

Owned by Attacq, developed by Atterbury Property and designed by Studio 3 Architects International, with sustainability consultants Aurecon, the iconic office towers are the final phase of the now 75 000m² Lynnwood Bridge mixed-use commercial precinct.

The towers have been thoughtfully constructed, incorporating lots of smart, green tactics . They include rainwater harvesting systems, which will collect, store, treat and use large quantities of rain from each building's roof and also from surrounding paving to be used for tasks like toilet flushing. The buildings' façade details are not only attractive, but control heat from the sun entering the buildings through full-height glazing, yet let in plenty of natural light. Instead of water-cooled chillers air-cooled ones are used. The buildings are also designed to have lots of fresh air, efficient lighting, occupancy sensors and a fine tuned building management system.

CLIENT BRIEF

All wet services had to be designed and installed with the objective to economise the installation and maintenance costs, while still providing an appropriate level of comfort to the occupants.

All materials, plant or equipment were installed with appropriate access for ease of operation, maintenance and replacement. Local products with South African Bureau of Standards (SABS) approval took preference when it came to material selection.

SYSTEM DESCRIPTION

Each building is equipped with an air-to-water heat pump installation, complete with storage vessel, circulation pumps and electrical backup.

The amount of potable water supplied to, and consumed by, the building has been reduced through the design measures detailed below:
Water efficient plumbing fixtures have been fitted onto taps and shower heads (in all bathroom and shower areas) to reduce the output volume of water supplied. All taps throughout the building have been fitted with flow restrictors so that no water is wasted through unnecessary usage.

All toilets in the buildings have a dual-flush system. This means that only a small quantity of water will be used when light flushing is needed.

Waterless urinals are installed in all the men's toilets. Rainwater harvesting systems collect, store, treat and use large quantities of rain from the roof of the building and surrounding hard areas such as paving. This treated water can then be used in applications where potable water is conventionally (and unnecessarily) used, such as for flushing toilets. Potable or municipal water is

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1. *Each building has a heat pump installed on the roof.*
2. *The rain water harvesting tank.*

used in the remainder of applications within the building – bathroom and kitchen taps, change room showers, and tea kitchens. In order to ensure that these design measures are realised, it is important for all employees to be aware of the water-saving initiatives used. Building occupants are encouraged to use water sparingly through initiatives such as taking short showers when using the cyclist facilities change rooms; closing all taps that do not have motion sensors; using the dual-flush toilet systems in the intended manner (the smaller button is for a low flush rate, and the larger one for a full flush); and reporting any leaks to the facilities manager immediately. Water meters are installed to monitor usage.

WATER FILTERING SYSTEM

This development minimises the storm-water run-off and pollution of natural watercourses through a system that allows for the attenuation and filtration of the 1-in one year storm peak runoff.

All post-development runoff enters the treatment system. Roof and paved area runoff is allowed to enter the sludge tanks. Sludge collected and settled in the sludge tanks will be removed manually and disposed of.

Clarified water from the paved area sludge tank runoff passes through an oil separator, and the resultant combined roof and paved area runoff then enters a 135m³ storage/attenuation tank. Of this volume, 45m³ is dedicated for treatment and use in the building's toilets and for irrigation, 65m³ is filtered and discharged to the natural water course and the remaining 25m³ is discharged without filtration to the natural water course.

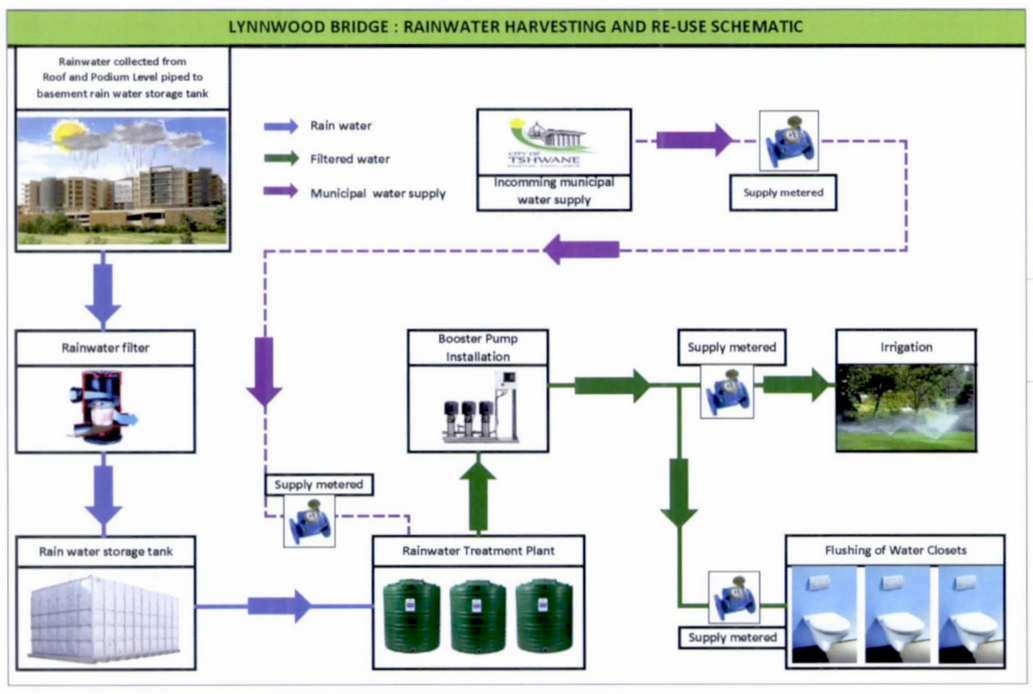
The tanks were thus designed for attenuation and filtration of the 1-in one year storm peak runoff though a 110m³ tank and an the balance that constitutes the 1-in-2 year event is filtered.

All water is being filtered through the following filtration system and flows at a maximum flow rate of 10m³/h:

- SAF-1 500 filter used to trap gross pollutants greater than 100 microns in size.
- Carbon filter using granulated activated carbon for removal of volatile and dissolved organic compounds and further clarification of water.
- Nitrate resin filter for removal of nitrates.
- Bag filters to remove filtration media or solids passing from the filter system to downstream.
- After filtration, the water will supply a 15kℓ tank dedicated to toilet flush use. This water will pass through UV lamps which will control micro-organisms.

SUSTAINABILITY

A green building is a long-term investment. Paybacks such as increased productivity and decreased sick rates, although difficult to quantify, represent significant ongoing future gains. Both Aurecon's current offices



Simplified system diagram of the hot water system.

and this 'green' office building in the same precinct demonstrate that it's possible to deliver a superior, integrated end product that is an asset to the people who use it and the natural landscape which surrounds it for a similar cost to that of a conventional building.

Aurecon was able to drive an energy efficient agenda throughout every phase of the project lifecycle owing to the integration of conventional engineering disciplines with sound knowledge of ESD principles. This integration was key in terms of making design decisions that positively impacted on the building's performance at the very outset of the project, as opposed to simply designing the building and then awaiting feedback on how to optimise its performance at a later stage.

The optimisation of the performance of the building during design phase included detailed modelling of all building services using complex modelling software which helped the team understand the building's use of energy and enabled them to check the sustainability of each decision and then tweak the design to ensure enhanced performance.

Water is a precious and declining resource. The predicted municipal water consumption is approximately 1 684 238,4ℓ per year. The reduction of potable water consumption achieved is 51,85% and has been achieved through various initiatives to reduce the amount of potable water consumed by the building occupants. The predicted water savings is 1 060 446,4ℓ per annum. Based on the current water rates of R10,81/kℓ, an estimated saving of R11 463,42 per year could be expected .

ENERGY MODELLING

It was thanks to Aurecon's knowledge of the impact of design decisions on performance that enabled the team to achieve 12 points for the 'energy' category during round one of the team's submission to the Green Building Council of SA (GBCSA). Because of Aurecon's integrated design approach, the project achieved higher points for energy than initially expected. This enabled the project to target a 5-star rating with minimal additional investment.

Computer modelling was used by the Aurecon team to estimate the energy usage of the buildings to comply with the Green Star SA – Office Design v1 rating tool methodology. The results of the analysis were then used to determine the potential emissions of the proposed office building once operational.

Based on the Green Star Office v1 energy calculator, the annual base building benchmark for the building is 223,2 $kgCO_2/m^2/yr$. The actual annual base building emissions value for the building is 85,6 $kgCO_2/m^2/yr$. This results in a 62% reduction in base building annual CO_2 emission, and may therefore achieve 12 points within the ENE-1 criterion.

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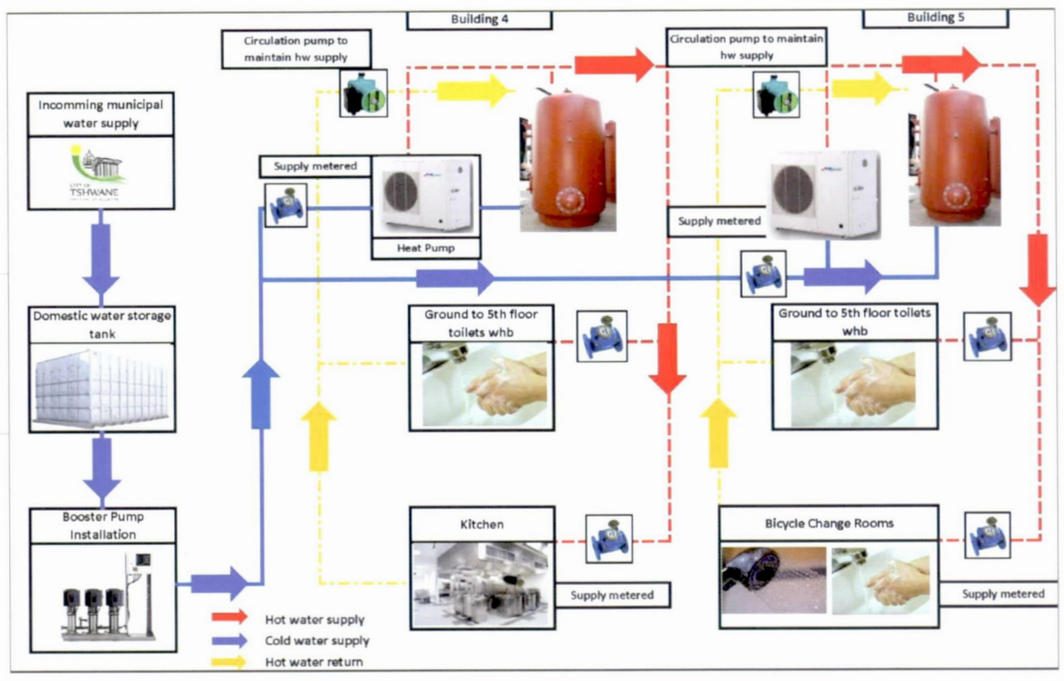

Rainwater harvesting and re-use simplified schematic.

The rainwater harvesting system and pumps.

CHALLENGES

The project team has tackled multiple challenges, including an adjacent wetland and the two podiums being rated as a single development.

The wetland, in close proximity to the building, threatened registration with GreenStar SA, unless a viable solution of mitigating potentially harmful water run-off which could negatively affect the surrounding flora and fauna was found. Aurecon's building makes use of various species of plants affixed to the building's northern car park façade to act as a natural filtration system. This system, although effective, was too costly a solution for these offices which now make use of a mechanical water filtration system integrated with the building's other water systems. Because the building consists of two towers, many of the tower's systems could not be fully integrated. The two towers were submitted as one development with a single rating, which means both towers were jointly required to achieve a high level of performance. This was achieved through careful modelling of the towers' performance and constant tweaking of the building systems to achieve desired performance levels. ***PA***