

**To: The Heritage Council of NSW**

**Re: State Heritage Listing of the Ultimo Power House, Tram Depot and Powerhouse Museum**

My name is Debbie Rudder and I was the Curator of Power Technologies at the Powerhouse Museum from 1991 to 2014. In retirement, I work as a volunteer researcher for the Powerhouse and the Jervis Bay Maritime Museum as well as writing for diverse publications. I have deep knowledge of the museum's collection and the buildings in which it is displayed, conserved, researched and stored. My particular expertise covers the technology and history of: stationary steam and internal combustion engines; electricity generation and supply; chemistry and materials; scientific and navigational instruments; industrial design, machine tools and manufacturing; and Australian innovation.

I am concerned that the current proposal to list the 'Ultimo Tramways Power House' falls far short of what should be heritage listed for the benefit of current and future generations of NSW citizens and for visitors from across Australia and the world. I ask the committee to consider the following submission, which includes discussions of significance (first of the Power House and its integrated Tram Depot, and then of the Powerhouse Museum), the remaining heritage features, and precedents for the listing.

***Significance of the Power House and Tram Depot***

Ultimo Power House, the first large publicly-owned power station in NSW, began generating electricity late in 1899. Electricity was transforming the world, and this exciting development promised to modernise Sydney by replacing dirty, noisy steam trams with a clean, quiet form of transport. *The Power House includes excellent examples of Federation industrial buildings, designed by the Public Works Department under the leadership of renowned architect Walter Liberty Vernon, with sympathetic extensions erected as electricity demand increased.*

It is a site where workers laboured to keep the boilers charged with coal and water to create steam; where that steam travelled at high pressure through pipes to activate engines, and later turbines, that turned generators; where other workers managed the reticulation of the generated electricity through wires, switchboards and batteries to supply the city's electric trams and the station's own lights and cranes. *By 1903 Ultimo was also powering other crucial city infrastructure: bright arc lights at metropolitan railway stations and shunting yards, replacing dim incandescent lamps; the opening spans of the Pyrmont and Glebe Island bridges, enabling the movement of harbour traffic; grain elevators at Darling Island, making the wheat export system more efficient; machine tools, cranes and lights at Eveleigh Railway Workshops, assisting manufacture, repair and training for the State's rail system; and pumps for the city's low-level sewerage system, which served over 110,000 residents and improved public health. The station contributed to electrification of the city's heavy rail network, and it supplied bulk power to some Sydney suburbs and later to the State grid.*

Reflecting the inherent dangers of the work, it was a site of thorough training and thoughtful collaboration, of individual obedience to strict rules and unionised achievement of improved conditions,

and, sadly, of occasional injury and death. *The adjacent Tram Depot was built as part of the initial power station project; both have been owned by the same entities over many decades; and their uses have been interdependent, first under the ownership of the Railways and later of the Museum.* The power station became the model for other NSW railway power stations, and the depot became the model for other tram and bus depots.

The first generation of equipment at Ultimo consisted of boilers made in Sydney and engines, generators and cranes made in the USA. As there were then only three power stations with greater output, all of them in the USA, *Ultimo was a source of pride for Sydney's engineers, manufacturers and citizens.* Building the power station and tram depot was a bold project carried out by NSW Public Works with the assistance of Australian contractors; the bricks, stonework, steelwork, wooden balustrades, and cast iron columns, staircases and floor-plates were made in Sydney. Later generations of equipment came from the USA, UK and Australia; the replacement of engines by steam turbines was the most important change and brought improved efficiency. *Notably, turbo-generators for the station were made in Sydney in 1923, and an overhead crane for the Turbine Hall was made at Newcastle in 1929.* In 1932 large mills were installed to pulverise coal, and all coal handling was converted to automatic; these changes again improved the station's efficiency.

Electricity was used commercially in Australia as early as 1846. From the 1850s telegraph engineers in the eastern States developed a good deal of expertise in applying electricity to communication and other tasks. AC electricity was generated at Macquarie Lighthouse from 1883 and at Melbourne, Penrith and Redfern power stations in the 1890s. There were electric tram systems in Hobart from 1893 and Brisbane from 1897. And turbo-generators were in use in Victoria, Western Australia, Queensland and at private power stations in Sydney before any were installed at Ultimo. *So the major equipment at Ultimo was not innovative, but it was large in scale for its day.*

That said, *Ultimo was a site of innovation.* While most of the technology used there was imported or based on overseas patents, in 1902 Railway Commissioner Charles Oliver patented an oil separator that removed oil and grease from waste hot water, and he had one of these devices installed at Ultimo; this allowed the waste water (and the heat it contained) to be re-used, and thus reduced the amount of coal fed to the boilers; the oil and grease (no longer suitable for lubrication) were burned in the boilers, further reducing the amount of coal used. This improved the station's efficiency and considerably reduced the cost of running it. In 1903, in conjunction with extensions to the buildings and machinery, a larger separator, again to Oliver's patent, was installed. In 1907 experiments were carried out at Ultimo aimed at advising coal-mine owners on which electrical equipment could be used safely in the presence of methane, a gas present in dangerous concentrations in many NSW mines.

*Sydney's electric trams proved very popular, tramlines shaped the city's development, and the system became one of the most extensive in the world.* When Ultimo Tram Depot closed in 1953, buses replaced trams on routes connecting Ultimo with Pyrmont, Drummoyne and Canterbury; now we see more tram tracks being installed and tram vehicles imported to relieve the problem of buses clogging city streets. The first modern light rail route in Sydney, from Central Railway Station to Pyrmont and suburbs further to the west, runs past the Powerhouse Museum on tracks originally installed for heavy rail, tracks that

brought coal to the power station and carried ash away. The city's second light rail route runs along George Street, which was the first route powered from Ultimo.

### ***Significance of the Powerhouse Museum***

*The museum has high significance to the people of NSW as a site for adults and children to engage with, and learn about, science, technology, design and history.* The grandchildren of the first generation to visit in the 1980s are returning with their parents, attracted from across the State by exhibitions and programs designed for a wide range of audiences. It is conveniently located close to Central Station, and its buildings have a strong visual impact on visitors approaching from there via the Goods Line walkway. Although the formal name of the institution, Museum of Applied Arts and Sciences, is now preferred in advertising, the site is still affectionately known to most people as the Powerhouse.

*The adaptive re-use of the buildings saved them from further deterioration and eventual demolition.* The Tram Depot was completed first. Its walls needed little repair, but the dilapidated roof was replaced in the original saw-tooth form. A glass façade secured the south end of the Depot, ensuring it echoes the wide open entrance that greeted arriving trams. For the safety of visitors and staff, the tram tracks were removed and the inspection pits covered. It opened to the public in 1981 with exhibitions, interactive experiences and a learning laboratory; it now houses workshops, conservation laboratories, a photography studio, library and offices. *The basement was redeveloped as a secure, climate-controlled store for objects and archives, which has been of immense value:* it is much closer to the galleries than is possible for most large museums; small and medium sized objects need travel only a short distance when selected for temporary display or after an exhibition is dismantled; and objects are readily accessible for conservation, photography and research.

The main part of the museum opened in 1988. Its grand spaces are appropriate for large objects and major exhibitions. As there had been many changes to the configuration of equipment and structures during the power station's working life, changes to make it suitable for a museum were in keeping with its history. *The majority of the building fabric was retained,* the missing roofs were replaced, machinery pits were filled in to create a safe environment, and partial mezzanine floors were created to provide display space for smaller exhibitions. The tall Galleria (inspired by the museum's progenitor, the 1879 Garden Palace) and Wran Building, whose large glazed walls and curved steel roofs contrast pleasingly with the old brick walls, were added on the western side and provide a wonderful entry experience. Suspending a diverse group of aircraft, from an early Bleriot to a huge Catalina and small modern planes, over other exhibits ensured that the Turbine Hall and Boiler House became dramatic spaces where visitors contemplate the scope of human creativity.

*To help interpret the history of the buildings, the museum's collection includes photographs, archives and objects related to the power station, depot and tramways.* Some objects relate to working life and others to the public face of the power station and museum, including: full-size Sydney trams; models of NSW trams, electric locomotives and carriages; collections of tram destination rolls, tickets and photographs; a model of Pyrmont Bridge; *architectural drawings of the Powerhouse, and the prestigious*

*Sulman Medal awarded to the architect against strong competition in the Bicentennial year. In addition to that medal, the project also won the 1988 Australian Council for Rehabilitation of Disabled award for the museum's accessible design.*

*The museum is the site of ongoing education about the history of energy supply and use in NSW. Online information tailored for schools, further object information available on the collection's online public access catalogue and in blog posts, and guided tours that point out heritage aspects of the buildings, make this possible along with a suite of exhibitions: The Boulton & Watt engine, The Steam Revolution, Transport and Ecologic. The working 1785 **Boulton & Watt engine** (one of the earliest engines in the world to turn equipment in factories, and the embodiment of ideas about heat, mechanism, efficiency, feedback and automation) shares the tall Galleria space with NSW's first locomotive (plus tracks, tender, three historic carriages, a recreated railway platform and related small objects). **The Steam Revolution** uses engines of different types to tell the story of how steam changed lives in the city and in regional NSW. **Transport** uses a range of vehicles, including an early Sydney electric tram, to show how public and private transport shaped cities, rural development and people's lives. And **Ecologic** explains important aspects of sustainability today, including wind and solar energy and how we can use energy more efficiently.*

### ***Heritage features***

- The functional arrangement of the buildings on the site is intact; the layout justifies the original decision to provide a large space between the Engine Room and the Tram Depot to allow for expansion as electricity demand increased.
- The windows retain their original shape and function, except the tall arched windows in the western wall of the Turbine Hall, which have become spacious portals that lead visitors from the Galleria into the original power station.
- Crucially, the Engine Room retains many features, and its ambience was recreated by using it to house working steam engines, some of them powering other machines; the overhead cranes remain intact and in place; the white wall tiles were retained, and the floor was finished with tiles carefully matched to the originals; a neat hole in the eastern wall remains where a pipe carried steam from the Boiler House, and there is a counter-weighted mechanism on the wall that once supported the pipe; the spherical glass light shades are reproductions of those seen in early photographs of the room; the switchboard gallery on the northern wall is mostly original, including one of two staircases and the cast-iron columns with decorative brackets that support the cast-iron floor plates; the other staircase and the wooden balustrades are reproductions; all these features combine to remind visitors of how the space originally looked and sounded.
- The overhead crane that served the Turbine Hall is still in place, complete with the high-level rails along which it ran.

- The viewing window from the Switch House, which allowed control staff to keep watch over the generating equipment, is still in place.
- The tall, roof-high stumps of two of the three brick chimneys are still in place (the upper parts having been demolished before the museum project was proposed) and in excellent condition, towering over the Boiler House; one is used as part of the museum's air-conditioning system, and the other houses stairs that allow access to the roof.
- Two underground tunnels, which brought cooling water from Darling Harbour to condense steam, and returned the warm water to its source, are still in use as part of the museum's air-conditioning system.
- Decorative stonework and brickwork on the northern façade of the Office Building and on the Switch House are still in very good condition.
- The form of the Tram Depot, and a high proportion of the fabric of its walls, are intact.

### ***Precedents***

The nearby **Sewage Pumping Station** is State Heritage Listed, as is **Glebe Island Bridge**, which 'is of state significance as it demonstrates one of the earliest examples of an electric-powered swing bridge in Australia'. Operations at both these sites were originally powered from Ultimo, so surely the Powerhouse deserves the same status.

The **Hydraulic Pumping House** at Darling Harbour is listed even though all its generation equipment was scrapped long ago, just as at the Powerhouse. It retains the rooftop water tank and two indoor accumulators, just as the Powerhouse retains important features. Hydraulic power was only ever a niche system, serving some of the central city's lifts, hoists, wool presses and bank doors. Electricity brought a great deal more change to many more lives than hydraulic power, and it has been much more important to industry, commerce, transport, medicine and domestic life, in the regions as well as in the city, for a longer span of time.

**Mort's Dock and Engineering Works** was an important private enterprise, but all that remains are some archaeology and memories. The Powerhouse boasts much more, and much richer, material culture, so its memories and substance are at least equally deserving of preservation.

*The Tram Depot has always functioned integrally with the Power House buildings. Thus, when the latter were deemed to have Local Heritage status, the Depot was not listed separately because it was understood to be part of the curtilage of the Power House.* In contrast, the less significant **Ultimo Post Office**, adjacent to and owned by MAAS, was placed on the Local Heritage Register as a separate entity because *it was not part of the curtilage of the power station.*

In recognition of the significance of both entities, the Power House and Tram Depot are listed separately on the **Register of the National Estate** and on the **National Trust Register**. NSW should take this opportunity to go one better and list the whole of its world-famous Powerhouse Museum on the State Heritage Register.

Yours sincerely

A handwritten signature in black ink, appearing to read 'D. Rudder', with a long horizontal flourish extending to the right.

Debbie Rudder

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