

MEMO

TO: Nicholas Wolff
FROM: Sean Holmes
SUBJECT: Sydney Modern - Sustainability Responses to City of Sydney Comments
OUR REF: 2302897U-ESD-MEM-00 Rev01 Response to CoS Comments
DATE: 23 March 2018

This memorandum serves as an addendum to the ESD State Significant DA report by WSP (SYD1528900.0.2 RNP171101 SEARS ESD Report Final_Rev5, Appendix AB of SSD Application).

The memorandum responds to comments raised by the City of Sydney relating to the approach to sustainability on the Sydney Modern Project and should be read in conjunction with the submitted ESD report..

BICYCLE PARKING

Bicycle Parking

THE CITY OF SYDNEY COMMENT:

The proposed visitor bicycle parking location is not suitably located being too closely located to the coach parking and a highly trafficable pedestrian area. It is recommended that visitor bicycle parking spaces be relocated to be easily visible on approach, and be easily accessible without conflict between riders, pedestrians and coach passengers.

The proposed staff bicycle parking location does not encourage its use and should be reconsidered.

WSP RESPONSE:

The Sydney Modern project has considered the encouragement of cycling to and from the site, with a view to encouraging the following:

- reduced greenhouse gas emissions when compared to other transportation options
- reduced congestion and single occupant car traffic on roads
- public health benefits from active transportation
- facilitating a point to point flexible transport option for visitors and staff

The facilities have been reviewed during design, with a view to maximising the uptake of cycling to and from the site for both staff and visitors. Issues considered within the design are:

- safety and security
- signage and lighting
- number of parks, showers, lockers where appropriate, in order to comply with Green Star requirements for active transport – the industry best practice benchmark for sustainable transport
- locations and access to and from parking from major cycling routes

The design has been changed to increase the number of visitor parking spaces to 80 for the project.

SUSTAINABILITY

Heating and Cooling and Thermal Envelope Performance

THE CITY OF SYDNEY COMMENT:

The proposal indicates that over 50% of the heat load that needs to be combatted (by air conditioning) is derived from heat ingress through the roof area, but also that over 50% of the annual anticipated energy use in the building is for space heating. This City seeks confirmation that this is what the modelling is signalling and that every effort has been made within design constraints, to limit summer heat gain within the new building spaces, and likewise full attention has been given to achieve highly efficient space heating solutions for summer months.

WSP RESPONSE:

The Sydney Modern project has engaged a suitably qualified sustainability consultant to undertake analysis on energy and thermal performance modelling. The modelling includes a dynamic 3D model, considering outside weather condition, internal heat gain conditions, thermal performance of the building envelope and glazing, and consideration of the stringent internal conditions required for a gallery of this nature. The suitably qualified consultant is engaged to continue providing advice during the design development stage of the project, where thermal performance of the building envelope will be considered in order to maximise the energy efficiency of the project, including consideration of building envelope and glazing performance parameters.

The proposal indicates that the Sydney Modern Project is on track to have an annual energy use intensity (EUI) that is less than half that of the current heritage AGNSW building, and below the average EUI of the Gallery's BIZOT peer group of museum facilities (see graph titled "Sydney Modern Project: Energy Benchmarking"). The project is actively considering additional energy use reduction measures that will further reduce annual energy use, especially HVAC energy use. These design alternatives were not included in this submittal because the preferred options had not been confirmed at the time of submittal.

Note that the graph titled "Site Thermal Energy Use Characterization: Sydney Modern Project" shows that:

- roughly half (54%) of annual energy use goes to total heating needs across the building (inner ring, red band).
- 52% of total annual energy goes to Outdoor Air Preheating and Supply Air Reheating (outer ring, orange band). Less than 1% of the annual energy use goes to conduction losses through the roof (outer ring, pink band).

- The very large air preheating and reheating energy use results from the extremely close temperature and especially humidity control required in the expansive gallery areas of the building. Note that these close control conditions are already at the most relaxed levels allowed by international gallery standards (established by BIZOT) and therefore already register substantial energy savings relative to conventional practice at many peer institutions around the world.

The Sydney Modern Entry Plaza is being designed to enhance the physical, thermal and visual comfort of museum visitors and staff. Conditions on the Plaza under the Canopy are intended to be in between those of fully exposed outdoor areas (ambient) and climate controlled areas within the Museum. The Canopy will provide:

- areas of full protection from rainfall
- areas of light shade that will be warmer than ambient for winter comfort
- areas of deep shade that will be cooler than ambient for summer comfort

The movement of visitors from full exposure to sun outside the Canopy, on through light and then deep shade areas, provides a gradual reduction in daylight and brightness that will make the journey into the lower light environment inside the Museum a visually comfortable one.

To aid the resolution of the Canopy design, thermal comfort and visual comfort modelling of the area under the Entry Pavilion Canopy is being conducted. This work, done iteratively through the design process, is informing the design of the Canopy to ensure that it provides appropriate thermal comfort across the Entry Plaza.

Photovoltaics

THE CITY OF SYDNEY COMMENT:

Calculations suggest the 250 kWp proposal could deliver 4.6% of the electrical energy demand of the building. This is not insignificant, in the building context, but note that a larger system could readily be accommodated on the new roof area. Has a larger system been modelled for payback, energy savings and carbon abatement?

The City of Sydney has a strong commitment to renewable energy generation particularly through on site generation. Pitched solar panels (as opposed to flat, on flat, or near flat roofs) is a common design solution and is appropriate in most commercial, residential and community building contexts. The City strongly supports maximising the solar energy opportunity on the site. Installing the panels flat will immediately reduce the efficiency of operation, and this 'loss' will continue over system lifespan. Further, flat panels will attract dust and bird faecal deposit whereas tilted panels will be kept much cleaner by rain wash. The 'aesthetic impact' issues can be modest and minimised in the design. The installation is to be on new roof not on old roof fabric - this further reduces any aesthetic concerns. Australia will be challenged to meet its international (Paris Agreement) targets and governments at all levels need to demonstrate commitment to renewable energy solutions. The payback period for the proposed 250 kWp system is far better than for the sub-optimal smaller system modelled. A pitched installation makes sense for efficiency, maintenance and stronger carbon abatement reasons.

WSP RESPONSE:

The Sydney Modern project has taken a holistic sustainability approach to considering rooftop photovoltaic systems. Consideration for rooftop PV systems include:

- Rooftop real estate – competing demands for the use of roof top space for outdoor sculpture and other art installation areas, green roof space, publicly accessible roof top urban space including café outdoor seating areas, and photovoltaic systems.
- Whole of life energy and greenhouse gas benefits of installation of such systems
- Other parameters, including structural lift from wind loading on rack mounted systems, visual implications for an iconic civic building, photovoltaic glass, building integrated photovoltaic systems

Whilst Sydney Modern project acknowledges that a large rack mounted photovoltaic system will provide the best energy and greenhouse gas emission outcome, the project has considered other aspects and implications of the technology and have taken a balanced approach when assessing photovoltaics.

As a result of this consideration, the gallery design will include approximately 1,500m² rooftop flat mounted photovoltaic panels, with a total system capacity of approximately 250kW.

Energy Efficiency Opportunities

THE CITY OF SYDNEY COMMENT:

The ESD report states that “many further energy efficiency measures (EEMs) have been loosely or actively considered for the SMP. The analysis work to date has identified several EEMs that have a high potential to significantly reduce energy use or increase thermal comfort and the stability of internal conditions.”

The City urges that all shading and glazing solutions that optimise the thermal performance of the envelope absolutely be taken up, not just “identified/considered”. This building needs to show commitment to the resilience needs of Sydney in 2030, 2050 and beyond when Sydney will be hotter in summer, and experience both more extreme heat events and extended heatwave conditions. It is prudent to design the city’s high profile public buildings to meet well known, CSIRO modelled future conditions

WSP RESPONSE:

Energy efficiency has been embedded within the Sydney Modern project, through a high-performance shading, glazing and a high performance thermal envelope. These elements improve energy efficiency of the design, as well as aid the stability of the internal conditions for the project. In particular, the façade’s ability to maintain internal thermal stability during extreme heat events has been studied and has influenced the design and specification of the entire building envelope. These initiatives and performance levels are considered under both a “Test Reference Year” weather condition, which is a typical year of weather free from extreme events and is best practice for dynamic energy modelling, and a recent year with extreme heat that compares to CSIRO modelled future conditions.

Climate resilience of the project is considered under the Resilience – Climate Change section.

Water and Stormwater

THE CITY OF SYDNEY COMMENT:

The City Supports the water efficiency, rainwater harvesting, water reuse and stormwater cleansing commitments in the ESD Strategy. The City recommend reuse of stormwater for

toilet flushing as well as for cooling tower make-up. The proponent should clarify what is being proposed in the cooling system, cooling towers, harbour heat rejection or both. If harbour heat rejection is proposed then modelling is required to assess potential ecological and harbour temperature impacts of such a solution.

WSP RESPONSE:

The project is proposing to collect, store and reuse rainwater from the new Sydney Modern rooftops to supply make up water to the existing heritage building cooling towers, as well as landscape irrigation for the new building. The project does not propose to provide toilet flushing with rainwater supply as the cooling tower make-up and irrigation demands together consume more water than we can capture across the entire new development..

The Sydney Modern project is proposing to use a harbour heat rejection system to provide all new heat rejection requirements for the project, a Marine Impact Assessment has been provided to support this initiative.

Resilience – Climate Change

THE CITY OF SYDNEY COMMENT:

The inclusion of a detailed climate adaptation plan is recognised and endorsed, but it recommended this not be deferred to a later stage of the proposal – the planning and design work around resilience and climate change should be a priority in the design of the proposal.

WSP RESPONSE:

The Sydney Modern Project team agree; resilience and climate change should be a priority in the design of the proposal. Note that many resilience measures have already been incorporated in the project, including: building entry thresholds well above recommended future flood inundation levels, locating all critical electrical and mechanical services in mezzanines well above recommended future flood levels, high performance facades to increase internal thermal stability, and additional internal insulated gallery doors to increase thermal stability in case of power loss.

The Sydney Modern Project team would reinforce the fact that the project is the first art gallery to target a 5 Star Green Star Rating, administered by the Green Building Council of Australia (GBCA). The GBCA acknowledge that a 5 Star Green Star Rating represents Australian Excellence in sustainable outcomes within the built environment, and encompasses holistic aspects of sustainability.

Please do not hesitate to contact the undersigned regarding this memorandum.

Regards,



Sean Holmes
Associate - Sustainability