Rajeev Maini, Rajat Chaudhary
Manager, South Assessments / Senior Assessments
Heritage NSW
Department of Premier & Cabinet
As Delegate of the Heritage Council of NSW

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Subject: Sandstone Culvert Integrity
Reference: Wallerawang Battery Energy Storage System – Response to Submissions
Date: 14th April 2022

Dear Rajeev, Rajat,

We refer to the above project and the comments raised by Heritage NSW (as delegate of Heritage Council of NSW) during exhibition of the Wallerawang Battery Energy Storage System (BESS) applicable to the existing sandstone culvert located adjacent to the Project Site.

We understand that the primary comments from Heritage NSW are as follows:

The identified sandstone culvert assessed as having local level significance in the SOHI may potentially have higher level significance therefore it is vital that any impact on the culvert is avoided. Recommendation 1 of the SOHI should be implemented to ensure there is no impact during construction works, including vibrations. A structural engineer should be consulted in early stages of project planning, prior to approval, to assess risks and advise on measures to avoid impact.

Arcadis, being structural engineers within the meaning of the Building Code of Australia, have reviewed the culvert and proposed works and have prepared this letter to identify the risks and potential mitigation measures to avoid damage to the culvert. This letter report has been prepared based on a desktop study of the culvert and proposed development of the site, considering comments from Heritage NSW.

The culvert appears to be constructed from segmental sandstone units, laid to form a circular channel. The channel appears to be approximately 15-20 metres long and topped with approximately 3 metres of clayey soil. The culvert is located adjacent to, and north of the proposed site approximately halfway along the northern most boundary. Taking account of the nature of the culvert structure, the proposed construction and operation activities, and based on the requirements from the Heritage NSW, we make the following recommendations to be considered during the detailed design phase.

Dilapidation Survey and Cleaning

The current condition of the culvert is unknown, and we recommend that a dilapidation survey is conducted during the construction phase, prior to any construction works or site clearing activities beginning. The purpose of the survey would be to perform a visual inspection of the culvert noting its current condition and thereby establishing a baseline for future comparison. The zones immediately around and within the culvert are likely to defined as a confined space and so the inspection should be carried out by a suitably qualified contractor. It would be prudent to clear the culvert of any debris or laitance at this time for both improved performance and for improved visibility. The contractor should be made aware of the delicate nature of the culvert and safe work method statements produced. Follow up surveys should be conducted at a frequency to suit construction program and compared with the baseline survey. Any concerns should then be raised with the relevant authorities.

Ground-borne vibration and movement

Structures have different tolerances to movement and vibration which are unique to their material and form of construction. Ground borne vibrations are dependent on geological profile and the generating frequency which is a function of equipment type during construction or operational activities during service life. The culvert is likely to be sensitive to ground borne vibrations both during construction and during operation of the facility. We recommend that during detailed design, a suitably qualified geotechnical engineer is engaged to advise on acceptable limits of vibration for the culvert and appropriate equipment for construction works.

Furthermore, the facility operations should be reviewed for likely vibrational activities and an assessment performed on the long-term effect on the culvert. If determined to be an issue, potential mitigation measures can include vibration dampening, bearing pads, foundation isolation etc. These items can be resolved during the detailed design process by engaging with a suitably qualified acoustic engineer and geotechnical engineer and any equipment suppliers.

Instrumentation and monitoring

Following review by the geotechnical engineer, we would recommend establishing thresholds for vibration measurements which align with the advice provided by the geotechnical engineer to avoid damage to the culvert via a Construction Noise and Vibration Management Plan. An acoustic engineer should be engaged to provide advice on appropriate monitoring equipment and locations. The plan would define the following:

- Safe working thresholds: Where vibration limits do not present risk of damage and work can proceed uninterrupted
- Medium/Action thresholds: Where if limits are breached, a review of the activities would be undertaken, and work practices altered to suit
- Alarm thresholds: Where work ceases, damage assessed, and work practices altered.

All thresholds should be below the maximum values proposed by the geotechnical engineer. The instrumentation and monitoring is critical in managing site activities and mitigating the risk of damage to the culvert during construction.

It is recommended that the geotechnical and acoustic engineer review the likelihood of impact on the culvert for vibration from operational activities during detailed design phase. It is possible that there will be no impact, however if required, this can be managed through measures such as vibration isolation bearings/pads between equipment and structure.

Exclusion zones

There is a low risk of direct damage to the culvert through impact either during construction or operation, however we recommend that thought be given to establishing an exclusion zone around the culvert entrances both during construction and during service. The exclusion zone would prevent any accidental impact from either equipment or debris during construction and ensure access was still available for dilapidation survey. Contractors working on the site should be alerted to the heritage significance and sensitivity of the structure during onsite induction and appropriate safe work method statements submitted demonstrating this recognition where appropriate. During normal operation, we recommend an exclusion zone be maintained to allow future inspections by authorities where necessary and any routine maintenance or repair as appropriate.

By considering the above strategies and measures during the detailed design phase of works, construction works should be able to proceed whilst safeguarding the culvert against damage.

Please request any further information you may require.

Kind regards,

Paul Michael BE(Hons) MIEAust CPEng NER
Building Structures Manager, NSW&QLD

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