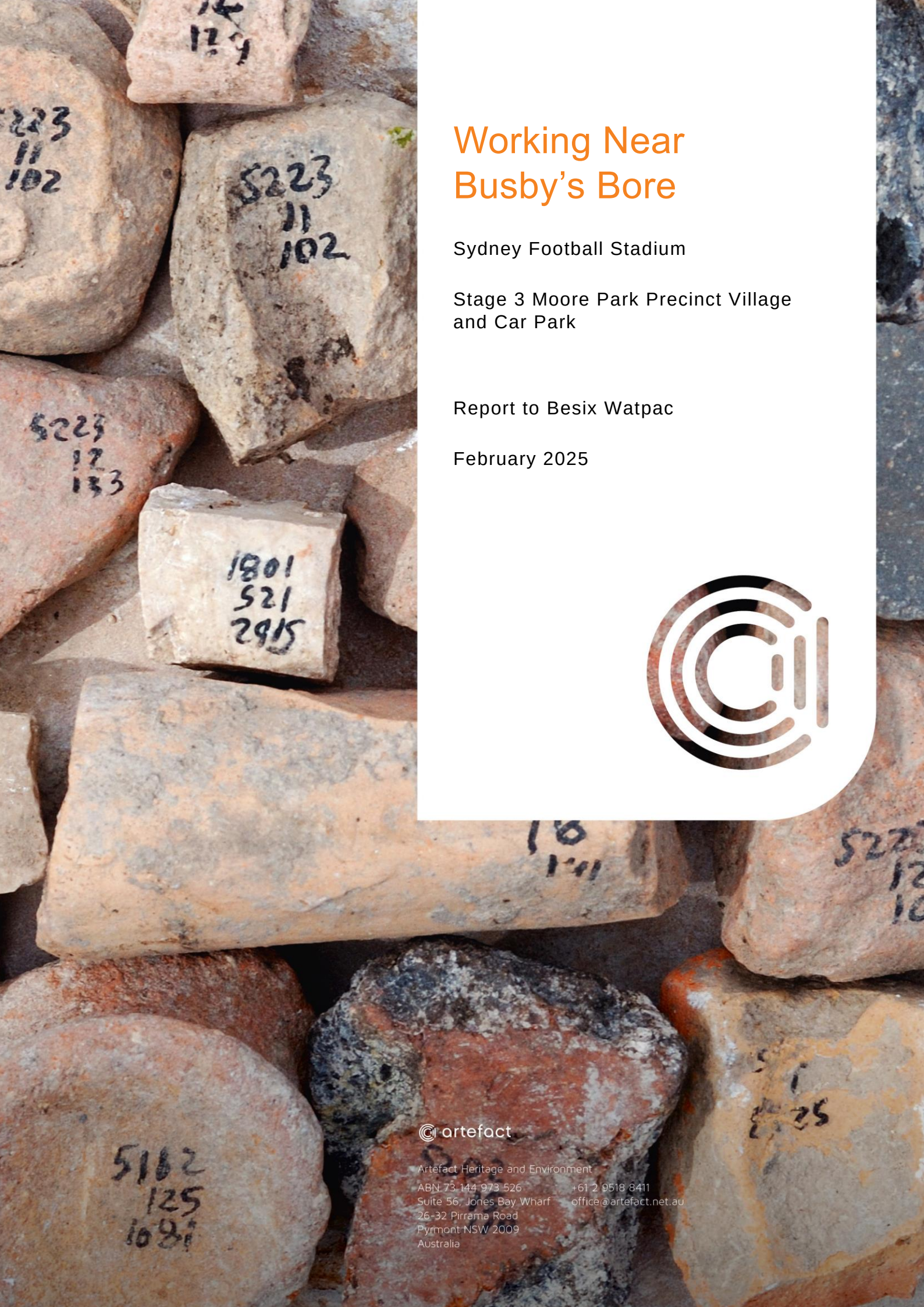

Working Near Busby's Bore

Sydney Football Stadium

Stage 3 Moore Park Precinct Village and Car Park

Report to Besix Watpac

February 2025

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CONTENTS

FIGURES

1.0 INTRODUCTION

This methodology has been developed to support construction around Busby's Bore for the Sydney Football Stadium Redevelopment project.

The methodology was originally developed with the input of Arup (acoustics and vibration), Curio Project (heritage and archaeology) and Aver (construction and demolition management) for Stage I of the Sydney Football Stadium Redevelopment project and was included in the Environmental Impact Statement.[1]

In November 2022 the methodology was updated with input from John Holland and Artefact Heritage to respond to SSD-9835-Mod-7 which details the construction of a Precinct Village (including retail pavilion, tennis clubhouse and tennis courts) and up to 1,500 space multi-level carpark.

The modified consent, SSD-9835-Mod-7, dated 18 July 2022 requires that the Working near Busby's Bore methodology be modified, as stated:

> *B22. Prior to commencement of construction, the Applicant must prepare a Construction Environmental Management Plan (CEMP). This CEMP is to include:*
>
> *(viii) an updated Methodology Statement – Working Near Busby's Bore prepared by Infrastructure NSW dated September 2018, specifically including the details of the proposed works in this development consent, and the recommendations of the Addendum Heritage Impact Assessment, prepared by Artefact, dated 21 December 2021 and the Noise and Vibration Impact Assessment (Issue 2), prepared by Arup, dated 6 September 2021 for the Precinct Village and multi-level carpark stages;*

The recommendations and methodology set out in the updated Working Near Busby's Bore would be integrated into the Construction Environmental Management Plan (CEMP)[2]as well as the supporting required under condition B39 of the modified consent.

The Working Near Busby's Bore methodology was further updated following the discovery of a shaft relating to the Busby's Spur on 25 June 2024 and the associated tunnel on 29 January 2025. The discovery of the shaft and spur tunnel triggered a redesign and approval modification application which reduced impact to the State Heritage Register listed item by reducing the car park footprint, conserving a portion of the spur *in situ* in the car park, and reconstructing a portion of the spur shaft at plaza level. [3]

This version of the Working Near Busby's Bore methodology, which supports SSD-9835-Mod-10, addresses protocols to avoid impacts to the portions of the shaft and spur tunnel to be conserved *in situ*. The Archaeological Research Design addresses methodologies for archeologically managing sections of the item that will be removed as part of the car park works.

Further background information, significance assessment, histories and description of the item can be found in the addendum Statement of Heritage Impact and Archaeological Research Design.

[1] Infrastructure NSW. "Working Near Busby's Bore: - Methodology Statement." SFS Response to Submissions (SSD9249) Attachment 8, 2018.
[2] Artefact Heritage. "Construction Heritage Management Plan Sydney Football Stadium, Stage 3." Report to BESIX Watpac and Venues NSW, 2024.
[3] Artefact Heritage. "Working Near Busbys Bore V4.; Sydney Football Stadium Stage 3 Moore Park Precinct Village and Car Park." Report to BESIX Watpac August 2024.

The methodology for the removal of the shaft and tunnel is discussed in the Archaeological Research Design.[4]

[4] Artefact Heritage and Environment. "Historical Archaeological Research Design, Moore Park Precinct Village and Car Park." Report to Venues NSW and BESIX Watpac, 2024.

2.0 IDENTIFICATION AND ASSESSMENT

2.1 Discovery of the shaft and tunnel

During excavation for the piling platform on 25 June 2024 BESIX Watpac and their civil contractor uncovered what was described as "an old well / shaft". Dr Iain Stuart from Artefact Heritage and Environment, who is the approved Excavation Director for the project, attended the site on 26 June 2024.

As required under the approved CHMP for this project, work around the item ceased, protection against inadvertent damage was erected, and the Department of Planning, Housing and Infrastructure (DPHI) was notified of an unexpected find at the Sydney Football Stadium Redevelopment, Moore Park Precinct, Village and Car Park site. In addition, as a courtesy, Heritage NSW and Sydney Water were also notified of the discovery.

The location of the find, identified in this report as BBS 1, can be seen in Figure 1.

On 29 January 2025, excavation works being undertaken in accordance with the current PV&C approval encountered a tunnel at RL 33.45. Upon examination of the top of the abandoned Busby's Bore Spur Shaft 01 ('BBS-01'), it was observed that the gravel material had subsided by approximately 1.5m, therefore confirming that the shaft and tunnel are connected and also confirming the discovery of the tunnel associated with BBS-01. Investigations completed to date indicate that the tunnel is filled with silt and other debris.

Following the discovery of BBS-1 the proposed works associated with the construction of the car park and Village precinct needed to be modified as the shaft and associated tunnel are located within the footprint of the car park. Condition B39(j) to the SSD contemplated redesign of the multi-level carpark options for basement footings and mechanical plant on the northern Moore Park Road boundary, if Shaft 8 or the spur of Busby's Bore are encountered during excavation works.

It should be noted that a Section 4.55 modification to SSD 9835 is not required to facilitate proposed works on Busbys Bore spur as Condition B39(j) to the SSD approval was specifically imposed by the Minister for Planning and Public Spaces to enable the redesign of the carpark footings if the spur of Busby's Bore was encountered during excavation works (which is the case in this instance). That is, the Minister determined on the advice of Heritage NSW and the Department's Key Assessments Team, that the car park could be approved and should proceed subject to imposition of an appropriately worded condition of consent that as drafted enables the redesign options to be dealt with within the bounds of the consent as approved.

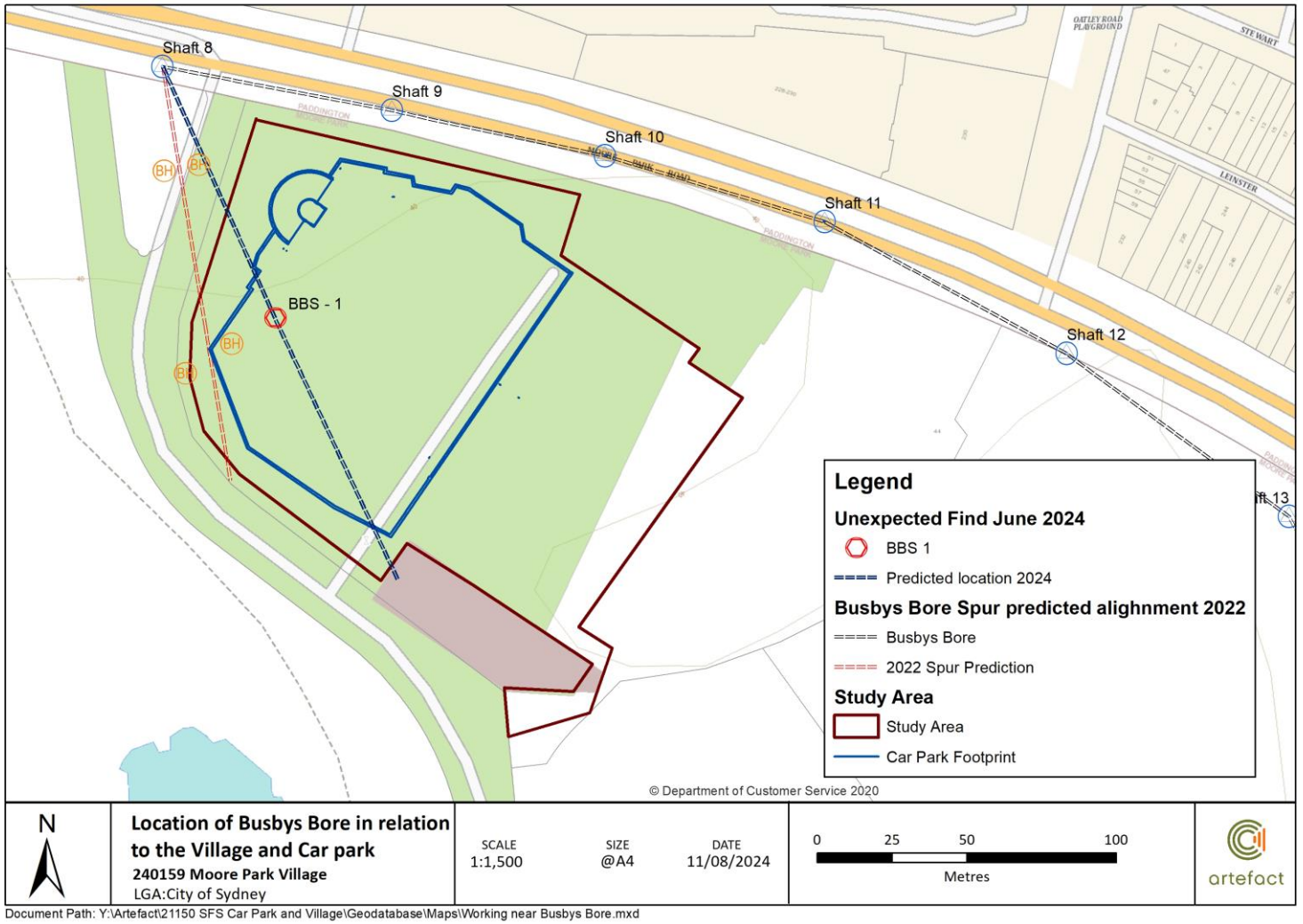

Figure 1: Map of known and possible Busby's Bore shafts within SFS Redevelopment Site, revised to show the location of BBS-1 and the new predicted location of the spur

3.0 PROTECTION

This section discusses the protection of Busby's Bore spur from the first stage of construction work involving the piling platform and piling to the second stage which will involve the construction of redesign Option 3.4.

3.1 Redesign options

Consent Condition B39 (j) of the CoA for SSD 9835 has a requirement relating to the discovery of Busbys Bore within the project footprint.

> *Details of the multi-level carpark redesign options for basement footings and mechanical plant on the northern Moore Park Road boundary, if Shaft 8 or the spur of Busby's Bore are encountered during excavation works.*

As Busby's Bore Spur has been discovered during excavation works Venues NSW has undertaken a process of looking at redesign options for the multi-level carpark.

As required under Condition B39(j) a number of options for redesign of the car park to minimise impacts on Busby's Bore Spur have been developed by Venues NSW and presented in consultation with Planning and Heritage NSW. Option 3.4 was selected as the preferred outcome to manage the Busby's Bore unexpected find. This would involve the partial retention of the shaft *in-situ*[5] and partial rebuilding of the shaft and associated interpretation on the plaza level.

More specifically Option 3.4 proposes:

- Retention of a part of the rock section of the shaft at proposed basement parking Level B4
- Interpretation of a part of the brick and sandstone section on the plaza as a vertical extrusion of the shaft's original location as part of a broader heritage interpretation response.
- Archaeological recording of the removal of the shaft and tunnel.

Archaeological excavation and recording would assist in answering pertinent research questions and provide new information about the history of Busby's Bore.

The section of the shaft that is to be removed will be undertaken by stone masons under archaeological supervision to the level of Car Park B4. The proposed outcome is shown in Figure 2 and Figure 3. Details of the removal and archaeological monitoring are discussed below.

Approximately 69m of the associated tunnel will be removed and archaeologically recorded between the start of the car park excavation and BBS-1. The depth of the tunnel is around RL 33.45. The base of car park level B4 is approximately rock RL 36.260.

[5] Approximately 2.8m or 26% of the shaft.

Figure 2: Section of the proposed car park showing remains and interpretation of the spur (source Venues NSW)

Figure 3: Level B4 with remains of the spur (source Venues NSW)

3.2 Protection during removal of the shaft and tunnel

The aim of the archaeological work is to record in detail the construction of the shaft and tunnel during their removal.

The shaft removal will be undertaken in sections of about 1m in order to maintain stability of the shaft as a whole and to allow the surrounding material to be removed once the shaft is lowered so that the ground surface is lowered in sync with the removal of the shaft.

Development of a methodology for recording and removal of the spur tunnel portion to be impacted is ongoing and will be discussed in the updated Archaeological Research Design.

3.3 Protection of the section of spur within Level B4 to be conserved during construction

Basement Level 04 of the car park will contain the preserved section of spur (as shown in Figure 2). The sandstone portion of the shaft will be removed to the underside of B03 (approximately RL 32.660). When work reaches that level only the interior material will be removed to expose the shaft. The bottom of the excavation for the carpark is RL 30.120.

The following measures should be undertaken when working near the shaft.

- Physical exclusion zone and protection measures, such as barriers or fencing, must be established around the conserved portion of the shaft during construction to protect it from inadvertent harm
- The exposed portion of the conserved shaft should be covered with protective material, such as geotextile fabric or tarpaulin, to protect it from dust and debris generated by nearby construction and from natural elements
- Care must be taken during the construction of the concrete car park slabs immediately surrounding and above the shaft. Concrete splash protection must be installed
- The concrete base slab must be constructed in a way that the weight of the slab is not directly supported by the conserved portion of the shaft
- Following the completion of construction, the exposed shaft must be cleaned of any dust or debris using non-harmful methods.

Detailed mapping of the tunnel would be provided to the construction team and archaeological supervision required for any bulk excavation within 3m of the predicted location of the tunnel in line with recommendations of the 2004 Conservation Management Plan.

Further information is provided in the Archaeological Research Design.

3.4 Long term protection of section of shaft and tunnel during operation

The long term protection of the conserved section of the spur once construction is completed is outside the scope of this report, but for completeness it should be noted that a Conservation Management Plan may be needed to assist Venues NSW with management of the remans.

4.0 MONITORING PROTOCOLS

Details of the monitoring and vibration plan is provided in Chapter 4 of the Pulse White Noise Acoustic Report.

A conservative vibration criterion of 3mm/s, based on structural damage criterion for 'sensitive structures' in DIN 4150 – Part 3 will be applied.[6] The vibration monitors will be calibrated to generate real-time alerts (SMS messages and/or flashing lights) when vibration criterion is exceeded.

In the event that the vibration criterion is exceeded by works on site, an alert will be sent to the Site Manager. This alert will trigger a cessation of works and the project archaeologist and structural engineering advisor will be notified and requested to attend site. A visual inspect of the pits and/or bore will be undertaken to determine whether any damage has been sustained.

An exceedance of the vibration criterion will necessitate a review and potential change in demolition, piling and/or construction methodology as advised by the project archaeologist and structural engineering advisor. These changes could include:

- Re-evaluation of the vibration criterion based on results of the initial condition investigation and inspections of the structure following the commencement of works
- Maintain vibration monitoring throughout PV&C works
- Reduce the size of demolition and construction equipment and develop alternative methodologies to minimise vibration
- Use less vibration emitting demolition methods such as concrete pulverisers and smaller percussive hammers if necessary closer to Busby's Bore
- Use rubber tracked excavators and machinery if necessary closer to Busby's Bore
- Balance variable speed vibrating plant and operate at speeds that do not produce resonance
- Ensure all fixed plant at the site are appropriately selected (on a risk assessment approach), and where necessary, fitted with vibration attenuation measures
- Position vibrating plant and equipment as far apart as it practicable from each other and consider whether orientation and location of the plant can reduce vibration impacts at sensitive receivers such as Busby's Bore
- Use non-percussive piling techniques for all piles where practicable
- Ensure that vibratory compactors must not be used closer than 30 meters from sensitive receivers unless vibration monitoring confirms compliance with the vibration criteria specified.
- Maintain machinery and equipment
- If necessary, plan traffic flow, parking, loading/unloading areas to minimise movements within the area of Busby's Bore.

[6] German Standard DIN 4150-Part 3 'Structural vibration in buildings – Effects on Structure'

5.0 ARCHAEOLOGICAL SUPERVISION AND MONITORING

Archaeological monitoring during the piling works and any works that may impact portions of the tunnel that are to be conserved is required as follows:

1. Monitoring of the pile filling to verify that no impact on Busby's Bore has occurred
2. Monitoring of the bulk excavation within 3m of the spur tunnel to verify that no impact on Busby's Bore has occurred
3. Review of the vibration data and the Construction Management Sub-Plan if required.

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