Heritage Impact Statement

Project details

Heritage Impact Statement for: Beehive Company Gold Mine

Victorian Heritage Register Number: H1361

This Heritage Impact Statement forms part of a permit application for: Undertaking immediate repairs to the Beehive Chimney, to address two primary safety risks:

(a) Ensuring the chimney is maintained in a good state of repair

(b) Arriving at an earthquake loading rating that is closer to desired.

This project will utilise 'Parks Victoria Enhancing Access' program funding (deliverable by 30 June 2025).

Pre-application meeting number: P40992

Address and location description: Main Street, Maldon (Chimney feature)

Prepared by: Statewide Heritage team, Parks Victoria.

Prepared for: Parks Victoria

Date: 29 May 2025

Significance of the place or object

The cultural heritage significance of the place or object

What is significant?

The Maldon quartz reefing field, although relatively small compared to others in the State, was extraordinarily rich in gold. The hardness and heavy mineralisation of the rock containing the gold placed Maldon's mining companies in the vanguard for the introduction of new mining technology. Beehive Reef was opened in 1854 and was mined until 1918. Large-scale mining commenced in 1860, when machinery described as the 'most extensive in the colony' was installed. The 60 horse-power engine powering the machinery was called at the time the 'most powerful employed in mining speculations in Victoria'. The site's towering brick chimney stack, constructed in 1861, has been recognised historically (since 1923) as a monument to Maldon's nineteenth-century gold mining.

How is it significant?

The Beehive Company Gold Mine is of historical, archaeological and scientific importance to the State of Victoria.

Why is it significant?

The Beehive Company Gold Mine is historically and scientifically important as a characteristic example of an important form of gold mining. Gold mining sites are of crucial importance for the pivotal role they have played since 1851 in the development of Victoria. As well as being a significant producer of Victoria's nineteenth century wealth, quartz mining, with its intensive reliance on machinery, played an important role in the development of Victorian manufacturing industry. The Beehive Company Gold Mine is important as a manifestation of this aspect of gold mining.

The Beehive Company Gold Mine is scientifically important for the survival of its brick chimney stack. This stack provided draught for the steam boilers. Chimney stacks, like the Beehive one, were once a common sight on mid- to late 19th-century quartz mines. The Beehive stack today is the only one of its age and size still standing in Victoria. The significance of the stack has already been recognised through a National Estate listing and is now a landmark and heritage symbol for the township of Maldon, Australia's first notable town. The stack's scientific value is enhanced by its association with a broad range of mining relics. The Beehive Company Gold Mine is also significant for its potential to yield artefacts and evidence which will be able to provide information about the technological history of gold mining.

Existing condition of the place or object

Description

Standing at approximately 26.7 metres tall, the chimney stack was constructed in 1861 and is the only surviving example of its age and size in Victoria. The stack provided draught for the steam boilers to work the extensive quartz reef mine that was rich in gold. It operated until 1918. It is located within a publicly accessible park.

Approximately two metres of the chimney were removed following damage from a lightning strike in 1923. The chimney currently stands at 26.6 metres above the ground – and therefore is estimated to originally have been approximately 29 metres tall. The Chimney consists of tapered circular shaft of varying wall thickness (thickness decreases with increase in height)

seated on a rendered square pedestal (assumed to be rendered brickwork) seated on a stone & brick base / footing (appears predominantly stone). See *Figure 1*.

The bricks to the Chimney shaft have a curved external face. The original mortar to the brickwork is expected to be a lime-rich mortar – testing is currently underway to confirm. Repair works to the chimney's brickwork shaft last appear to have been carried in c1996. Those repairs were undertaken using a cement-rich mortar.



Figure 1: Structural engineer's sketch of the Chimney, showing the stepped shaft wall thickness

Issues

Parks Victoria allocated funding in September 2024 to undertake a structural assessment of the chimney, and concurrently applied for external grant funding to deliver repair works. Unfortunately, the application for external grant funding for works was unsuccessful (February 2025).

The structural assessment included full height inspection from an elevated platform, recording of existing conditions and measurements, mortar testing, geotechnical investigation, and structural calculations including modelling and load analysis. The structural engineer was also asked to provide a range of repair options and make recommendations.

In February 2025, Parks Victoria allocated a further limited amount of funding to the delivery of repair works to the Beehive Chimney, through the 'Enhancing Access' program.

The same structural engineer was engaged to prepare detailed design and specification documentation. There is a very ambitious timeline due to the funding requirement that works must commence prior to 30 June 2025.

Structural assessment findings

In undertaking the conditions assessment, the structural engineer noted:

- It is not mandatory for existing structures of this age and type to meet current codes, however the calculations provide a useful analysis to understand how the structure may perform.
- There is severe weathering to bricks and mortar at top 6.7m section, particularly internally. The absence of capping has contributed to this, and enabled water/wind ingress. See *Figure* 2.
- Missing and badly-pitted bricks as a consequence of previous repairs using an inappropriate mortar (causing salts to damage brickwork, resulting in pitting, exfoliation, and brick fall). See *Figure 3*.
- Geotechnical investigations confirmed that the chimney foundation is sound and founding material is siltstone rock.
- That the design life could be categorised as 100 years, and an Importance Level of 2 were appropriate parameters that would be used in the calculations.
- Using these parameters, and noting a 1-in-1000 year event, the wind loading rating at all heights was determined as currently meeting (and exceeding) the 1.8 desired rating.
- Using these parameters, and noting a 1-in-1000 year event, the earthquake loading rating for all heights was noted as currently below the desired safety factor of 1.8.
- Repairs to address areas in poor condition is required within 12-24 months to ensure the integrity of the structure.



Figure 2: A view looking down inside the Beehive Chimney showing no capping, and severe erosion of interior mortar at the top section (January 2025)



Figure 3: A section of the Beehive Chimney (south face) showing mortar, pitted bricks, and loss of brickwork (January 2025)

In summary, the key issues that require addressing are:

- A. Missing bricks/deterioration caused by previous repairs using a sub-optimal mortar (causing salts to try and leave via brickwork, and resulting in pitting, exfoliation, brick fall)
- B. Severe weathering to bricks and mortar at top 6.7m section, particularly internally (due to no capping, water/wind ingress)
- C. Earthquake loading 1 in 1000 year event, as is, each section is below desired safety factor of 1.8, which presents a potential public safety risk

Earthquake loading: Using design life (100 years) and importance level (Level 2) parameters, ideally, an overall reduced height to 20m is recommended to lift rating to meet desired 1.8 (lower height, less risk). However, because analysis of historical data suggests the probability of a large earthquake event in this location is 'very unlikely', structural engineer advises that a lesser 'absolute limit' rating (1.5) may be acceptable, which enables some reconstruction (albeit to a reduced height of 23m).

Current use of the place or object

The Beehive Company Gold Mine site is currently a publicly accessible park.

Constraints and opportunities resulting from the significance of the place or object

The curved bricks required to fill gaps and replace severely weathered bricks cannot be easily sourced, and the reuse of existing materials from higher up the shaft is an efficient outcome.

Contemporary building techniques and codes have developed since the date of original construction and, while not mandatory, provide valuable guidance on how to best mitigate safety risks. Given this is a public park and a highly trafficked pedestrian area, Parks Victoria aims to come as close as possible to meeting non-mandatory contemporary codes to reduce safety risks and ensure the area of the park around the chimney can remain open and accessible.

There is some precedent for a modest reduction in height to address safety concerns, noting that the chimney was reduced in height following damage sustained from a lightning strike in 1923.

Proposal

The proposed works

The scope of works for Option 3 includes (see Attachment 1: Design documentation prepared by Ingegnaria Consultants, 'For Tender & BP Application', 29 May 2025):

REMEDIA WORKS SCHEDULE TYPE DESCRIPTION DEMIL . RWOI DENIOLISY TOP APPROX 7 METRES OF CHIMWEY SHAFT DOWN TO STEP CHANGE IN SHAFT WALL THICKNESS 230 TO 350 MM SALVACE & CLEAN BRICKS FOR REUSE . RUDZ & FILL IN HOLES IN BRICKWORK B INVESTIGATE / TEST GREY COLORED PREVIOUS REPAIR MORTAR IF CENIENT RICH-REMOVE & REPOINT. DEPTY OF PREVIOUS REPAIR MORTHE APPEARS TO BE APPROX 10 TO ZOMM C REPOINT BRICKHORK TO SHAFT'S RETAINED BRICKWORK D CRACK STITCH VERTICAL CRACKING REFER DETAIL SUB2 RWO3 A REBUILD APPROX 3.5 METRES OF CHIMNEY SHAFT TO 23 METRES MAX ABOVE GROUND LEVEL MEASURED ON SOUTH ELEVATION, IN 230 MM BRICKNORK - BOND PATTERN TO MATCH EXISTING CHIMNEY SHAFT BRICKHORK. B. FRONIDE METAL CAPPING TO WHOLE OF SHAFT . NOTE CAPPING TO BE TIED DOWN TO NEW BRICKWORK REFER DETAIL SHOP RWOL A CLEAN & PREPARE TOP SURFACE OF UPPER CORNICE TO PEDESTAL & PROVIDE WEATHERSTRUCK RENDER COATING FROM SHAFT TO EDGE OF CORNICE B INVESTIGATE PEDESTAL'S RENDER COATING COMPOSITION FLAYERS & MIX) TO INFORM RENDER REPAIR TOP COAT RWOS A FILL IN HOLES IN THE BASE'S BRICKWORK & STONEWORK

B REPAIR ALL MORTAR BETWEEN THE BASE'S BRICKS

Due to significant time and funding constraints, this work will be delivered in two parts:

- Stage 1 repairs covered by General Exemptions, and commencing immediately; and
- Stage 2 all remaining works, subject to statutory approval.

The Stage 1 repairs will include the erection of self-supporting ('freestanding') scaffolding (General Exemption 12.9), and repointing up to an estimated 50 square metres, with lime mortar (General Exemption 2.3). See *Attachment 2: Record of Decision Making, Stage 1, repairs*.

The Stage 2 works will include all other items.

The proposed permanent reduction in height has been kept to an absolute minimum, while balancing the requirement to achieve an as high as possible earthquake load rating, as well as providing for a sufficient number of curved bricks to be made available for reuse for missing or badly deteriorated bricks elsewhere.

The works have been carefully specified and balanced to address safety risks, while minimising the degree of change required. While these works necessitate a change in height to a feature that substantially contributes to the heritage place, they ensure that this chimney can remain in-situ, substantially intact, and in good repair, while also reducing the immediate threat to public safety. The significance of this feature and the larger Beehive Company Gold Mine site will still be clearly understood, and the heritage values will not be detrimentally impacted.

It is planned for this scope of works to be delivered within the limited available budget and timeframe (subject to approvals, procurement, and consultant and contractor availability).

A range of options were considered for these works (see Table 1), with Option 3 being the preferred option. On Option 3, with respect to the earthquake load rating, the structural engineer notes that:

"The factors of safety dip below the absolute threshold of 1.5 in the mid to upper regions of the chimney for a large earthquake event. However given the earthquake history suggests that the probability of such an event is very unlikely, it is considered acceptable in the short term for the Chimney to exist at 23 metres maximum height conditional upon repairs to all material deterioration defects. In the long-term consideration should be given to a further evaluation of strengthening options or the introduction of an exclusion zone around the Chimney."

The 'material deterioration defects' will be addressed (repointing the mortar, replacing bricks where required, and deconstruction of the top 6.7m), and these works are therefore minimising the risk of any further bricks falling from height in the short-term.

Given the probability of a large earthquake event is 'very unlikely' based on analysis of historical data, the lower earthquake load rating is considered acceptable in the short-term.

This proposal is subject to statutory approvals, including the Building Act and Heritage Act.

The structural engineer has developed design documentation suitable for tender and approvals.

Options considered

Various repair options were explored (Table 1) during the structural assessment. All options included the following essential works: crack stitching, deconstruction of the top 6.7 metres, removal of all previous sub-optimal mortar repairs (c1996), repointing with lime-rich mortar, and installation of capping. Options 1A and 1B also included some further strengthening works and reconstruction of the top 6.7 metres, while Option 2 proposed that the top 6.7 metres not be rebuilt.

Parks Victoria has considered the heritage impacts, costs, timeframe/complexity, and how close each option comes to meeting the desired earthquake AEP rating (Table 1). Parks Victoria requested a further option be considered by the structural engineer – Option 3. This additional option is to rebuild as much as possible of the top 6.7 metres, while salvaging whatever bricks are necessary to fill gaps and replace the most highly damaged bricks. While this option moves away from meeting the (non-mandatory) desired earthquake rating, it remains within the absolute threshold, and Parks Victoria accepts this slightly higher residual risk.

Table 1: Comparing options

Options		Heritage impact	Costs	Timeframe/Complexity	Earthquake safety risk
1.	1A. Full reconstruction, and strengthening with post tension rods	Best practice (conservation approach), rebuild a good outcome, suitable treatment that will ensure longevity and resilience	Likely exceeds currently available funding. High materials, high labour, requires scaffolding/ elevated platform. Footing/rods fabrication and install 200-300k.	Likely not achievable within available timeframe. Standard Heritage Act approval process (1-2 months), but long lead time on sourcing/fabricating curved bricks and specifying/fabricating rods, install will require substantial deconstruction and sub-surface works. Footing/rods install component 2-3 months.	Meets desired AEP rating (1.8)
	1B. Full reconstruction, and strengthening with concrete	Best practice (new build approach), rebuild a good outcome, suitable treatment that will ensure longevity and resilience	Likely exceeds currently available funding. Moderate materials, high la bour, requires scaffolding/ elevated platform. Custom solution, unknown cost.	Likely not achievable within available timeframe. Standard Heritage Act approval process (1-2 months), but construction process challenging and long lead time on sourcing/fabricating curved bricks, above-ground works only. Custom solution, unknown timeframe.	Meets desired AEP rating (1.8)
2.	No reconstruction 6.7m, and no strengthening	Least preferred. Unlikely to be considered acceptable by statutory authority or community. A substantial change but maintaining the structure and significance of the larger place, some justification for not rebuilding, precedent for reducing height in 1923, positive reuse of curved bricks to resolve other issues (not easy to source/fabricate elsewhere)	Likely within currently available funding. Minimal materials, moderate labour, requires scaffolding/ elevated platform.	Likely achievable within available timeframe. Above-ground works only, reasonably simple scope of works, however longer Heritage Act approval process anticipated, community engagement required.	Close to meeting desired AEP rating (1.8)
3.	Reconstruction of 3m, with no strengthening	Middle ground. May be considered acceptable by statutory authority and community. A change but maintaining the structure and significance of the larger place, some justification for not rebuilding, precedent for reducing height in 1923, positive reuse of curved bricks to resolve other issues (not easy to source/fabricate elsewhere). No sub-surface disturbance required.	Likely within currently available funding. Moderate materials, moderate labour, requires scaffolding/ elevated platform.	Likely achievable within available timeframe. Above-ground works only, reasonably simple scope of works, however longer Heritage Act approval process anticipated, community engagement required.	Does not meet desired AEP rating (1.8), but close to absolute threshold (1.5)

Information to support an assessment against sections 101(2) and 101(3) of the Heritage Act 2017

Impact of the proposal on the cultural heritage significance of the place or object

While this proposed scope of works involves reducing the height of the chimney, it enables the structure to remain in place, without the need to impose an exclusion zone, and continues to contribute to the significance of the larger heritage place.

The proposed 3.7m reduction in height, equates to ~14% of the overall structure. The visual impact of this, both from a distance and standing beneath, are considered to be relatively minor. The filling of gaps in the brickwork where bricks have been lost over the years with original curved bricks is a positive outcome, and does not necessitate the introduction of new materials which may not match perfectly and will prove difficult to source or produce. The removal of the very prominent white mortar from c1996 and its replacement with an appropriate lime-rich mortar will provide a consistency to the overall appearance of the chimney. The internal stepping inside the chimney stack will remain.

The capping will add to the protection and longevity of the structure through combatting water/wind ingress, and is another positive outcome.

Provide reasons why the proposed works should be supported. Reasons must address the matters which the Executive Director is to consider under s101(2) including:

The 'Parks Victoria Enhancing Access' program is the only source of funding currently available to deliver these repairs. While full reconstruction and the introduction of strengthening would be an optimal outcome in the future, the context of this location does not necessitate such a high level of intervention, and funding for a much more complex and costly scope of work is not currently available.

We are confident that the proposed scope of works can be delivered within the limited timeframe and within funding available. A more complex scope of work (including any option that involved sub-surface disturbance) would be unachievable within the limited timeframe and funding constraints. Failure to undertake these works would require alternative safety mitigation measures to be imposed including restriction of access around the environs of the chimney.

What other matters relating to the protection and conservation of the registered place or object may be relevant [s101(2)(f)]?

A refusal of this application would result in loss of funding which would further limit Parks Victoria's ability to meet the Minimum Standards for maintaining heritage places in good condition, per the Heritage Act (2017) and Heritage Victoria guidelines.

Reasons may address the matters which the Executive Director may consider under s101(3) including:

This site is within the Victorian Goldfields World Heritage Bid area of interest.

Addressing safety risks

There are several risks that this project is addressing, including code compliance and meeting the Minimum Standards as per the Heritage Act (2017). There are also two primary safety risks to address:

(a) Ensuring no further bricks from fall from height

There is significant mortar missing from the interior of the top 6.7 metres. The structural assessment confirms that this is due to the chimney being uncapped, and water and rain ingress inside the chimney, scouring out the mortar over time. To address this, works to the top 6.7 metres is required.

Further down the shaft, there are also many gaps where bricks have dislodged and fallen out, and many severely deteriorated bricks. The structural assessment confirms that this is due to salt attack and efflorescence. To address this, works are required to rake out areas with a sub-optimal mortar repairs and re-point using a lime- rich mortar. The condition of each brick can also be assessed during this process and replaced only where required, or left in-situ if deemed to be in good condition.

The proposed scope of works would fully arrest deterioration, and minimise risk of further brick fall.

(b) Arriving at an earthquake loading rating closer to desired

Existing structures of this age and type do not need to meet earthquake load ratings. However, it is useful to understand how close the structure is to meeting current codes, and consider the likelihood of peak earthquake events and potential consequences.

The structural assessment noted that, based on calculations, only a permanent reduction in height (removing 6.7 metres), or substantial strengthening works (including either installation of post-tensioning rods, or a stiff inner shell) would achieve an earthquake load rating close to the desired 1.8 rating. The original options (1A, 1B, 2), are not supported given that the resulting cost and timeframes cannot be accommodated (1A, 1B), and the detrimental heritage impact is not considered acceptable (2).

It is important to note that the earthquake loading ratings, by which the desired 1.8 is calculated, is based on peak earthquake events. The structural engineer subsequently sourced and analysed several documents considering historical earthquake events in this region to better understand the likelihood of peak earthquake events, and notes that no major earthquakes (magnitude >6) have been recorded:

"Maldon is assessed to be in a region of low to moderate seisimicity. Therefore, the risk of a major earthquake is considered to be low however such events typically cause more damage because of shallower earthquake depths and lower building standards in these regions. Ground shaking attenuation is very rapid in Victoria and unless a small to moderate earthquake occurs virtually under the Maldon area significant damage of the Chimney should not be expected."

The structural engineer further explains that these earthquakes described are well below the 'peak loading event' that the calculations have been based on, and notes that the Chimney has survived many previous low-level earthquakes.

This permanent reduction in height of approximately 3.7 metres, in combination with the essential repair works, will result in an increase in the earthquake loading ratings, bringing them closer to the desired rating and thus minimising safety risks.

Summary of impacts and conclusion

The benefits of the proposed Option 3 are:

- Chimney can remain in-situ, substantially intact, and in good repair
- Permanent reduction in height has been kept to an absolute minimum
- Some curved bricks will be made available for reuse to fill gaps and replace where necessary
- Earthquake load rating considered acceptable by structural engineer and within Parks Victoria's risk tolerance (enabling the park to remain open for public access)
- 'Material deterioration defects' will be addressed (repointing the mortar, replacing bricks where required, and deconstruction of the top 6.7m), and thereby alleviating the risk of further bricks falling from height in the short-term
- Likely deliverable within the available budget and timeframe

Recommended conditions and staging

The engagement of a suitably qualified and experienced Contractor for the delivery of works will be undertaken as per Parks Victoria's procurement requirements. It is anticipated that the Stage 1 works will commence prior to 30 June 2025, and Stage 2 works will be undertaken after that, if approved.

As per the pre-application discussion with Heritage Victoria (8 May 2025), it is anticipated that a Heritage Protection Plan may be a Condition of the Permit, and this would be developed in close consultation with the appointed Contractor.

Attachments

Attachment 1: Design documentation prepared by Ingegnaria Consultants, 'For Tender & BP Application', 29 May 2025

Attachment 2: Record of Decision Making, Stage 1, repairs