

# *3<sup>rd</sup> Australasian Engineering Heritage Conference 2009*

## **Managing Active and Redundant Industrial and Engineering Heritage Sites**

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**SUMMARY:** *Management of active and redundant industrial heritage sites, including buildings, structures, infrastructure, landscapes, settings and equipment has been and will continue to be a challenging area of heritage conservation. Most heritage sites of an industrial nature are either under threat or will be under threat in the future as they become redundant and obsolete. Collectively these sites form a large part of the heritage of the areas in which they are found and they are the most difficult of all heritage sites to protect, retain, conserve, fund and find appropriate uses for. Most successful retention and conservation programs for industrial heritage places arise from large-scale redevelopment works where retention of some part of a place is required through a consent process or as one-off actions of committed individuals or groups to save a particular site or feature.*

*Industrial and engineering built heritage and infrastructure has not received the same focus as private or government non-industrial buildings, landscapes or precincts. Consequently much of our engineering heritage will disappear and making decisions on what to try and retain and how to manage it is important if this aspect of our heritage is to survive.*

### **1. INTRODUCTION**

Most of our industrial or engineering heritage will disappear, in fact, very little will survive and what does survive is unlikely to be the most interesting, important or significant.

This may seem a depressing way to commence a paper on how to manage and conserve these places but engineering and industrial heritage have been well behind in terms of recognition and planning to protect their particular heritage values. A relatively small interest group fights for engineering heritage in contrast to other more generally accepted ideas of what heritage is. It is hard to move beyond the aesthetic and picturesque to engage the public in heritage understanding although the dramatic and the breath taking (as seen in activities such as the Sydney Harbour Bridge bridge climb) have placed some engineering heritage at the centre of public experience.

It is an interesting but probably sad reflection that engineering and industrial sites have more heritage 'appeal' once they are closed, interpreted, provided with a cafe and where they are integrated into a picturesque setting. Even innovative heritage places such as the blacksmiths workshop at Launceston Museum where almost nothing has changed or been removed since the last fire was put out lack that vital element of ongoing use that makes engineering/industrial sites most significant.

However, being realistic, industrial sites with high heritage value are unlikely to remain in use and retention, conservation, preservation, adaptation and interpretation can all assist in conveying their value to visitors and for research.

By its very nature industrial heritage is designed not to survive as unlike many other built features it does not often lend itself to adaptation or re-use and the cost of maintaining redundant industrial infrastructure is of such magnitude that without some form of economic return, which usually arises from use, the majority of industrial or engineering sites do not have a future.

This leads to several quite obvious conclusions:

- 1 Maintaining places in use is the best way for most sites to have a future
- 2 Managing sites prior to redundancy is the best way to retain and preserve significant sites
- 3 Understanding what is most significant and why is the best way to target places that should be retained
- 4 Focussing on a relatively small range of places better uses available resources to achieve hopefully better heritage outcomes.

This paper explores these concepts as well as successes, failures, funding, balancing often competing cultural values that do not consider engineering value as highly as other heritage values, the value of recording sites, interpretation, when to let sites and features go and when to fight for retention of engineering heritage. The issue of adaptive re-use and how that often removes core heritage values from engineering and industrial sites will be discussed along with the importance of strategic planning to enable heritage retention of vulnerable places.

### **1.1 Explanations**

To avoid confusion, as this paper considers a very wide range of issues and places, I set out some guiding parameters:

- 1 By necessity the paper is general and there will be exceptions, I have no doubt, to many of the matters that are raised. This does not change the overall points being made about the difficulty of managing industrial heritage sites.
- 2 Movable engineering heritage is not specifically addressed. It is noted that there are substantial collections of movable heritage that vary greatly in quality and value, many are in museums, often locally based and some are held by organisations.
- 3 It is assumed that most industrial sites that become redundant cease their planned use and consequently an aspect of their significance is lost. The exception to this is the relatively large number of active railway museums where use continues.
- 4 OH+S issues often mean that industrial sites cannot be retained. This particularly relates to contamination but also general safety issues related to future uses.
- 5 There are many very active and often successful volunteer groups who operate former industrial sites such as railways. This paper, while making general comments about these types of sites, does not underestimate the value of this activity.

## **2. ASSESSING HERITAGE VALUE**

No decision about a heritage site should ever be made without understanding the heritage value of the place and its component parts.

The heritage value may seem obvious for some places, but generally it requires considerable research and understanding to come to an informed and balanced position on what that value is and how it compares and relates to its locality, to other similar places, etc.

If a place is to be retained as a museum site without change then most values are likely to be retained, perhaps except ongoing active use. However most industrial sites that are approaching or become redundant do not become museums and will at best survive in small part. Understanding what is most significant about each place is essential to achieving good outcomes.

Major sites require a conservation management plan to guide decisions. The preparation of these documents requires its own paper as if these documents are to be useful they must achieve the following:

- 1 A good historical understanding of the place, processes and innovations
- 2 A clear statement of significance
- 3 A very clear analysis of the relative significance of the component elements of the place
- 4 A good comparative analysis of where the place fits into the broader range of similar places:  
and when all of this has been understood;
- 5 Policy (rather than recommendations) on viable ways to retain and manage what is important.

As a general rule motherhood or generic policy statements in such documents achieve little. There are often complex and conflicting issues to be resolved in setting out policies for industrial sites that require careful preparation of policies.

A good example of a complex site is Goat Island in Sydney Harbour. It is partially used for shipbuilding and repair but also contains a collection of early colonial buildings. The island, once the base of the Maritime Services Board in Sydney, is now part of Sydney Harbour National Park and is in the process of planning for the future.

The island has an overlay of exceptional colonial powder magazines, wharves, barracks and quarrying with one of the last active shipyards in the harbour. The shipyard use has an adverse and major impact on the earlier structures and features, but clearly both are significant.

The CMP involved extensive analysis and comparative study (around the world for some aspects of the site) to determine the relative values of the components parts so that any policy that provided for the removal of parts of the infrastructure could be supported on the grounds of significance as a primary reason.



*Figure 1. Goat Island, view of shipyard.*



*Figure 2. Goat Island, Colonial Powder Magazine*

This raises the issue of why would removal of parts of a place be considered if they are significant? In the case of Goat Island, which exemplifies many of the issues that are found on most industrial heritage sites, some of the reasons for developing policy that considered quite radical options for the future were:

- 1 Much of the infrastructure is in poor condition, some collapsing requiring complete replacement, e.g. wharves, and some no longer capable of operation.
- 2 The cost of repair to features such as wharves alone exceeds the whole operational budget of the place.
- 3 Rising sea levels, that are already evident on the reclaimed areas of the island, will see a number of structures and features underwater in the future.
- 4 The operational standards of the shipyard require extensive upgrade that will adversely impact on heritage values.
- 5 The costs of upgrading the shipyard to commercial level will not provide for any financial return.
- 6 The costs of conservation, restoration and adaptation of the colonial and most significant aspects of the place are very high and alone require substantial funding, further funding is unlikely for other aspects of the place even though also significant.

While this is a simple analysis, it highlights the difficulties of maintaining even high profile sites in the centre of a large city where there is a high level of visitation possible.

### 3. MANAGING ACTIVE SITES

There are no operating engineering or industrial heritage sites that are easy to manage for their heritage values.

Fortunately there remains in some government and private organisations a pride in what has been achieved in the past that reflects in the way elements from the past are retained. More often, however, economic considerations dictate that replacement is a better option than repair and that new technology must replace older technology.

A model study is the Hydro Tasmania approach which I delivered a paper on at the last conference. It was model as they committed to understanding their history and what was significant before determining changes and then they assess the impact of change against heritage values and, where possible, and it is not always possible, make decisions taking into account heritage values.

A small but good example of this is a small and remote Tasmanian Dam where a safety assessment determined that the dam wall was at risk of collapse due to its construction. While in my non-engineering view this was a poor recommendation based on only empirical analysis and current design standards and without the benefit of understanding how the dam wall was built, the decision had been made to rectify the problem. Through review of the decision it was possible to retain a large part of the original construction without alteration and to solve the non-compliance. This only happened because the dam had been identified as having high significance in a heritage study and a review process was triggered by proposed works to places of that level of significance. Alternative design solutions could then be explored to try and resolve the issues of heritage value and ongoing use.

Often the solution is to reduce the amount of work or change taking place and to only do what is needed to address the specific problem. What tends to take place is that a much broader scope of works develops around a problem that has consequential impacts on heritage value. With this dam the solution was to only concrete line the spillway, which was the high risk area and to retain the flanking dam walls with their finely crafted stone facing.



*Figure 3. Hydro Tasmania Dam with stone walling of heritage value.*

This also raises the complex question of the heritage value of old technology when that technology is no longer appropriate in a working complex. It is far easier, for example again looking at a hydro site, to retain heritage values in inert features such as buildings, pipelines, dam walls, etc., rather than in the power generation units and the electrical or control systems. Solutions that retain the appearance of a place but provide for replacing the operating systems are not that hard to develop but I would suggest that much of the real significance is then actually removed.

A common suggestion, in attempts to retain heritage value at active sites, is to remove a piece of equipment or infrastructure that is redundant and relocate it to a museum or repository to provide an example of the design, technology etc.



**Figure 4.** *Tungatinah Power Station, the turbine has been rebuilt within the existing chamber and casing, retaining the appearance but not the fabric.*

It is in situations such as the one outlined above that retaining elements as museum exhibits can have a value, preferably they are retained on site near their original location but this is not always possible. It is also important to establish if items are being kept purely to retain material evidence of past equipment or features or if it is to have a display and interpretation use.

Some organisations maintain their own museums or collections and manage them well providing for interpretation and public access. If items are simply left near their original locations there is a high risk of long-term damage and accidental loss.

Clear planning and policies are important to manage removed or relocated heritage items.

A less successful, in my view, integration of heritage elements into a working system is found in much of the recent upgrade work undertaken by State Rail in NSW. This probably occurs on other rail systems as well.

State Rail has undertaken many heritage studies and have very good records and understanding of their heritage, built, technical and operational. Putting aside steam operation which survives in museum form due to the high level of interest and commitment of enthusiasts, the general operating system has struggled to conserve its heritage with upgrade requirements and a failing level of service and operation.



**Figure 5.** *Bomaderry Railway Bridge, built but never used and now collapsing.*

Even sites and infrastructure considered to have rarity and high significance continue to be lost or compromised by upgrades. Perhaps this is inevitable and we should only expect a small remnant of the heritage of an old operating system to survive.

One of the greatest enemies of heritage conservation in operating systems such as rail networks is the corporate zeal of management to unify and re-badge. This is seen in regular upgrades of signs, fences, pavements, paint schemes, use of standard and usually inappropriate (for heritage sites) materials and an often unbalanced focus on removing liability from the organisation for what may happen on its property.

While there is no real argument with making places safe and easy to use for the public, using unsympathetic standard elements on important heritage sites is both poorly informed and denigrates the heritage values that our being espoused in the studies that are undertaken before upgrades occur.

A simple solution is to develop a secondary set of materials and finishes that are appropriate and complying for use on particular heritage sites. This need not be expensive or onerous and can achieve very good heritage outcomes. It requires a major change in corporate thinking however to achieve.

A difficulty in arguing for retention of heritage values at many engineering sites is the inability to provide access or interpretation as the sites are not accessible. An element of a place's significance is always tied up with the ability of the place to demonstrate its value and while the item or technology itself can be of great significance, when it cannot be publicly appreciated it can be harder to justify retention. Some elements are of such significance that being accessible doesn't matter, others rely on being able to be seen or accessed.

An example of the difficulties of public access can be seen at a number of Hydro Tasmania sites where public access has in the past been encouraged with picnic grounds, small visitor centres and museums and guided tours of major sites and features including operating power stations. This provided a high level of public interaction and appreciation of the technology and allowed for extensive interpretation. Difficulties with OH+S and liability, the cost of staffing and maintaining such activities as well as a decline in visitation has seen them all close. Interestingly those features themselves, designed to appreciate the heritage of the operation, are now part of that heritage and at risk of being removed and lost.

A key factor in achieving success in terms of heritage management of operating sites is the attitude of the senior management of the organisation to heritage. Without appropriate funding, programs of works, commitment to achieving good standards of work and a level of flexibility in approach to important heritage sites, little will take place to achieve heritage outcomes.

The corollary of this is having realistic expectations of what can be achieved to conserve heritage and maintain an operating system. Not everything will remain and compromises will be required, a level of pragmatism is essential to achieve even modest outcomes.

Understanding what is significant and why it is significant will underpin arguments for retention of heritage values.

#### **4. MANAGING SITES ABOUT TO BECOME REDUNDANT**

Often there is little warning about the closure of industrial or engineering sites that have heritage value, which gives little time for planning or negotiating about their future. Often the land on which these structures and elements are located is valuable and there is no intention to retain even parts of the place for their heritage value. Heritage is seen as an impediment to future development.

Recent examples, such as the CUB site in Sydney, illustrate the intensity of development pressure in cities and the limitations on retaining heritage elements. Generally features that are retained are the architectural elements of an industrial site that are more capable of productive adaptation. Very little infrastructure, machinery or equipment is retained on these sites.

The ideal situation is where an organisation prepares for redundancy by undertaking a heritage assessment, determining how to deal with important heritage features and elements and incorporates heritage in the future use, sale or development of the place. Some local councils or authorities will insist on this taking place and where development pressure is high can have considerable success in retaining heritage features. However this is not always the situation and inaction on more peripheral sites will see the place deteriorate to the point where usually it cannot be realistically saved.

An interesting example that illustrates a number of difficulties in planning, approvals and retention is Wangi Wangi Power Station near Newcastle in New South Wales.

Prior to closure of the station a detailed study was undertaken by the power agency of its equipment and infrastructure. Each element was graded for significance with recommendations of what was essential to retain for heritage reasons. The building itself is significant but probably not as important as what it contained. Having undertaken the study the power generation authority planned for disposal of the site and remediated the place by removing all equipment and in the process doing considerable damage to the building. The place has remained in this deteriorated state since. The site was acquired privately and plans prepared to re-use the building effectively to build a small town within the shell of the vast structure. Part of the proposal was to add several residential levels to the top of the building to take advantage of the superb views. This was initially refused on heritage grounds as it affected the form and appearance of the former power station building. This was appealed and on review the work was approved, but not without much argument and persuasion based on the alternative being the loss of the building.



*Figure 6. Wangi Wangi Power Station*

This highlights several fundamental issues for engineering heritage.

- 1 Despite a very fine study, recording and analysis, nothing was retained of the operational part of the place apart from the building and chimneys and these were allowed to fall into very serious disrepair.
- 2 When a change was proposed that gave some chance for the place to have a future it was resisted because of purported heritage values, even though the major heritage values had already been lost and finding a new use was the only way to save any part of the place.
- 3 Comparative research of disused power stations around the world (in this example) revealed that apart from sites such as the Tate Modern Gallery in London - an adapted power station - that almost none of these sites survive as they are too hard and too expensive. When this is understood considering change, even considerable change to a place, becomes more reasonable and is usually the only way of maintaining anything for the future.

Wangi Wangi is unlikely to have a viable future apart from a development site with perhaps a few remnants of the station retained. Large redundant engineering sites generally have very little prospect of being retained.

What then should happen to these sites in terms of planning for redundancy?

The usual answer is archivally recording the place. This is valuable but limited as it usually takes place after closure when much of the fitout has been removed.

A better option is recording while in operation which gives some understanding of how the place functioned. Ideally recording should include oral and written history, film and still photography and collecting records of the place.

I have over many years recorded a large range of sites including hospitals, power stations, hop kilns, cement works, prisons and railway sites but most had already ceased use. The resulting recording while evocative do not reflect the heritage value of what has taken place.

An often suggested use for parts of larger sites is as a museum displaying the history of the place. In very few situations is this viable or appropriate. Interpretation of the history of the place as part of new development is sound and widely undertaken and can be very creative in engaging public interest. Sadly, however, interpretation can often be token and not engage with the detail that is important on engineering heritage sites.

Working on many industrial heritage sites has revealed that there are no fixed ways of approaching their management - apart from understanding their heritage values first - and that opportunities need to be defined for each place.

The heritage outcomes for sites that are to become redundant will be determined by:

- 1 The heritage values of the place and its component parts,
- 2 The location and accessibility of the place for visitation and interpretation,
- 3 The potential to develop uses that are viable as well as compatible that allow some of the heritage fabric to remain,
- 4 The financial resources available,
- 5 The level of adaptation that is possible before its heritage values are unacceptably compromised,
- 6 The commitment of the owner/manager to heritage.

Balancing these factors can be difficult.

## **5. MANAGING REDUNDANT SITES**

Redundant industrial sites are in some ways the easiest but in other ways the hardest to manage. The level of difficulty depends on a range of factors but principally where they are located and what potential they have for adaptive re-use. The more 'industrial' the site the harder it usually is to adapt or at least adapt and re-use successfully. Sites of just engineering value, that is without buildings or other usable or adaptable structures, such as bridges or industrial plant are very difficult generally to manage once they are redundant.

The following section looks at a number of case studies to illustrate some of the issues in planning to retain heritage values at redundant industrial/engineering sites.

### ***5.1 Hop Kilns***

One of the most evocative and interesting industrial site types I have worked on has been Tasmanian hop kilns and their related infrastructure. There are about 40 extant kilns in the Derwent Valley of varying designs and built mostly of brick or timber or a combination of the two. Many kilns retain their operational equipment, some movable heritage and a range of interesting technical features. Kilns comprise a drying floor or metal mesh on slats, heated from beneath with wood, coal, gas or oil furnaces and one or more levels of drying floors, often with low head heights, sometimes only 1.5 metres in height. The lower floor of many kilns retain hop presses, loading docks and bays, rakes, paddles, metal labels and other material.

The most significant and robust kilns are in a single group and ownership and there have been concerted attempts by the owners to develop uses including tourism, accommodation and commercial use. They are however located in relatively remote locations and are not in Hobart or a days travel from it making accommodation difficult.

The remaining kilns in the Derwent Valley have had relatively little other use apart from low-grade agricultural storage. Several have been adapted for residential use that has involved extensive reconstruction so that only the outer form of the buildings remain. Compliance with building codes has not allowed original fabric to survive. One is used as a gallery and restaurant with reasonable success.

Many of the timber kilns, having been out of use for 40 years, are in very poor condition and will be lost along with their workings. Several have been demolished due to their poor condition.

These are iconic industrial structures that are not only significant for their engineering and industrial heritage but as visual landscape elements in a very significant modified landscape. This is a rare example of industrial heritage defining a picturesque landscape and the whole landscape deriving from the growing and processing of hops.

The sites are managed by individual owners, some of whom take an interest and look after the buildings and equipment and most of whom do not maintain the structures.

This is a building type that does not easily convert to other uses, and only one or two can be adapted for public uses as they are relatively closely located and duplication of uses is not viable.

Despite considerable research and work there have been no long-term uses found for the majority of the buildings and infrastructure.

## 5.2 Railway Buildings on disused lines

While railways, at least in NSW, have been stripped over many years of their heritage attributes and as already noted in this paper have been dumbed down by the corporate branding of the system, some quite intact railway sites remain.

I first took an interest in railway structures and technology in the mid 1970s when I surveyed a large part of the NSW railway system (completed in the later 1980s) for a thesis on railway structures. This was followed by a second post-graduate thesis on how to establish the heritage of railway buildings and structures. During that period I recorded many of the railway sites in the state. This was at a point where line closures and major cutbacks were taking place and in conjunction with the National Trust I prepared a record of what remained.

Re-visiting some of these sites in recent years is depressing as highly significant sites with fine groups of buildings, technology and infrastructure have disappeared completely, often without trace.

Fortunately disused lines generally remain in government ownership and some are simply abandoned leaving a fascinating legacy.

One location by way of example, Dumaresq, outside Armidale retains almost all of its site features as last operated. Some of the rail sidings and points were removed earlier as use declined, but most elements remain.



*Figure 7. Dumaresq Railway Station*

The site was established in the 1880s with a station building of three attached pavilions, a brick platform, station signs, signal frame (now disconnected), station masters residence (now in private ownership and well maintained), point levers at each end of the yard, a home signal, road crossing with rails, remains of gates, culverts and a grain shed. The place has general grounds maintenance presumably provided by the owner of the residence but otherwise is unattended and unused. The station building is used for storage and is secured, because the residence is close and occupied the place has not suffered from vandalism.



*Figure 8. Dumaresq Railway Yard with abandoned infrastructure.*

As the place has not required upgrades to satisfy constantly changing OH+S requirements, has not been subjected to standardisation and new low grade materials, signs and fitout and has not been upgraded it retains an amazing connection with its past and encapsulates traditional railway operation and practice in country NSW.

But does it have a future? And what of all the other similar infrastructure that is abandoned?

As the line and trackwork exist, even though not operational, it remains a railway and cannot be disposed of in the event that the line could be re-activated. Based on the practice of removal of most redundant railway buildings on active lines it could be assumed that as the site features deteriorate they will eventually be removed unless there is a specific plan to retain the place for its heritage values.

What makes it unusual now is its intactness and its mid Victorian date which exemplifies railway development in Australia. What makes it difficult is that even though close to a significant country centre, it is out of the way and unlikely to attract visitation or uses that would provide for public access. Even if the place could be sold, as some disused railway sites have been, its most likely use is residential or as an adjunct to a residence. Small railway buildings do not lend themselves to contemporary living without considerable change.

Whatever the outcome for sites such as this, it is unlikely that they will retain the quality of intactness that presently exists.

### **5.3 Bridges**

Bridges represent engineering achievement at its peak from our earliest structures to contemporary bridges.

Bridges fall into several categories:

- 1 Major bridges, usually but not always remaining in use, that are generally not under threat and which are well maintained. These range from colonial stone bridges, through various types of steel bridges to concrete in the twentieth century.
- 2 Minor bridges often of timber or steel or a combination of both and more recently of concrete. These bridges are more often found in the country outside towns, are often modest, narrow and require considerable maintenance. They were built in the case of rail and road as part of low cost railway construction to open up the country or where materials were difficult to access or across minor waterways on minor country roads.

Over time as roads and conditions are upgraded all of these bridges will be scheduled for replacement with new wider, better graded, better aligned bridges. Rarely does a replaced bridge survive, even if located adjacent to the new bridge, as they quickly fall into disrepair and become dangerous. Most replaced bridges are not of high individual significance but their representative value as a feature of the landscape is disappearing quickly. There are some notable exceptions where early bridges are retained adjacent to their replacement structure.

In attempts to preserve some of the engineering heritage of bridges, even relatively common bridges on operating roads and railway routes, studies and reports have been prepared by various authorities to identify structures that could be retained as examples of what once proliferated. Suggestions have been made to retain good examples in varying locations or to retain a group of similar structures on a single road or railway line where they can be maintained with greater ease.

A rare example of redundant bridge that has not been removed is outside Armidale in NSW where a small over-rail bridge remains adjacent to a new concrete bridge.

It only survives as the railway line is abandoned and the bridge presents very little risk to anyone. As the structure slowly deteriorates and fails it will inevitably be removed.

An example of very significant bridges that are redundant are the small stone bridges along the alignment of the old Midland Highway in Tasmania that are now abandoned with adjacent new road construction. Some remain in use on back roads but many are now on private property and no longer maintained. These are convict built engineering works of fine quality that require maintenance. They are gradually being recognised for their heritage value by heritage listing.

Another example of a major timber bridge, abandoned but retained for its heritage value is the timber trestle bridge near Gundagai in NSW. It is a spectacular structure that is increasingly in poor condition and which will require major conservation work if it is to survive.



*Figure 9. Dumaresq road bridges, old and abandoned and new beyond.*

#### **5.4 Fortifications**

Australia has an extensive collection of fortifications dating from first settlement of Sydney through the Crimean, the American War of Independence, the First and the Second World Wars. Often forts are overlaid on earlier structures because of the commanding positions they occupy.

Collectively they represent a major engineering achievement as well as a fascinating historical statement about our development as a country. Like many major public works most fortifications were redundant before they were even complete and their designs suffered from poor decisions about how to protect Australian ports and harbours. Nearly all of the fortifications around Sydney Harbour, which I have studied are long redundant and most have been abandoned, often stripped of fittings, sometimes infilled and mostly dangerous. They are however an extraordinary collection of structures with an amazing engineering and technical history.

Most of the Sydney forts are owned and managed by DECC National Parks and Wildlife Service or the Sydney Harbour Trust. Some sites are under separated ownership and management.



*Figure 10. Middle Head Sydney Accessible Fortification*



*Figure 11. Middle Head Sydney Non-Accessible Fortification*

Basic maintenance and security of the collective sites exceeds the operating budgets of the managing bodies. Conservation work, which does take place on selective sites, is expensive and by necessity very limited. Only the most interesting structures are maintained.

I was involved in preparing a strategic plan of management for the NPWS forts sites around Sydney and a number of policies developed that are of interest.

- 1 Firstly it became obvious that the cost of proper conservation and management of sites, many of which are underground, exceeded any potential budget that could ever be allocated, consequently most sites could not be maintained. This meant that those sites would have to have a management strategy that allowed continuing deterioration but provided basic safety to prevent collapse of structures etc.
- 2 Secondly it meant that high risk sites needed to be sealed off, if that was possible, or for some remote underground sites that were subject to regular break-in and vandalism, infilled with sand for safety. This was a dramatic policy that has not yet been acted upon but which will, once an accident occurs at a site, be adopted quickly.
- 3 An approach to site safety, given that many of the sites have high visitation and high risks under current OH+S regulations, was developed to address high risks but not all risks as the sites by their nature contain a high level of inherent risk. This has been adopted but caused considerable fear as risk is now one of the major forces that dictates heritage outcomes.

The approach was simple and was based on identifying areas of public access that was planned or intended (such as paths or picnic areas), providing warnings where there were sudden level changes, known lookout locations or stairs that were heavily accessed by the public, providing safety fences to key areas such as lookouts and guide fences with a simple top-rail for other areas to indicate that there was a changed condition. Dangerous routes were re-directed to prevent obvious hazards and short-cuts blocked. General signs warning that only specific areas were fenced were located at all entry and path commencement points. Undergrowth was used to deter access from dangerous areas around paths and the balance of the site was treated as a natural environment with standard NPWS approaches to bush areas.

These works in themselves were costly but relatively modest when compared to other approaches.

- 4 A similar approach was taken with maintenance. A basic schedule of works was developed to prevent ongoing deterioration and to provide higher levels of security. High risk areas were identified for immediate remedial or stabilisation works. Schedules of work were then established for key sites.
- 5 Two sites were identified as having potential for significant future works, visitation, public access and interpretation. These were both of National significance.
- 6 A major funding proposal was recommended not only to conserve the engineering and military heritage but to enhance the visitation as a destination of National profile.

What is particularly important from this study was the acceptance that inevitably only a small amount of conservation could take place even though the place is of such high significance and then managing it within that framework.

### 5.5 Overlooked heritage sites

Australia has a vast collection of overlooked engineering or industrial heritage sites. It is an aspect of our heritage that although recognised in heritage studies and thematic studies does not fare well when no longer required. Often industrial sites are considered a blight to the locality and undesirable and as residential development constantly expands into former industrial areas there is increasing pressure for industry to cease and relocate, long standing sites often of considerable heritage value are more valuable for other development and disappear.

Many remote sites are also overlooked. I have visited closed and abandoned cement works, brick works, power stations, mines, quarries, railways and foundries across NSW often recording them (many without consent). Apart from photographs and sketches, for the sites that I have visited that I have taken and no doubt others have similar experiences there remains no formal recording of many of these places that were often important industries and employers for whole communities.

### 5.6 Ruination

A relatively new concept in heritage planning is retaining sites in a ruined form and allowing them to gradually deteriorate until they reach a point where they disappear. The concept is new only in the sense that the heritage movement seeks to identify, heritage list and then maintain places of heritage value. The idea of allowing significant places to continue to decay is hard to accept and plan for.



*Figure 12. Henry Head Sydney Abandoned and accessible fortification.*

It is particularly appropriate for engineering heritage where many significant features are robust and can stand with slow rates of decay. As an alternative to clearing sites when redundant, where there is no pressing use for the site as is the case with many country locations, simply making it safe and leaving it can provide a strong understanding and interpretation of the landscape and land uses.

Ruination can be seen in old mining sites that have not been remediated, routes of abandoned railways with cuttings, tunnels and embankments, early farm buildings remaining in the landscape used as hay stores and the like, the remnants of dry stone walls, remains of timber bridges, culverts, quarries, etc.

The policy of ruination dominates the strategy for managing the fortifications of Sydney Harbour - there is to be no attempt to recover the forts but to manage them as ruins with safe access and interpretation.

For ruination to be successful in allowing people to understand what has happened it needs to be planned. This appears to be a paradox, but if for example a section of railway is allowed to remain as a ruin without remediation and removal of the evidence, its form and detail in the landscape provides all of the clues necessary to understand what happened, where it operated and how it worked. The planning is to ensure that sufficient remains to tell the story of the place.

For many engineering sites ruination is probably the best chance of retaining features and aspects of their significance.

## 6. IS THERE HOPE FOR ENGINEERING HERITAGE?

There is sufficient interest and activism within the community and amongst engineering and heritage professionals to ensure that some engineering heritage survives. Given the vast amount of engineering heritage that has existed, what does survive will be a very small segment.

What then is most likely to survive?

Firstly heritage that involves passion on the part of those conserving it. This often focuses on working heritage such as steam museums where the operation of the heritage items within a context motivates both the conservator and the public. There will always be visitation of these sites by enthusiasts but more importantly by the broader public.

Secondly high profile sites where development deals are made that provide for retention of aspects of the history and heritage of the place. This may involve some museum display but is more likely to be interpretation within an adapted structure sometimes using interesting remnant equipment or machinery.

Key heritage sites identified by government agencies where there is a commitment to retain and maintain heritage features. These are often higher profile sites or sites with a range of heritage values that include engineering heritage.

A miscellaneous range of sites in private ownership or management where the heritage features or structures can co-exist with other adaptive re-uses and which may enhance the appeal of the place for commercial or tourist activity. Retaining working equipment in hotel rooms such as IXL Jones in Hobart or the Q Station in Sydney has an appeal to guests who are looking for a 'unique' experience.

A small number of museum sites such as Waddamana Power Station which also allows the display and interpretation of collected heritage from related sites.

Engineering or industrial landscapes where the engineering works have modified the site and setting to such a degree that it is not possible or desirable to return the site to an earlier form. Some of these sites are evocative - Mort's Dock in Sydney - becoming landscape features apart from their engineering or industrial value, others cleverly manage the heritage elements in creative ways - Paddington underground reservoir park -to retain the heritage fabric.

Some abandoned industrial or engineering sites where there is little pressure for development and heritage features remain through their robustness. Mining sites or places like the early hydro site at Armidale where weirs and flumes now form part of walking tracks in the national park

## 7. CONCLUSIONS

High profile engineering sites will survive as a record of the major engineering achievements. Apart from the buildings related to engineering heritage sites light houses, power stations, some maritime sites, bridges, etc will be represented as both operational and redundant heritage sites.

Other engineering heritage will survive to a much lesser degree and mostly when there is a concerted local interest group who are prepared to be active in preserving the particular place. This restricts heritage conservation to areas that have an appeal and where there are sufficient people prepared to contribute.

Private engineering conservation is of very small scale and cannot be relied on as a strategy to retain important sites. A client showed me a superbly restored horse driven water pump from the 1820s that he had preserved and conserved when he accidentally discovered it on his property. Even though his property was of high significance and interest with many fine heritage features of great appeal, their location could not support any sort of public use or access that allowed him to undertake further works on other features of equal interest.

How do we manage and conserve engineering heritage? We keep maintaining pressure on the major owners and managers of this heritage to identify, manage and conserve their heritage responsibly and we keep the profile of this once neglected area of our heritage high.