What makes Industrial Sites Heritage Significant and how can they be Managed to Retain their Heritage Value in an Operating System?
The Heritage of Hydro Tasmania – a case study

Paul Davies B Arch (Hons) M B Env (Bldg Cons) ARAIA

Summary

Over three years I have undertaken a comprehensive heritage survey of all aspects of the Hydro Tasmanian system including one former private power scheme and one remaining private scheme. The objective was to assess each place, building, feature and major element for its heritage value and to make comparative assessments across the whole system. Each site and element was visited and recorded. I was selected to undertake the work partially as a non-engineer who had no detailed knowledge of the system but also on the basis that I had undertaken extensive broad-scale heritage surveys of regions and building types including studies of railway sites, the hop industry, lighthouses, jails, port facilities and fortifications. This is important as the assessments incorporated a broad range of values that extend well beyond the technical achievements of the place or item.

Often industrial heritage is recognised only for its technical achievement or innovation, but major achievements such as Hydro Tasmania are significant for the impact they have had on the economic achievement of the State, for the social changes brought about by bringing a large work force into the country from overseas, for the creation of towns and local infrastructure, for the impact of construction on major (in this case) wilderness areas, for innovations in rehabilitation, for the political action taken to prevent development in places such as the Gordon below Franklin, etc. as well as the often extraordinary solutions developed to solve unique engineering problems.

Significance is also not always in the large or impressive but is found in small elements that tell storeys of human endeavour. Often abandoned sites or ruins contain significance and the Hydro system contains excellent examples of abandoned and closed sites.

This paper explores some of those themes with numerous examples taken across the system to demonstrate how industrial sites have a broad range of heritage values.

1.0 INTRODUCTION

It was an interesting decision of Hydro Tasmania to engage a heritage architect to undertake a comprehensive heritage survey or audit of the complete Hydro working system to determine what heritage values it has and which elements or features demonstrate that heritage value.

The key issue for the client was how to manage heritage and continue to provide upgrades and maintenance of their infrastructure without unknown and unplanned issues arising at the last minute as heritage issues tended to only arise when planning for changes was well underway.

A key aspect of undertaking large scale heritage studies is to have a sound comparative base from which to make determinations and to apply well-established and consistent analysis to the assessment. Having previously undertaken studies on the railway system of NSW, the Hop Industry in Tasmania as well as other industrial sites and having carried out heritage studies of six regional and urban areas in Tasmania provided a good basis for this study.

I want to explore matters that assist in determining what is significant, in this case on Hydro sites, but more generally when there is a related group of places each of which, if considered in isolation, could be seen as significant.

2. SOME CONCEPTS

When approaching a major study I like to work from the broad down to the particular. With so many sites, with so many variations on a theme, with so much innovation and achievement it is necessary to define the components that contribute to significance so that a level of discernment can be achieved in recommendations about each item.

2.1 Significance

For Hydro sites a number of specific attributes became apparent that were not related to other industrial or engineering sites. These were only
determined however after extensive research and reading on how the system was built, determining what were the important developments (noting that nearly every new piece of infrastructure has some development over previous examples) comparing it to other developments in Australia and elsewhere in the world. An organisation such as Hydro Tasmania has good records and material to draw on and several very fine published works on the history and development of the system, these provided good background. Sound assessments of heritage value and significance can only be made when a correct and informed understanding of the history and background of a group of places is achieved.

The attributes that affected how significance was determined included:

- how power schemes were developed and how they required manipulation of rivers and lakes and the catchment and movement of water to achieve efficiency
  - there are a number of examples of relocating rivers, changing the direction of rivers, raising water from one catchment into another, all that have profound impacts not only on the Hydro system but on the surrounding environment
  - the re-use of water in a system so that it flows through a number of power stations, in some cases stations on unrelated rivers
  - the use of pipes, channels, tunnels and pumps to re-direct water through rugged and difficult terrain
- how they were built often in very remote and inaccessible locations and under difficult conditions
  - how access was achieved during construction for workers and materials, sometimes through light rail, often with horse drawn carts and often without road access during to the difficulty of the terrain
  - the physical constraints of building dams, in particular, in steep gullies with severe site constraints
- whether the station, dam or element established a new benchmark in design, innovation or construction technique
  - there are many examples an outstanding one is the development of rock fill dam construction over a succession of increasingly larger dams that have led the world in this form of design
- whether the element represented the peak of achievement for its type
  - there are numerous examples both within Australia and overseas but examples of tunnelling techniques and thin concrete dam wall construction stand out
- for smaller items the innovation, even in modest ways, that is found throughout the system
  - the way in which water is collected from even very minor sources, collected channelled and moved into larger collection points
  - the scale of some items, seen in their height, mass, etc.
    - a number of dams are of particular interest due to their height, span and construction form
  - the rarity of the item
    - although many items are unusual and designed as one-off structures, a number have rarity related to their significant form
  - the age of the item, a number of very early stations, dams and items remain, some in operation that give them great historical value
    - Lake Margaret
    - Tarrallea
  - a number of stations were built during the second world war for example under difficulties with the supply of materials and equipment, this is one attribute that gives them value
    - Tungatinah
  - exceptional workmanship
    - dry stone walling at Lake Margaret

I established a grading of significance to assist in relative assessment ranging from:

- Very high
- High
- Medium
- Low
- None

After undertaking the survey we agreed that places of high and very high significance were essential for the understanding of the development of hydro power and needed to be carefully managed and retained wherever possible and that medium items were desirable to retain, but as they were largely representative or typical elements did not need to be retained in all situations. This needs to be reviewed particularly if elements of medium value decrease so that they become increasingly rare. Ongoing review of outcomes is a critical part of management.

2.2 Relationship of elements to the overall system

Understanding how each element fits into the overall development of hydro-electric power in
Tasmania was however the major factor in considering significance. By looking at the overall framework of development the first thing that stands out is that development took place in a series of phases:

- early development of private stations and the first government station at Waddamana
- the first expansion of the system culminating in the construction of Tarraleah Station and its supply system
- the expansion from post-war to the 1960’s
- the development of the west coast wilderness schemes with their political implications.

Key elements define each of these phases that are important to the overall story of how hydro power was achieved.

2.3 Comparative Analysis

Comparative analysis between similar elements is an essential way to cross check levels of significance. When all items were identified and sorted by item type, each group of items was cross-referenced and effectively placed in order of significance. This quickly locates any items that have an irregular assessment of significance and checking of the relative values can be made. This also allows a quick check to make sure that the important examples of the item type have the correct assessment. When there are many similar examples it is easy during the detailed assessment process to give levels of significance that are not comparative, particularly if related to elements that are very significant.

2.4 Group value

While assessments tend to be on an individual basis for an element, it is often the grouping of elements that adds to or creates significance. Sometimes an otherwise moderately assessed element can be given higher significance if it is integral to other significant elements. Considering each element within the broader group, such as part of a power station fitout, may change the assessment of its significance.

2.5 Peer Input

For a group of places that have a high level of specialist and technical knowledge, which I am not fully aware of, having input from specialists is important. On the Hydro project workshops with engineers and managers who actually built some of the infrastructure were arranged to firstly identify what was there and how important they thought it was, to get background knowledge about construction, difficulties, innovation, etc that would not otherwise be found and in some cases to visit sites.

Further input was gained by a review process at the end of each stage of work where several members of the workshop reviewed all of the material and made comment on detail but also on how they saw significance. Apart from odd disagreements most of the assessments made were confirmed through this process.

2.6 Documentation and Database

Due to the scale of the project (it was spread over three years and three stages to make it manageable) and the ever present cost constraints of undertaking these studies site visits were necessarily brief. I took an extensive record during fieldwork by photograph of each item and worked from good site layout and design plans provided by the client, however not every item appeared on a drawing and some older, remote and small sites had almost no records. This in part reflected the history of some of those sites that were privately developed and later added to the State generation system.

The output from the study was a report outlining the process and methodology along with core recommendations and a database into which every element examined was entered and considered. Elements varied from a dam, a power station building, an inlet valve, a shadow board for tools, a crane, etc. Items such as control equipment were dealt with as single elements even though they comprised a number of smaller elements. If a particular component was significant this was noted in the database.

The database was set out with base information on location and item type, date of construction, description, statement of significance, threats, recommendations, pictures, etc. It was designed to be linked to the asset management system so that information could be placed on the existing property files. This allowed a warning system to be developed so that when work was planned on an item of significance it triggered a process of checking for the impact of the work on heritage values and a review process of the proposed work.

The test of any study is whether it is used or whether it remains archived. Sadly many excellent studies never get utilised. This is a different story. The database is now an integral part of the management system of the organization and the database is available across the whole organization in hard printed copy and on line.

2.7 The importance of public action and its impact on heritage significance

The Tasmanian Hydro system, in its latter developments has been the focus of extensive protest action that has had a profound impact on the way work was undertaken or not undertaken. This
has a major impact on heritage significance for social values as well as the practical outcomes. Many of the people involved in both sides of those issues are still involved and have strong views. Irrespective of this the environmental background to the latter station developments is a major aspect of significance that needs to be recognised. It does not tend to affect the detail or the day to day operation and for most of the material prepared in the database does not factor.

More recently there has again been public action about the closure of Lake Margaret and the potential for the loss of some of that infrastructure. This has affected the way in which that place has been assessed, although it has not changed the need to make operational changes.

When assessing sites that have been built through intense political protest and action, it affects the way in which significance is attributed.

2.8 Implementation

The implementation is the next challenge, the information is available but is it used or is it too hard?

Immediately after connection to the main property files requests for review and advice were made, often on relatively small sites that had high heritage value, that would not otherwise have been made. Some initial trial advice resulted in excellent outcomes that retained the major heritage value of the place and allowed the upgrade to take place to satisfy operational requirements.

An example is a small weir or dam with a rock face finish where to reduce the potential for failure it was decided to concrete face the dam wall. The wall construction and appearance was of high significance being undertaken by a specialist team of masons from Europe after the war and demonstrated very high standards of workmanship and achievement. The problem, after discussion with the design engineer, was the spillway where there was fear of erosion. While they were on site, in a remote location, they thought it would be advisable to concrete the whole dam to avoid any other possible problems. This was not actually necessary and the outcome was to concrete the spillway and leave the dam wall in its built state demonstrating the significant construction. This was cheaper, quicker and provided a good workable heritage outcome.

However, not all solutions are this simple. The organization has been undertaking major upgrades of many power stations and pieces of infrastructure as a result of increasing risk assessments, equipment approaching the end of its working life, greater needs for economy and efficiency etc. A major test was the almost complete upgrade of one of the major power stations requiring reconstruction of all of the operational equipment. In this case the database had identified due to the high level of heritage significance of the whole place that a conservation management plan was required (relatively few sites required this as the database provided adequate information for all but the most significant and most complex sites). This was undertaken and provided detailed guidance on every aspect of the place. But before this took place the upgrade approach was outlined and heritage advice was provided. When probed projects generally fall into two areas, essential works and ancillary works.

Essential works are in this case the rebuilding of the generator sets, installing new control equipment and new wiring and improving the safety of the station by fire separation and egress systems.

Ancillary works included removing redundant equipment, where to locate control equipment, whether to replace existing building finishes such as flooring and wall cladding, how to provide fire separation, etc. Initial discussion and an explanation of what was significant (in this case the main turbine hall, the layout and the building finishes were particularly important and the actual equipment while still significant was less so) allowed the design engineers to reassess their approach and to arrive at a different solution with the same outcome. In this example there was a loss of significance. The equipment did not survive, however it was not so significant that it needed to be retained even though not operational. The layout of the building and all of the finishes were retained, the appearance of the turbine hall, the machine casings and the old control gear survived (not all controls but examples of each element) and the station presents as it was built with the addition and layering of some new elements.

There were many detailed elements that were discussed and resolved and the design engineers embraced the concept of retaining significance as part of their design challenge to great effect.

Heritage is a balancing act, particularly when applied to an operational system. Retaining heritage values is not an absolute, it is one of a number of management objectives that needs to be considered. A good heritage outcome allows retention of core values and provides for ongoing operation.

2.9 How to manage conflict between redundancy and heritage

Redundancy is a major problem in relation to heritage and in particular industrial heritage. Traditionally when a place or piece of infrastructure
became redundant it was demolished and removed. Now if it has heritage value that is not straightforward. For an individual piece of equipment, such as a redundant control panel in a station for example, once it is assessed and its significance understood a hierarchy of actions can be applied such as retain on site but not operational for high value example to, remove and dispose of for low value items. For a whole station or system it is more difficult.

A major and topical example has been the recent closure of Lake Margaret power scheme near Queenstown in Tasmania. The, until recently, second oldest operating scheme in Australia (a small private scheme, Moorina, operates in northern Tasmania that is slightly older) is of State and National significance. It contains an outstanding collection of equipment, buildings, features, dams, and pipelines and is complete. Its survival is almost miraculous and it has continued to produce power on a viable basis.

Because of the heritage audit as well as considerable public interest early advice ensured that the place was not altered or in part demolished until there was a thorough analysis and discussion of options. In an example such as this the first action is to prevent any irreversible actions such as demolition or removal of what may considered redundant plant or buildings. The next action is to prepare a base study such as a CMP or other suitable assessment to properly understand the place. Parallel with this is the often urgent need to stabilise failing elements of significance to prevent loss.

The next action is to prepare a realistic analysis of the operational issues of the place with costings and viability. This needs to be checked against heritage values as in many cases simpler solutions can be achieved that change the viability analysis. This was the case at Lake Margaret.

A strategy then needs to be resolved from all of this. Where there are conflicting values, which is often the case, this may not be straightforward.

At Lake Margaret, apart from closure, a number of specific issues arose that required heritage input. The failure of the woodstave pipeline was a key one that engendered significant debate and a range of solutions to keep it in operation. In this example I took a pragmatic view that supported replacement of the pipeline in the event of ongoing operation and its removal in the interim as it was in risk of imminent failure. Sections were retained in situ, sections were removed for sampling, but when an element such as this, which will in time fail by the nature of its construction, does reach the point of failure it is appropriate to replace it. This view is not however shared by everyone.

Another example was managing the dam wall when water was not being drawn via the pipeline to the turbines and safety standards now deemed the wall to be at risk of flooding. The options for the dam, which is of State significance varied from partial demolition to rebuilding. Eventually a simple solution was agreed to raise the wall by about 300mm around the area that was critical (the intake) to reduce the risk of overspill. This was appropriately detailed and executed with minimal impacts on heritage values.

The heritage maxim of “doing as little as necessary but as much as needed” needs strong reinforcement in design situations, particularly when engineers and designers are not familiar with the subtleties of working with heritage structures.

The future of the station is not resolved at this time except that it will be retained.

3.0 CONCLUSION

This is a short quick overview of a process and some issues that I believe have placed the Tasmanian Hydro organization in a strong position to manage its extensive heritage assets. I have not had time to address in detail questions such as why do we consider that these places have heritage value. I would simply say that when you experience the completeness of a system such as this that it is hard not to see extraordinary heritage value from the exceptional human endeavour and innovation needed to move water around that State to generate power without using fossil fuel.

3.0 REFERENCES

This paper has been drawn from the fieldwork undertaken in the preparation of the inventory and specific information was largely drawn from the extensive plan and photographic collection of Hydro Tasmania. Several publications provide good overall historical background to the topic:

“A Million Horses” R M H Garvie 1962 Hyrdo-Electric Commission of Tasmania

“Lifeblood” Roger Lupton 1997 Focus Publishing