

**ASSESSMENT OF CULTURAL
HERITAGE SIGNIFICANCE AND
EXECUTIVE DIRECTOR
RECOMMENDATION TO THE
HERITAGE COUNCIL**

NAME LOWER STONY CREEK DAM WALL
LOCATION ANAKIE GORGE WALKING TRACK STAUGHTON VALE,
GREATER GEELONG CITY
VHR NUMBER: PROV VHR H2371
CATEGORY: HERITAGE PLACE
HERITAGE OVERLAY NA
HERMES NUMBER: 162321



EXECUTIVE DIRECTOR RECOMMENDATION TO THE HERITAGE COUNCIL:

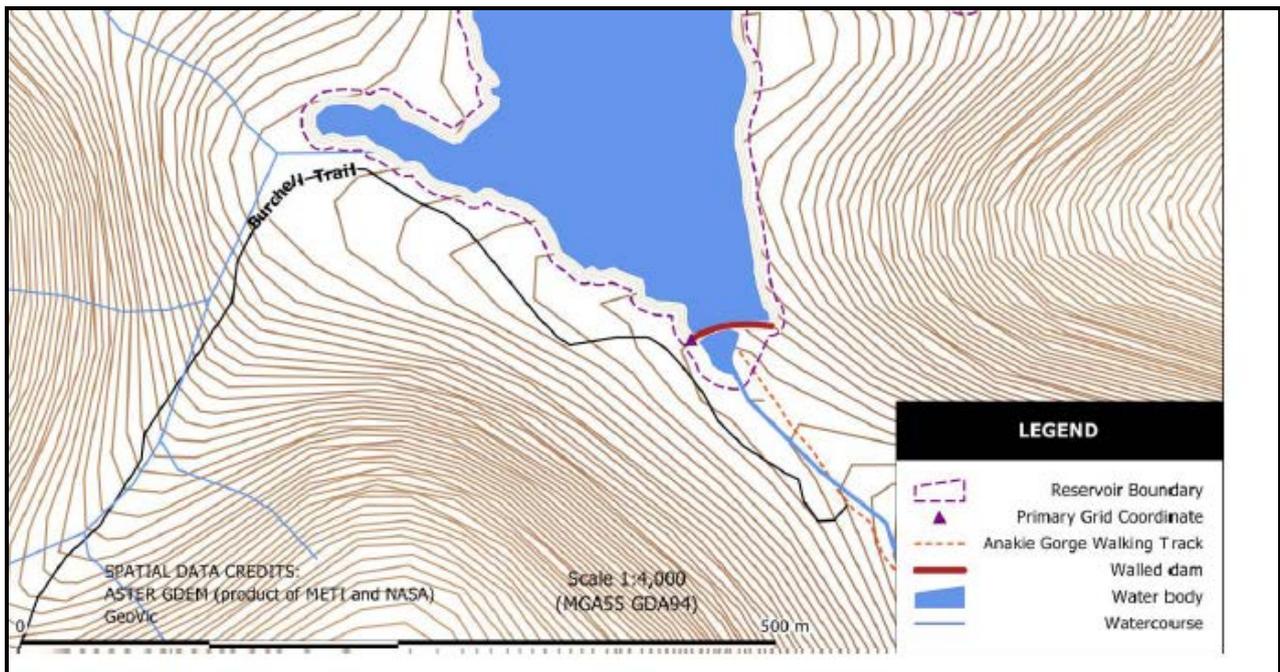
- That the Lower Stony Creek Dam Wall be included as a Heritage Place in the Victorian Heritage Register under the *Heritage Act 1995* [Section 32 (1)(a)].



Tim Smith OAM
Executive Director, Heritage Victoria
Recommendation Date: 17 March 2017

This recommendation report has been issued by the Executive Director, Heritage Victoria under s.32 of the Heritage Act 1995. It has not been considered or endorsed by the Heritage Council of Victoria.

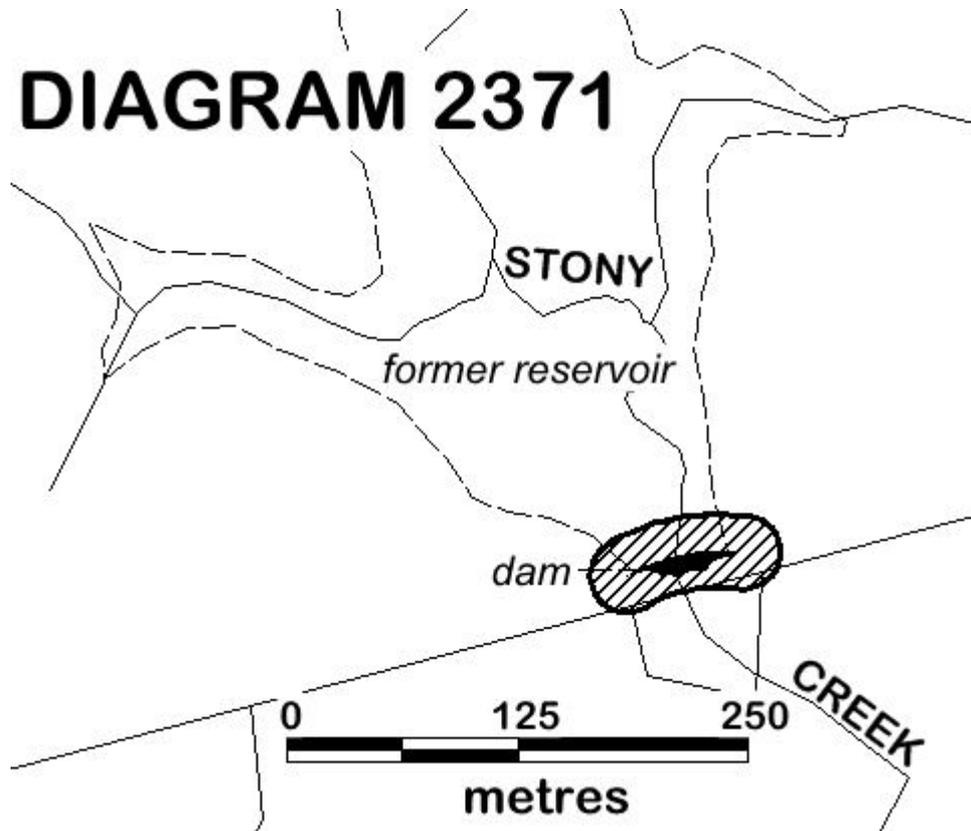
EXTENT OF NOMINATION



The dam wall at the south of the Lower Stony Creek Reservoir.

RECOMMENDED REGISTRATION

All of the place shown hatched on Diagram 2371 encompassing parts of Crown Allotments 58, 59 and 69, Parish of Moreep and representing a curtilage of 20 metres measured from the centre line of the top of the dam wall.



The extent of registration of Lower Stony Creek Dam in the Victorian Heritage Register affects the whole place shown on Diagram 2371 including the land, all structures and features.

RATIONALE FOR EXTENT

The recommended extent includes the Lower Stony Creek Dam Wall and a curtilage of 20 metres around it. This extent covers all the heritage fabric and provides a reasonable and protective setting for this type of structure.

AERIAL PHOTO OF THE PLACE SHOWING PROPOSED REGISTRATION



STATEMENT OF CULTURAL HERITAGE SIGNIFICANCE

WHAT IS SIGNIFICANT?

The Lower Stony Creek Dam Wall at the south end of the Lower Stony Creek Reservoir including the two valve houses, one containing an original outlet valve and a timber door.

History Summary

The Lower Stony Creek Dam Wall is the first mass concrete gravity dam wall constructed in Victoria and Australia. It is the third such structure of its type in the world, being constructed soon after Boyds Corner (1872) in the United States and Pérolles in Switzerland (1872). It was constructed between February 1873 and June 1874 as part of Geelong's first water supply system, after the failure of the scheme's first dam wall, an earthen structure at the Upper Stony Creek Dam five kilometres upstream. Building a dam wall at Lower Stony Creek presented challenges because the narrowness of the site made the cost of traditional construction methods (earth with puddled clay core) prohibitive. George Gordon, a Scottish engineer was responsible for the design, and Edward Dobson, an English engineer, was responsible for the construction. They pioneered the use of a new material – Portland cement concrete – and used the innovative design principles of Scottish civil engineer WJM Rankine. In 1874 the successful construction of a gravity dam involving the use of about 4,000 cubic metres of concrete, represented a significant technical advance. The Lower Stony Creek Reservoir supplied water to the Geelong area for more than 120 years. It was decommissioned in 2001, and subsequently included in the Brisbane Ranges National Park under the management of Parks Victoria.

Description Summary

The Lower Stony Creek Dam Wall is located forty kilometres north of Geelong near Steiglitz. It is a curved mass concrete gravity dam wall sixteen metres high and sixty-eight metres long. Its inner face, that presented to the water, is convex, and the outer face is concave. At the base of the outer face at the centre of the dam, there are two arched valve houses, with the east one still having its original outlet valve and timber door. The dam wall is made from concrete consisting of Portland cement, broken sandstone screenings and two inch gravel rammed into cambered laminations, each layer being about fifteen centimetres thick. Both faces of the dam wall are rendered with Portland cement mortar.

This site is part of the traditional land of the Watha Wurrung people.

HOW IS IT SIGNIFICANT?

Lower Stony Creek dam is of historical and scientific significance to the State of Victoria. It satisfies the following criterion for inclusion in the Victorian Heritage Register:

Criterion A

Importance to the course, or pattern, of Victoria's cultural history

Criterion B

Possession of uncommon, rare or endangered aspects of Victoria's cultural history.

Criterion F

Importance in demonstrating a high degree of creative or technical achievement at a particular period.

WHY IS IT SIGNIFICANT?

Lower Stony Creek Dam Wall is significant at the State level for the following reasons:

Lower Stony Creek Dam Wall was built between February 1873 and June 1874 and is historically significant as the first mass concrete gravity dam wall in Victoria and Australia, and the third such structure of its type in the world. It was an integral part of the Geelong Water Supply System, one of Victoria's earliest town water supply systems, commencing in 1873, which underpinned Geelong's development into a thriving city, port and manufacturing centre. The construction of the Lower Stony Creek Dam Wall marked an important moment in the history of engineering in Victoria through its early use of Portland cement concrete in a large structure and the application of the principles of stability developed by the Scottish civil engineer WJM Rankine. [Criterion A]

Lower Stony Creek Dam is a rare structure being one of a small number of mass concrete gravity dams in Victoria. Only three were built during the nineteenth century, the others being at Evansford and the Goulburn Weir, and a further eight were built during the twentieth century. Retaining its original vertical curved and horizontal convex-concave form, the dam wall demonstrates uncommon engineering techniques including thinness (it was 840 mm thick compared with at least 3 metres usually adopted in masonry dam walls), use of a scour pipe to remove sludge accumulations, and the absence of a by-wash, which meant that floodwater washed over the concrete wall testing its strength. [Criterion B]

The Lower Stony Creek Dam Wall is a pioneering engineering structure in Victoria. It demonstrates innovation and technical achievement in its time through use of a new material – Portland cement concrete – which in 1873 was only beginning to gain acceptance as an engineering material. The Wall also demonstrates the first practical application of theoretical design principles developed by the Scottish civil engineer, WJM Rankine, relating to the stability, pressure and tension of retaining walls. In 1874 the successful construction of a gravity dam involving the use of about 4,000 cubic metres of concrete, represented a significant technical advance for its time. The Lower Stony Creek Dam Wall is a fine demonstration of nineteenth century progressive engineering and workmanship. It served as an example to other engineers internationally, for example, being examined in the 1880s by the designers of the Quaker Bridge Dam, New York. [Criterion F]

RECOMMENDATION REASONS

REASONS FOR RECOMMENDING INCLUSION IN THE VICTORIAN HERITAGE REGISTER [s.34A(2)]

Following is the Executive Director's assessment of the place against the tests set out in *The Victorian Heritage Register Criteria and Thresholds Guidelines (2014)*.

CRITERION A

Importance to the course, or pattern, of Victoria's cultural history.

STEP 1: A BASIC TEST FOR SATISFYING CRITERION A

The place/object has a *CLEAR ASSOCIATION* with an event, phase, period, process, function, movement, custom or way of life in Victoria's cultural history.

Plus

The association of the place/object to the event, phase, etc *IS EVIDENT* in the physical fabric of the place/object and/or in documentary resources or oral history.

Plus

The *EVENT, PHASE, etc* is of *HISTORICAL IMPORTANCE*, having made a strong or influential contribution to Victoria.

Executive Director's Response

- Lower Stony Creek Dam Wall has a clear association with the Geelong Water Supply System, one of Victoria's earliest town water supply systems, commencing in 1873, which underpinned the development of Geelong into a thriving city, port and manufacturing centre.
- The Lower Stony Creek Dam Wall has a clear association with the history of civil engineering in Victoria as the first practical application of theoretical principles developed by Scottish civil engineer, WJM Rankine, relating to stability, pressure and tension in retaining walls.
- These associations are evident in the physical fabric of the place and in documentary resources.
- The development of the Geelong Water Supply System and the development of civil engineering are both of historical importance, having made strong and influential contributions to Victoria.

Criterion A is likely to be satisfied.

STEP 2: A BASIC TEST FOR DETERMINING STATE LEVEL SIGNIFICANCE FOR CRITERION A

The place/object allows the clear association with the event, phase etc. of historical importance to be *UNDERSTOOD BETTER THAN MOST OTHER PLACES OR OBJECTS IN VICTORIA WITH SUBSTANTIALLY THE SAME ASSOCIATION*.

Executive Director's Response

- As the first mass concrete gravity dam wall in Victoria and Australia, and the third such structure of its type in the world, the Lower Stony Creek Dam Wall allows the association with the Geelong Water Supply System and the development of civil engineering in Victoria to be understood better than most other places or objects in Victoria with substantially the same association.

Criterion A is likely to be satisfied at the State level.

CRITERION B

Possession of uncommon, rare or endangered aspects of Victoria's cultural history.

STEP 1: A BASIC TEST FOR SATISFYING CRITERION B

The place/object has a *clear ASSOCIATION* with an event, phase, period, process, function, movement, custom or way of life of importance in Victoria's cultural history.

Plus

The association of the place/object to the event, phase, etc *IS EVIDENT* in the physical fabric of the place/object and/or in documentary resources or oral history.

Plus

The place/object is *RARE OR UNCOMMON*, being one of a small number of places/objects remaining that demonstrates the important event, phase etc.

OR

The place/object is *RARE OR UNCOMMON*, containing unusual features of note that were not widely replicated

OR

The existence of the *class* of place/object that demonstrates the important event, phase etc is *ENDANGERED* to the point of rarity due to threats and pressures on such places/objects.

Executive Director's Response

- Lower Stony Creek Dam Wall has a clear association with the Geelong Water Supply System, one of Victoria's earliest town water supply systems, commencing in 1873, which underpinned the development of Geelong into a thriving city, port and manufacturing centre.
- The Lower Stony Creek Dam Wall has a clear association with the history of civil engineering in Victoria as the first practical application of theoretical principles developed by Scottish civil engineer, WJM Rankine, relating to stability, pressure and tension in retaining walls.
- These associations are evident in the physical fabric of the place and in documentary resources.
- Retaining its original vertical curved and horizontal convex-concave form, the dam wall demonstrates uncommon engineering techniques including thinness, use of a scour pipe to removed sludge accumulations, and the absence of a by-wash.
- Lower Stony Creek Dam is a rare structure being one of a small number of mass concrete gravity dams in Victoria.
- Only three were built in Victoria during the nineteenth century, the others being at Evansford and the Goulburn Weir, and a further eight were built during the twentieth century.

Criterion B is likely to be satisfied.

STEP 2: A BASIC TEST FOR DETERMINING STATE LEVEL SIGNIFICANCE FOR CRITERION B

The place/object is *RARE, UNCOMMON OR ENDANGERED* within Victoria.

Executive Director's Response

- As the first mass concrete gravity dam wall in Victoria and one of three built during the nineteenth century, the Lower Stony Creek Dam Wall is rare in Victoria
- Lower Stony Creek Dam Wall was the third mass concrete dam wall built after those at Boyd's Corner (New York, USA) – replaced with a modern dam wall in 1990 – and Pérolles (Switzerland) both built in 1872.

Criterion B is likely to be satisfied at the State level.

CRITERION F

Importance in demonstrating a high degree of creative or technical achievement at a particular period.

STEP 1: A BASIC TEST FOR SATISFYING CRITERION F

The place/object contains *PHYSICAL EVIDENCE* that clearly demonstrates creative or technical *ACHIEVEMENT* for the time in which it was created.

Plus

The physical evidence demonstrates a *HIGH DEGREE OF INTEGRITY*.

Executive Director's Response

- The Lower Stony Creek Dam Wall is a pioneering engineering structure in Victoria.
- It demonstrates innovation and technical achievement in its time in which it was created through use of a new material, Portland cement concrete, which in 1873 was only beginning to gain acceptance as an engineering material.
- The Wall also demonstrates the first practical application of theoretical design principles developed by the Scottish civil engineer, WJM Rankine, relating to the stability, pressure and tension of retaining walls.
- There is a high degree of integrity in the physical fabric. It demonstrates this through its convex and concave shape, now visible cambered laminations of Portland cement concrete and the engineering principles and construction methods integral to the innovative design.

Criterion F is likely to be satisfied.

STEP 2: A BASIC TEST FOR DETERMINING STATE LEVEL SIGNIFICANCE FOR CRITERION F

The nature &/or scale of the achievement is *OF A HIGH DEGREE* or 'beyond the ordinary' for the period in which it was undertaken as evidenced by:

- *critical acclaim* of the place/object within the relevant creative or technological discipline as an outstanding example in Victoria; or
- *wide acknowledgement of exceptional merit* in Victoria in medium such as publications and print media; or
- recognition of the place/object as a *breakthrough* in terms of design, fabrication or construction techniques; or
- recognition of the place/object as a successful solution to a technical problem that *extended the limits* of existing technology; or
- recognition of the place/object as an outstanding example of the *creative adaptation* of available materials and technology of the period.

Executive Director's Response

- In 1874 the successful construction of a gravity dam involving about 4,000 cubic metres of concrete, represented a significant technical advance for its time.
- It served as an example to other engineers internationally, for example, being examined in the 1880s by the designers of the Quaker Bridge Dam, New York.
- It has received wide acknowledgement of exceptional merit by heritage engineers, as 'worthy of recognition' as a structure 'of distinction as the first mass concrete dam in Australia.' See Harper, BCS. Edward Dobson and the Mass Concrete Gravity Dam on Stony Creek for the Geelong Water Supply [online]. In: Martin, Ray L (Editor). 9th National Conference on Engineering Heritage: Proceedings. Melbourne, Vic.: Institution of Engineers, Australia, Victoria Division., 1998: 97-106.

Criterion F is likely to be satisfied at the State level.

PROPOSED PERMIT POLICY

Preamble

The purpose of the Permit Policy is to assist when considering or making decisions regarding works to a registered place. It is recommended that any proposed works be discussed with an officer of Heritage Victoria prior to making a permit application. Discussing proposed works will assist in answering questions the owner may have and aid any decisions regarding works to the place.

The extent of registration of Lower Stony Creek Dam in the Victorian Heritage Register affects the whole place shown on Diagram 2371 including the land and features. Under the *Heritage Act 1995* a person must not remove or demolish, damage or despoil, develop or alter or excavate, relocate or disturb the position of any part of a registered place or object without approval. It is acknowledged, however, that alterations and other works may be required to keep places and objects in good repair and adapt them for use into the future.

If a person wishes to undertake works or activities in relation to a registered place or registered object, they must apply to the Executive Director, Heritage Victoria for a permit. The purpose of a permit is to enable appropriate change to a place and to effectively manage adverse impacts on the cultural heritage significance of a place as a consequence of change. If an owner is uncertain whether a heritage permit is required, it is recommended that Heritage Victoria be contacted.

Permits are required for anything which alters the place or object, unless a **permit exemption** is granted. Permit exemptions usually cover routine maintenance and upkeep issues faced by owners as well as minor works or works to the elements of the place or object that are not significant. They may include appropriate works that are specified in a conservation management plan. Permit exemptions can be granted at the time of registration (under s.42 of the Heritage Act) or after registration (under s.66 of the Heritage Act).

It should be noted that the addition of new buildings to the registered place, as well as alterations to the interior and exterior of existing buildings requires a permit, unless a specific permit exemption is granted.

Conservation management plans

It is recommended that a Conservation Management Plan is developed to manage the place in a manner which respects its cultural heritage significance.

Aboriginal cultural heritage

If any Aboriginal cultural heritage is discovered or exposed at any time it is necessary to immediately contact the Office of Aboriginal Affairs Victoria to ascertain requirements under the *Aboriginal Heritage Act 2006*.

Other approvals

Please be aware that approval from other authorities (such as local government) may be required to undertake works.

Archaeology

Ground disturbance may affect archaeological deposit at the place and, subject to the exemptions stated in this document, requires a permit.

Cultural heritage significance

Overview of significance

The cultural heritage significance of the Lower Stony Creek Dam Wall lies in its rarity and technical achievement as the first mass concrete gravity dam wall in Victoria and Australia, and the third such structure of its type in the world. Lower Stony Creek Dam is a rare structure being one of a small number of mass concrete gravity dams in Victoria. Retaining its original curving and convex-concave form, the dam wall demonstrates uncommon engineering techniques. It demonstrates innovation for its time through use of Portland cement concrete. It also demonstrates the first practical application of theoretical design principles developed by the Scottish civil engineer, WJM Rankine, relating to the stability, pressure and tension of retaining walls.

PROPOSED PERMIT EXEMPTIONS (UNDER SECTION 42 OF THE HERITAGE ACT)

It should be noted that Permit Exemptions can be granted at the time of registration (under s.42(4) of the Heritage Act). Permit Exemptions can also be applied for and granted after registration (under s.66 of the Heritage Act)

General Condition 1

All exempted alterations are to be planned and carried out in a manner which prevents damage to the fabric of the registered place or object.

General Condition 2

Should it become apparent during further inspection or the carrying out of works that original or previously hidden or inaccessible details of the place or object are revealed which relate to the significance of the place or object, then the exemption covering such works shall cease and Heritage Victoria shall be notified as soon as possible.

General Condition 3

All works should be informed by Conservation Management Plans prepared for the place. The Executive Director is not bound by any Conservation Management Plan, and permits still must be obtained for works suggested in any Conservation Management Plan.

General Condition 4

Nothing in this determination prevents the Heritage Council from amending or rescinding all or any of the permit exemptions.

General Condition 5

Nothing in this determination exempts owners or their agents from the responsibility to seek relevant planning or building permits from the relevant responsible authority, where applicable.

Specific Permit Exemptions

- Works to monitor and maintain the structural integrity of the dam wall and ensure public safety.
- Repairs and maintenance which replaces like with like.
- Emergency works to the dam wall provided that the Executive Director is advised within 24 hours after their commencement.
- Fire suppression, fire-fighting duties, weed and vermin control activities.
- Removal or lopping of trees and vegetation.

RELEVANT INFORMATION

LOCAL GOVERNMENT AUTHORITY

Greater Geelong City Council

HERITAGE LISTING INFORMATION

- **Heritage Overlay:** No
- **Victorian Aboriginal Heritage Register:** No
- **Other listing:** *National Trust of Australia (Victoria)*
The Geelong Water Supply Scheme, including the Lower Stony Creek Dam Wall, is classified by the National Trust as being of State Significance (B7410).

ALTERNATIVE NAMES

Lower Stony Creek Dam Wall, Lower Stony Creek Reservoir Wall.

HISTORY

The Geelong Water Supply System

In 1866 the Victorian Water Supply Department commenced construction of the Geelong Water Supply System, also known as the Stony Creek Water System. As part of this ambitious scheme, in 1872 the Government reserved about 1,560 hectares in the Stony Creek area for water supply purposes. This protected the land around future reservoirs from the impacts of gold mining, timber cutting and other activities. In 1873 the system commenced operation and its management was subsequently vested in the Geelong Waterworks and Sewerage Trust.

The Geelong Water Supply System includes the following elements: the Upper Stony Creek Reservoir No.1 (one of the world's highest earthen dams at the time of construction); the Anakie Aqueduct, incorporating tunnels and flumes, built in difficult country along the ranges on the western slopes of Stony Creek; the pipeline through the Anakie Gorge from Lower Stony Creek Reservoir, requiring construction of a number of creek crossings and several tunnels through ridges; the Lovely Banks Basins and associated structures; and the Lower Stony Creek Reservoir. The Geelong Water Supply System provided Geelong's only source of water supply for over 50 years and continued to operate in its entirety until the 1980s.

The Lower Stony Creek Dam

Prior to the construction of the Lower Stony Creek Dam, all large dam walls in Victoria had been built using earth fill. The Lower Stony Creek Dam Wall was the first mass concrete gravity dam wall constructed in Victoria and Australia. It is the third such structure of its type in the world, being constructed soon after Boyds Corner (1872) in the United States and Pérolles in Switzerland (1872). It was constructed between February 1873 and June 1874, after the initial failure of the scheme's first dam wall. In 1872, an earthen embankment of the Upper Stony Creek reservoir subsided due to poor footings, and its water storage capacity was reduced. A quick solution was required and a suitable location for a new reservoir was chosen five kilometres downstream.

George Gordon and Edward Dobson, Engineers

George Gordon (1829-1907) a Scottish-born engineer was responsible for the design of the Lower Stony Creek Dam. After working on water projects in Holland and India he was appointed in 1871 as the Chief Engineer for Water Supply in Victoria, and worked on the Coliban Water Supply for Bendigo. After being appointed in 1873 as the Chief Engineer of the Board of Lands and Works. Edward Dobson (1816/17?-1908) an English-born engineer was responsible for the construction of the of the Lower Stony Creek Dam. Dobson was born in London and gained civil engineer qualifications and experience, mainly on railway construction.

He moved to New Zealand in 1854, being appointed as the Provincial Engineer for Canterbury Province, New Zealand from 1854 to 1868. Dobson left New Zealand for Melbourne in 1868, and after some railway work took up the position of Resident Engineer of the Geelong District when George Gordon arrived.

Constructing the dam wall

One of Dobson's first tasks was to survey the lower portion of Stony Creek, now known as Anakie Gorge, and select a site. His surveying found that straight running reefs abruptly cut across the gorge in several places, forming large basins. Of these basins three appeared especially suitable for reservoir sites; and after making contour surveys and approximate calculations of the relative capacity of each for a given height of dam, he selected the lowest basin as the site for the new storage reservoir. The site was fixed so the whole of the Lower Stony Creek Dam sat on a hard quartz reef.

Building a dam wall at Lower Stony Creek presented challenges because narrowness of the site meant that it was impossible to build a standard masonry wall or earth embankment with a puddled clay core. A different technical solution and materials were required. A few years earlier, there had been discussion in the engineering world about how to build mass gravity dams safely in India. Engaged in this discussion was Professor WJM Rankine of Glasgow University who published the results of his study on stability in gravity dams in a widely distributed journal, *The Engineer*. His new theories, which considered the work of the French engineers Graeff and Delocre, brought to attention two new issues – vertical pressure and vertical tension - to be considered and a recommended practice for dams to be designed with horizontal curvature (convex-concave) in the wall so as to avoid the possibility of horizontal tension in the air face. George Gordon, then Deputy Chief Engineer of the Madras Irrigation Company, would no doubt have been involved with Rankine's study and been aware of and given consideration to Rankine's views even before the new design conditions developed by Rankine became known in Melbourne through the article in *The Engineer*.

Gordon and Dobson adopted WJM Rankine's theoretical developments. They also decided to build the structure with Portland cement concrete. Dobson was against building a masonry dam from local stone because of the large amount of work involved in levelling the foundation trench in rock for coursed masonry. He also felt that the stone in the area was not capable of yielding blocks of sufficient size to make good masonry, and the slow setting of hydraulic lime would make progress slow and more vulnerable to damage by floods. Portland cement was theoretically better suited the geological and topographic circumstances at Stony Creek, and – if successful – would potentially be quicker and a cheaper option.

At the time of the decision, Portland cement concrete was only beginning to gain acceptance as a stable engineering material for dam construction. Portland cement was developed in Britain between 1820 and 50 and its use increased in Britain during the late 1860s and early 1870s. In this era it became common as an element in concrete, but its use other than in concrete foundations and sea walls was still regarded as experimental. Dobson did not have an extensive background in using Portland cement, but it is likely that papers circulated by the Institution of Civil Engineers, London, would have made him aware of the potential of Portland cement and the possibilities of producing a strong durable concrete as an alternative to masonry. Throughout the process, Dobson showed his proficiency as an engineer: in his approach to determining the best mix, in his attention to the mixing process, in his preparation of the surface between each lift, and in his adoption of low lifts each carefully compacted.

Reports indicate that the dam wall was built in layers of concrete each about six inches thick 'well beaten down with wooden rammers'. The rock at the sides was penetrated to a depth of seven feet. The outlet valve was built nine feet above the bed of the creek, and almost on level of the creek, a separate scour pipe forced sediment into the creek. No by-wash was built and surplus water passed over the top of the bank into the creek below testing the dam wall's strength. The inner face of the weir – that presented to the

water – is convex, and the outer face concave. Edward Dobson described his construction methods as follows:

The concrete was made of broken sandstone from quarries opened close to the dam, mixed in a puddling mill with cement mortar made of pit sand and Portland cement. The earlier samples proving coarse and porous, the proportions were varied until the result gave a hard, compact, and watertight material, which was best realised by the following proportions: 2-inch metal [gravel] 4½, screenings 1½, sand 1½, cement 1; total 8½ parts. The cement and sand were first thoroughly mixed in a dry state then made into mortar and thrown over the broken stone, which was turned over and over until the whole formed a pulpy mass, when it was put in place with barrows as quickly as possible, great expedition and method being required to effect this before it began to set.

For its time, the successful construction of a gravity dam involving the use of about 4,000 cubic metres of Portland cement concrete, represented a significant technical advance. The dam wall curved in plan to a radius of 91.5 metres. It was extremely thin for the standards of the time, being only 840 mm thick compared with at least 3 metres usually adopted in masonry dams.

The Lower Stony Creek Reservoir supplied water to the Geelong area for more than 120 years, with very little cracking or water seepage. It was decommissioned in 2001, and subsequently included in the Brisbane Ranges National Park under the management of Parks Victoria.

CONSTRUCTION DETAILS

Design engineer name: George Gordon
Dam style: Mass concrete gravity dam
Builder name: Edward Dobson
Construction started date: 1873
Construction ended date: 1874

What is mass concrete construction?

Mass concrete is concrete set without structural reinforcement.

What is a gravity dam?

A gravity dam is a dam constructed from concrete or stone masonry and designed to hold back water by primarily utilizing the weight of the material alone to resist the horizontal pressure of water pushing against it.

VICTORIAN HISTORICAL THEMES

04 Transforming and managing land and natural resources

4.7 Transforming the land and waterways

PHYSICAL DESCRIPTION

The Lower Stony Creek Dam Wall is a curved mass concrete gravity dam wall sixteen metres high and sixty-eight metres long. Its inner face, that presented to the water, is convex, and the outer face is concave. At the base of the outer face at the centre of the dam, are two arched valve houses, the former still having its original outlet valve and timber door. The wall is made from concrete consisting of Portland cement, broken sandstone screenings and two inch gravel rammed into cambered laminations, each layer being about fifteen centimetres thick. The water-tightness of the dam was aided by rendering both faces in Portland cement mortar.

At the base of the outer face of the dam, in the centre, are two concrete arched outlet valve houses. The east (higher) outlet is original and contains valves leading to the Anakie Gorge pipeline, which carries water to Geelong. This valve house retains most of its wooden front installed during construction, although they were damaged by a bushfire in 2006. The west (lower) valve outlet house contains the valves to regulate water levels in the reservoir by emptying excess water into Stony Creek. This outlet has lost its doors, but still remains functional and has been repaired with modern concrete.

ARCHAEOLOGY

There is no identified archaeology of state level significance at this place.

INTEGRITY/INTACTNESS

Intactness – The Lower Stony Creek Dam survives in original form and in good condition. Since its construction the valve house has been repaired with modern concrete. The inner face of the dam wall was re-rendered in the 1940s. (April 2016)

Integrity – The integrity of the place is very good. The heritage values are still evident in the fabric and can be read, understood and appreciated. (April 2016)

CONDITION

The place is in good condition. The dam has retained its original form and is in good condition for its age. (April 2016)

COMPARISONS

Nineteenth century mass concrete gravity dams in Victoria

There are two other mass concrete gravity dams in Victoria built in the nineteenth century. Neither is included in the VHR.

Evansford Dam, Clunes (not included in the VHR)

The Evansford mass concrete gravity dam was built by the Maryborough Water Works Trust which was formed in 1881. The dam was completed and filled with water by August 1883. The height of the wall is estimated to be around 17 metres and length to be around 60 metres.



Evansford Dam, Clunes (1881)

Goulburn Weir, Nagambie (not included in the VHR)

The construction of a weir on the Goulburn River began in 1887, and was completed in 1891. The Goulburn Weir was the first major diversion structure built for irrigation in Australia and was considered advanced for the time. Such was the regard for the structure, it appeared on the reverse of Australian half sovereign and ten shilling banknotes from 1913 until 1933. Goulburn Weir is a concrete structure founded on bedrock, with its downstream face stepped with granite blocks quarried from the nearby Mt Black. It is 127m long and 15m high.



Goulburn Weir, Nagambie (1891)

Earliest extant dam in Victoria

The earliest surviving large dam in Victoria is the Yan Yean Reservoir. It is part of the Yan Yean Water Supply System (VHR H2333) constructed between 1853 and 1857. This reservoir was one of the largest in the world, sited at 600 feet above sea level and the wall was built from an earthen bank 30 feet high and a clay puddle core. The Lower Stony Creek Dam marked a turning point in the construction of dams away from earthen walls, such as that at Yan Yean, to the use of mass concrete.

KEY REFERENCES

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Geelong Advertiser, 16 Jan 1874

PROPOSED TEXT FOR THE BLUE HERITAGE PLAQUE

The Lower Stony Creek Dam (1873-74) is Victoria's and Australia's first mass concrete gravity dam and the third such structure of its type in the world. It is a pioneering engineering structure and demonstrates a high level of technical achievement for its time.

IMAGES



The location of the Lower Stony Creek Dam Wall.



West valve outlet house

East valve outlet house

The outer face of the Lower Stony Creek Dam Wall showing both valve outlet houses. The water supply outlet valve is in the east house. It leads to the Anakie Gorge and joins the outlet pipes at Anakie Pipe Head Basin to Geelong.



The inner face of the Lower Stony Creek Dam Wall.



The outer face of the Lower Stony Creek Dam Wall.



The inner face of the Lower Stony Creek Dam Wall showing some water in the reservoir.



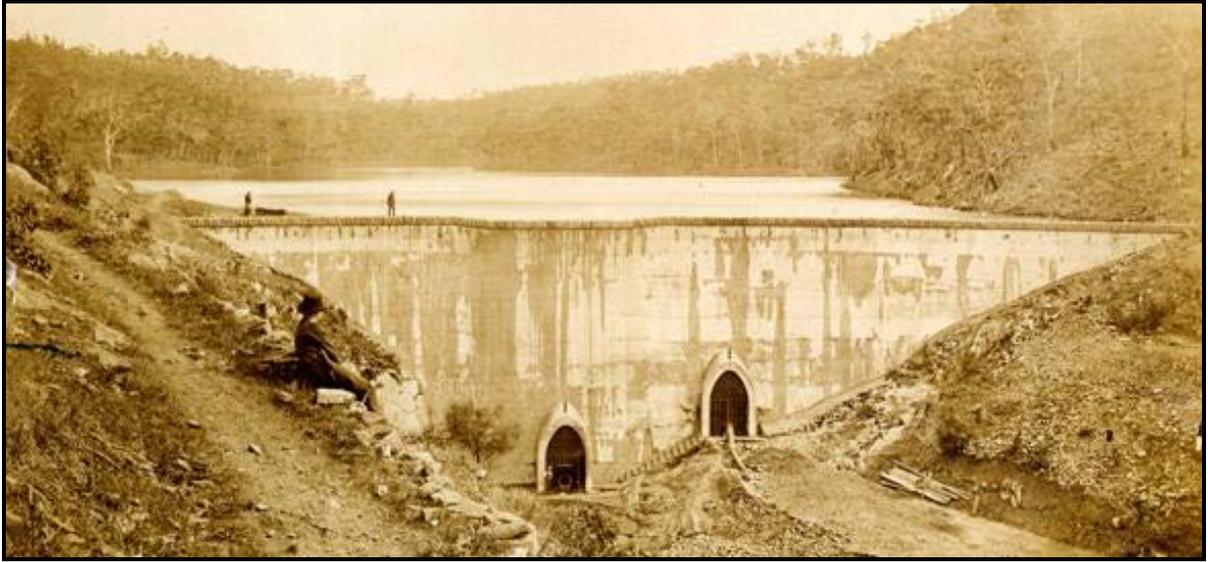
The water supply outlet valve in the eastern house. This took the water to the Anakie Gorge and joined the outlet pipes from Anakie Pipe Head Basin which pipes water to Geelong.



The western valve house.



While the condition of the dam wall is good for its age, some cracks are being monitored. Proposed permit exemptions allow for such works to continue.



The outer face of the dam wall during construction 1873 (Image: Barwon Water).



The outer face of the Lower Stony Creek Dam Wall c.1910 showing excess water being released from the outlet valve (Image: Geelong Heritage Service).



The inner face of the Lower Stony Creek Dam Wall c.1910.