Lord Wilson Heritage Trust

Report on

Commemorating the Centenary Tai Tam Tuk Reservoir The Dam and the people

紀念大潭篤水塘建成一百週年 人與水壩的故事

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Contents

Note:
The original names of Tytam, Tytam Took, Taitam, Tai Tam Tuk etc. quoted in the archives are used appropriately in this report.

ABSTRACT

Tai Tam Tuk Reservoir is the last and the largest capacity impounding reservoir of the four reservoirs of Tai Tam Waterworks Scheme. Construction of the dam commenced from 1912 and completed in 1917, while the memorial stone for the completion of the reservoir was laid on 2nd February 1918.

This report records the research project investigating the latest findings of the construction history of the dam, including the hand dug brick wells in ground investigation, To Tei Wan quarry, the pier for landing the stone at Tai Tam harbour, the steel sheetpiled cofferdam, the site office, the staff quarters and the infrastructure work adjacent to the submerged Tytam Took Village.

People taking part in the construction and after construction of the dam included the villagers of Tytam Took, Mr. Daniel J. Jaffe - the Special Engineer of the project, several hundreds of construction workers and quarry workers, Director of Public Works Department, The Governor of Hong Kong, the fishermen and residents of Tai Tam Harbour and the descendants of the Engineer-in-charge of the pumping station. Their stories are included.

Part 1 The Dam

Introduction

As early as in 1884, J.M. Price who was appointed as Surveyor General in 1873, reported [1] to the Legislative Council on the progress and present position of the Tytam Water Works which was designed as far back as in 1873 and was not commenced until 1883. The object of the waterworks was to increase fourfold the deficient water supply of Victoria by the creation of a large artificial lake in the Tytam Valley. The main features of the project included the granite masonry and concrete dam of 110 feet high in the centre with a storage capacity of 300 million gallons, a 2,428-yard tunnel, a 5,163-yard conduit, the filter beds and a service reservoir. [4]

1885

On 1st November 1885, Price reported [2] that only three valleys on the island were considered as possible sites of supply – Pokfoolum, Aberdeen and Tytam valleys. Hong Kong, even after the construction of Tytam Reservoir, was still in short of water storage because of the increasing population.

1888

The Tytam Water Works project was completed in 1888, under the supervision of Mr. James Orange, with a total cost of $1,257,474. [4]

1895

Extension works on the main embankment in Tytam, including a clear water channel and the raising of the overflow weir, were proceeded [3] [5].

1896

On 9th May 1896, F.A. Cooper reported [4] on the water supply of the City of Victoria and Hill District. He gave an account of history of water construction works and again stressed the potential sites for reservoirs at Pokfoolum, Aberdeen and Taitam. The report quoted both the consultant Mr. Chadwick's [6] and Mr. Price's [7] suggestion to raise the main embankment and extend the catchment area.

In addition, five sites suitable for construction of additional reservoirs in the Taitam Valley were proposed. Both Site No. 1 and 2 were above the elevation of existing Tai Tam Reservoir dam while Site No.3 situated immediately below the waste weir. Site No. 4 and No. 5 were not mentioned though their corresponding drawings No. 11 and 12 were attached to the report.

1901

The Byewash Reservoir of Tytam, was contracted for construction. [8]

Up to 1901, all the storage reservoirs – Pokfulam, Taitam and Wongneichong – for supplying the City with water, were at such elevation as to afford a supply by gravitation. Their combined maximum capacity, with boards inserted to raise the levels of their respective overflows, amounted to 510 million gallons. A fourth reservoir, known as Taitam Byewash Reservoir (26.3 million gallons) also affording a supply by gravity, was begun in 1901.

Unless the rainfall was very abundant or its incidence happened to be particularly favourable, the contents of the reservoirs were inadequate to maintain constant supply to the city throughout the dry season (Oct to Apr). It was therefore necessary that additional accommodation for the storage of water should be provided.

F.A. Cooper, the then Director of Public Works, in his report on Water Supply of the City of Victoria and Hill District, dated 9th May 1896, proposed to construct two additional reservoirs with a joint capacity of 110 million gallons on sites which were within the catchment area of the Taitam Reservoir and would therefore have afforded a supply by gravitation. He also mentioned the possibility of constructing two other small reservoirs in the Taitam Valley at a considerably lower level than the Taitam Reservoir. As pumping would be necessary to render the contents of such reservoirs available, he did not consider it expedient to support their early construction.

The immaterialise of constructing further reservoirs within the catchment area of the Taitam Reservoir was however demonstrated in 1901. In that year, the rainfall during what is known as the wet season (May to Sept) was the lowest on record,

amounting to only 39.91 inches, as compared with an average for the previous 17 years of 65.42 inches. The result was that Taitam Reservoir did not fill up – its contents amounted to only 322 million gallons (capacity 407 million gallons) and the dry season (1901-02) opened with only 346 million gallons stored in all the reservoirs, clearly demonstrating that the additional storage reservoirs should be situated to derive their supply from additional catchment areas.

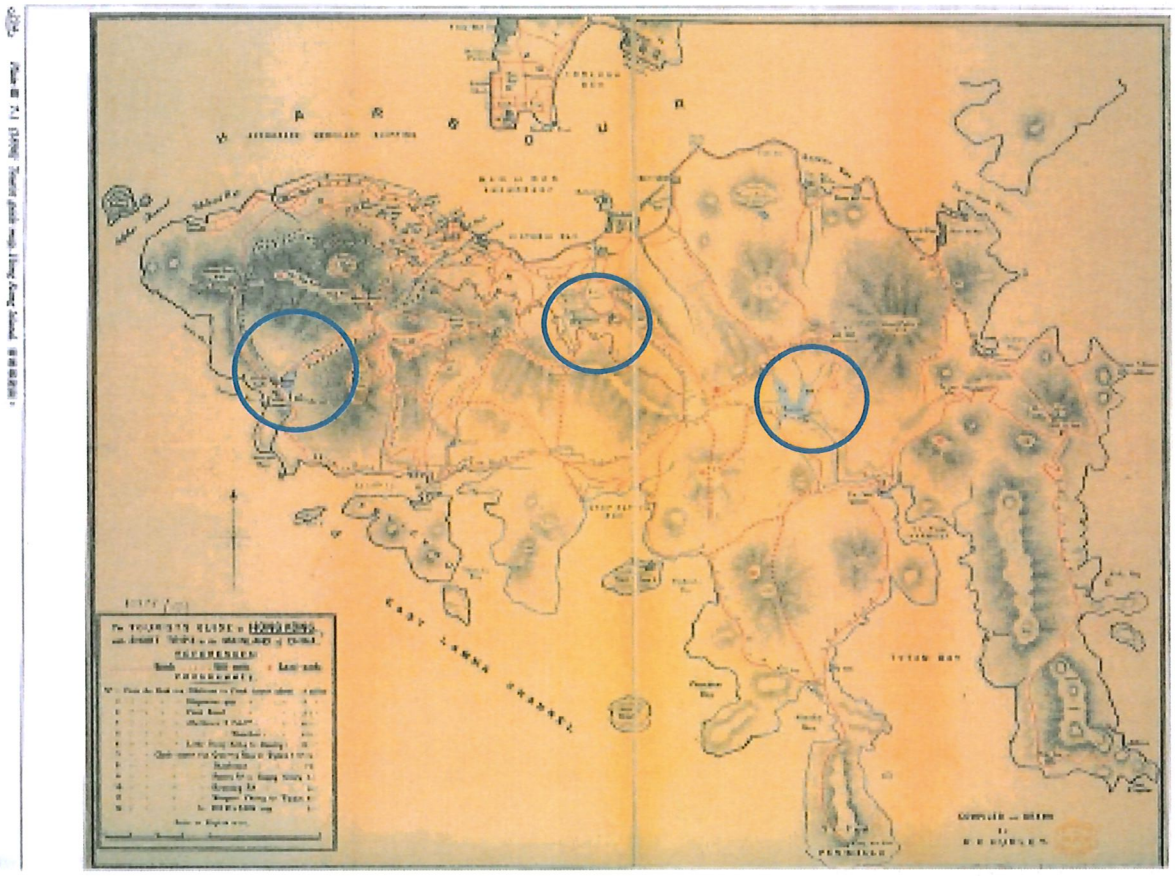


Figure 1 Location of the Three Reservoirs in 1901

1902

Mr. Osbert Chadwick, the Sanitary Commissioner, submitted his report dated 18th April 1902 on "Water supply of Hong Kong mainly with regard to the full development of the supply from the Tai Tam Tuk Valley" [9]. He mentioned that Taitam Reservoir was not filled during the rainy season of 1901, and the catchment area should be increased as well as the reservoir capacity by building a dam further down the valley though eventually pumping would become necessary. This was contrary to the project originally proposed by Mr. Cooper [4] to construct two reservoirs with a joint capacity of 110 million gallons, placed within the Tai Tam catchment area and above the existing reservoir.

Chadwick further proposed that one or more reservoirs should be constructed by throwing a dam across the Taitam-tuk stream, and as near as possible to sea level, in order to collect all water flowing into the head of the Taitam-tuk estuary.

Mr. Osbert Chadwick, on a visit to the colony in 1902 for the purpose of reporting on sanitary conditions, advised that a scheme should be prepared with a view to the full development of the Taitam Valley, down to sea level, and that one or more low-level reservoirs with a capacity of at least 400 million gallons, should be at or near sea level should be constructed.

As the construction of such reservoirs would involve pumping, he further recommended the provision of one pumping engine, capable of raising and delivering into Taitam Tunnel 1.25 million gallons daily, and the laying of a rising main, 15" in diameter, from the pumping station located on the shore of Taitam Bay to the entrance of the Taitam Tunnel.

While the complete scheme would require much time to prepare, temporary pumping plant capable of raising half a million gallons per day were installed. This plant was installed immediately below the junction of the three branch valleys, a small dam to intercept the dry weather flow of the streams being constructed and a rising main, 1.25 miles long, extending to the entrance to the Taitam Tunnel. The work started on 1st November 1903 and proved exceedingly useful, being ultimately dismantled and removed in November 1915.

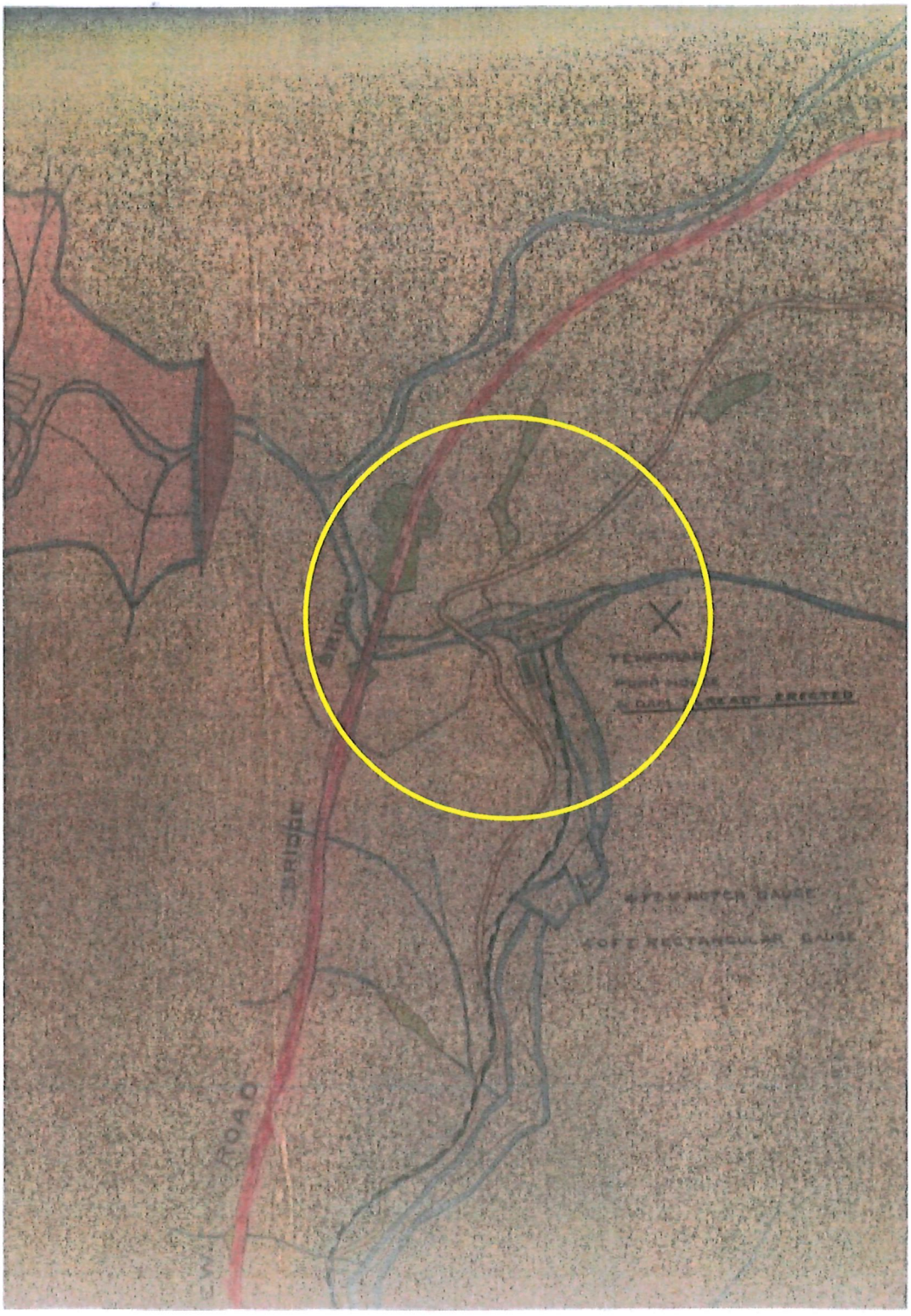


Figure 2 Temporary Dam and Pumping Plant

Two dams, fitted with gauges and self-recording apparatus for registering the discharge of the main stream in the lower part of the valley, were also constructed. The sum expended in preliminary works, surveys, borings, well sinking, temporary pumps, gauges and recording apparatus amounted to $142,025.00.

The Sessional Paper 1902 [10] described the action taken to respond to the recommendation in Mr. O. Chadwick's Report [9]. Regarding the query that *"one reservoir should be near to sea level and should be constructed first"*, it was replied by *"must wait result of survey and borings now in progress"*. It also recorded that the survey for catchment enlargement was in progress. The Paper also included that another storage reservoir at Tytam (30 million gallons) i.e. the Byewash Reservoir, was under construction [11] and grouting was needed at the foundation [12].

Dam Site Selection

The Report of Public Works for year 1902 [12] stated that preliminary works and surveys for a dam site in the upper part of the estuary were undertaken. A storage reservoir would be built at Tytam Tuk and water would be pumped to the Tytam Tunnel.

Three wells (trial pits) and a number of borings were made in order to obtain reliable information of the nature of the foundation for the proposed dam. The wells, of 5' 8" internal diameter and were made of bricks and bonded by cement, built on top of a cast iron curb ring. At the end of the year 1902, the wells were sunk to depths of 32' 5", 30' 0" and 8' 0" respectively. At these depths rock had not been encountered.

The machinery and plant used for the boring work included two barges equipped with boilers, steam winches and derricks. The wells were kept dry by means of a pulsometer pump or by bailing depending on the situation. Hand digging or a grab bucket operated by a steam winch was found to be most suitable.
As recorded for other construction works, many labourers employed for the site work suffered from a severe malarial fever.

1903
At the meeting of the Finance Committee, Legislative Council, on 20th April 1903, Mr. W. Chatham, the Director of Public Works, highlighted the progress of the trial works for the proposed dam of 900 feet in length, with an overflow at a height of 60 feet above low water and an impounding capacity of 1,200 million gallons. The site was at the low water mark and about 700 yards South-East of Tytam Tuk Village. The three wells and borings were sunk in order to determine the bed rock level. The furthest well extended to 40 feet below the low water level and was considered to be within 6 feet of the rock.

In his annual report, the Director of Public works wrote [14] that the Bye-wash Reservoir, which was commenced for construction in 1901, was near completion. Well No.1 after sinking to a depth of 35.5 feet was abandoned due to tilting. Figure 3 shows the out-of-plumb well still exists.

Figure 3 The Tilting Well No.1

Well No.2 was sunk to rock at a depth of 46 feet by 17th May after overcoming the negative skin friction by increasing the load on the well to about 200 tons. The difficulty in pumping within such a confined space and from such a depth was recorded. The layers of material bored through were:

- Clay and silt intermingled with shells
- Occasional layers of sand and shells
- Boulders, of 2 feet in depth, of varying sizes down to shingle, consisted of very hard stone and densely packed together
- Rock at a depth of 46 feet

Water entering the well through the layer of boulders precluded the inspection of the bottom by pumping.

Well No. 3 was sunk with similar findings of Well No.2 as shown below.

- Clay, silt and sand
- Stratum of beach boulders
- Boulders of 10 feet depth
- Sand
- Rock at a depth of 58.75 feet

As in Well No. 2, the bottom of the Well No. 3 could not be inspected by pumping. The nature of the rock was ascertained by comparing with the rock above water level at the side of the bay. The sinking of this well was completed by the middle of October 1903.

In parallel with the sinking of the wells, a large number of prickings with 171 Norton Tubes were made all over the dam site and confirmed the information obtained from Well No. 2, i.e. the presence of a hard layer, presumed to be rock, at an average depth of about 40 feet over the entire area.

As the information from Well No. 3 cast some doubt about the reliability of that derived from Well No. 2 and from other borings, Well No.2 was sunk further and it was found that what was formerly supposed to be rock was a large boulder.

As a longer period would be required to finalise the dam to be built at the low level, an emergency scheme was required. After full investigation, a scheme including a dam on site No. 4 from Mr. Cooper's report in 1896 [4] was prepared and submitted. The amended design had a greater height than the original design but provided the most ready and economical option. The scheme was referred to the Secretary of State for Colonies on 22nd October 1903. Though the scheme was not formally approved by end of the year, the necessary contract documents were ready for tendering purposes.

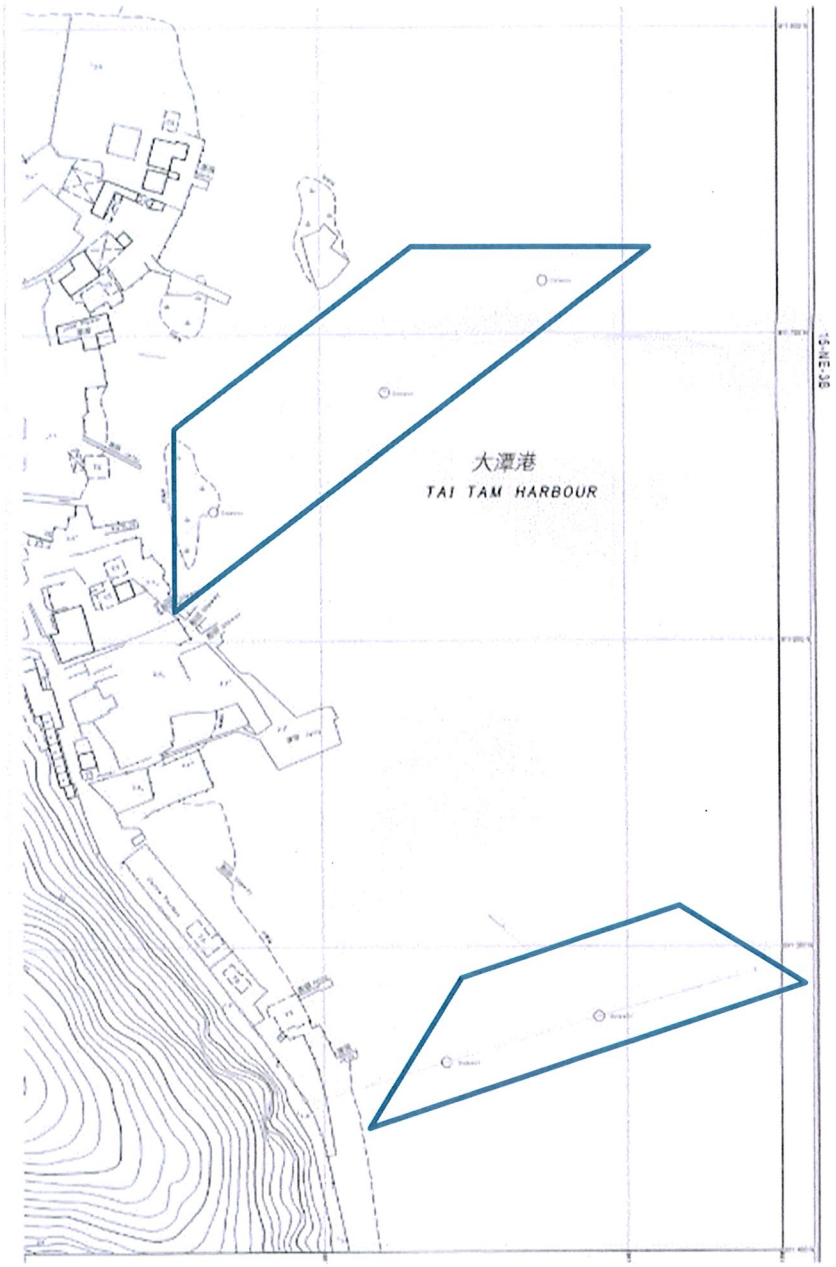
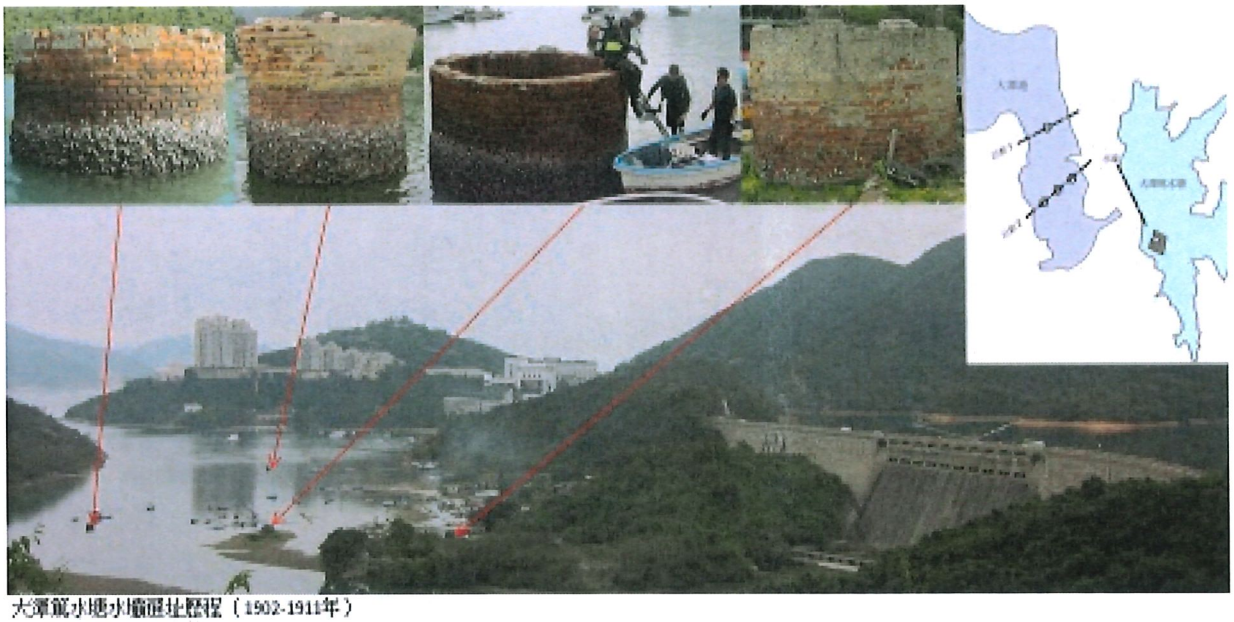


Figure 4 Wells No.3 and No.1 (L to R, Bottom) and Wells No. 5, No. 4 and No. 6 (L to R, Top)



大潭篤水塘水壩選址歷程（1902-1911年）

1902年	選址計劃(一)地基勘探開始，工程人員打了三口磚井(內徑1.73米)，以確定岩石層的深度。	1907年	在海灣面建水壩難度甚高，加之建設資金出現問題，導致整個計劃限縮。
1903年	1號井挖至海水下10.6米處出現裂隙，故被棄置。2號井挖至14.0米處發現岩石。3號井確定岩石層位於海水下17.9米。由於勘探結果存在風險，2號井需要再深挖至19.6米處才發現岩石層。	1911年	委員会一致通過由工程師謝菲(Scoffe)提出的在現址興建水壩的提案。
1904年	移往上游640米進行選址計劃(二)地基勘探，4至6號井於海水下13.7－16.5米處觸及岩石層。	1912年 1917年	大潭篤水塘水壩工程開工。 大潭篤水塘全面竣工。

Figure 5 The Brick Wells at Tai Tam Harbour

1904

The dam below Taitam Tuk was categorized as Second Section of Tytam Tuk Scheme in the Report of Public Works for 1904 [15]. The Report elaborated the further ground investigation work.

With the investigation result, it was decided that it would be inexpedient to proceed in the first instance with the construction of a dam at or near sea level, but a suitable site further up the valley was selected, the reminder of the works which were designated "Taitam Tuk Scheme – First Section" being designated in accordance with Chadwick's recommendations. Proposals for the carrying out of these works were submitted to the Secretary of State for the Colonies in October 1903 and approval was received by telegram on 1st January 1904.

A contract for the construction of the Intermediate Reservoir and contingent works was entered into on the 16th March 1904, the whole of the works was completed in 1908 at a cost of $896,140. The scheme included:

- The reservoir dam (196 million gallons increased to 210 Million gallons by insertion of sluice boards).
- A pumping station at Taitam Bay, quarters for a European Overseer and for Chinese engine drivers.
- Two sets of pumping machinery, A road from Shaukiwan –Stanley road to the Byewash Dam for the rising mains.
- Access roads to the Pumping Station, to the gauge basin at the entrance of Taitam tunnel.
- A rising main of 18" dia and 1.93 miles in length from PS to the entrance of the tunnel.
- A suction main 18" dia and 1.37 miles in length from storage reservoir to the PS.

Well No. 2 was sunk to a depth of about 65 feet where solid rock was found. The accumulated information showed that the solid rock on site most seaward site laid at a general level of 65 feet below Ordnance Datum, and a watertight diaphragm wall would have to be carried down to such depth. A dam on this site would have a length of 550 feet at the base and 780 feet at the crest, which would be 135 feet above the level of the rock.

The boatman, a Mr. Cheng who drove the research team members to To Ti Wan, was born and raised at Tai Tam Bay. He recalled that many years ago Well No.2 and No.3 were crushed and collapsed by vessels during sand quarrying in the shallow water. The incident was confirmed by Mr. Ma, a senior citizen who has lived in the area since his childhood.

Three more wells (No. 4, 5 and 6) were sunk along a line about 700 feet landward of the one above-described (Figure 4). Similar strata were encountered in this case, and the rock was found to lie at a depth of from 45 to 54 feet below Datum. A dam on this site would be 120 feet above the level of the rock. A dam here would therefore be as costly as one on the other site and would entail a considerable loss of storage capacity, and some loss of catchment area.
The trial works started in 1902 was brought to a conclusion on 10th October 1904.

1905 – 1906

The dam of Tytam Intermediate Reservoir was under construction since 1905 and the work was completed in 1908. [16] [17]

1907

The Report of Public Works in 1907 [18] described the necessary plans and particulars were prepared with a view to calling for tenders for this work, but the Government decided that it was inexpedient, for financial reasons, to proceed further with it and accordingly no further steps in the matter were taken.

Daniel Jaffe, the Executive Engineer of the Tytam Tuk project, wrote in The Engineering Record on 25th May 1907 [19] that Mr. W. Chatham, The Director of Public Works, had suggested a site for a new reservoir 600 feet in length and 60 feet in height above Ordnance Datum with an impound of 1,200 million gallons. The bed of the sea at this proposed dam site was about the level of Ordnance Datum and the well-defined rock on both shores of the bay gave hopes that a rock bottom would underlie the sand and mud at not a very great depth. He also mentioned that the rock was found at a depth of 65 feet below Ordnance Datum based on the findings from the wells and borings. Though rock was found at a less depth higher up in the bay, the difference in rock level was not great enough to compensate for a longer dam and reduced storage.

The drawing (Figure 6) prepared by Jaffe shows that the location of the dam for the low level reservoir was near to the head of the Tytam Bay. Had it been constructed at this proposed site, it should have been the first reservoir and dam built from the sea instead of the Plover Cove Reservoir dam which was completed in 1968.

1908

The dam of Tytam Intermediate Reservoir was under construction since 1905 and the work was completed in 1908. [16] [17]

On the completion of the "Taitam Tuk Scheme - First Section" which was designed as part of a much greater scheme, it was considered that the finances of the

Colony did not permit of the more extensive scheme until October 1912, when a contract was let for the carrying out of the Second Section.

1911

As stated in the Report of Proceedings of the Public Works Committee [20] for the meeting held on 7th Dec 1911, Mr. Jaffe had prepared a report and an estimate (dated 6th Feb 1905) and forwarded to the Government for the construction of an additional reservoir with an estimate of $3,312,300. The dam on Site No. 1 to impound 1,200 million gallons would cost $2,445,000.

A re-consideration of the catchment area had led to the construction of the dam at a higher point (Site No. 3) than that already referred to. The estimate of the amended scheme was $2,017,000 including the dam of 1,500 million gallons impounding capacity at the location immediately below Tytam Tuk Village at a cost of $1,642,000. The Committee agreed unanimously to recommend that the amended scheme should be carried out as expeditiously as possible. [20]

Figure 6 Location of the Wells and the Dam (from The National Archives, UK)

1912

A contract was let to Messrs. Sang Lee & Co. on 22nd Oct 1912 for the carrying out of the "Taitam Tuk Scheme – Second Section" which included the following works:

- The Tai Tam Tuk Reservoir at sea level, capacity 1,420 million gallons
- Extension of the pumping station to accommodate the additional pumping machinery
- Two additional sets of pumping machinery
- Two suction mains 18" dia and 0.52 mile in length from the draw off tower to the PS
- Two additional rising mains 18" dia and 1.93 miles from the PS to the entrance to the Taitam Tunnel

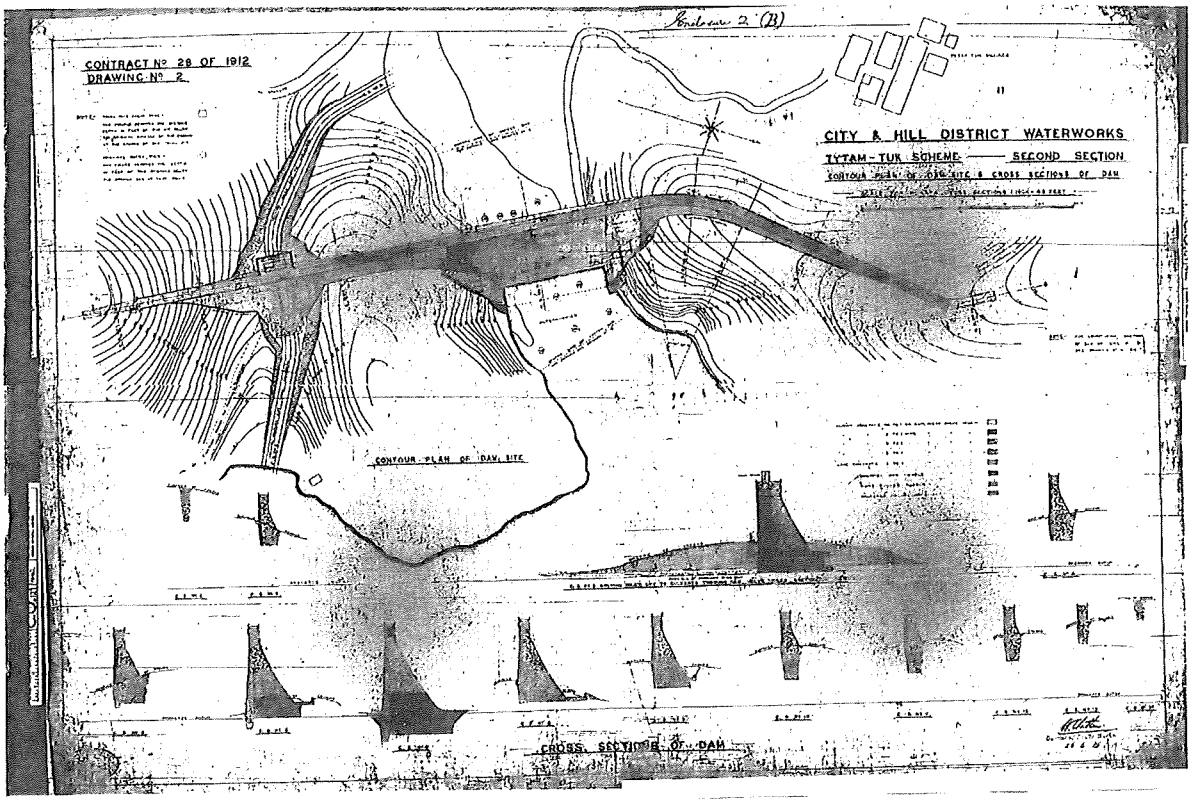


Figure 7 Layout of the Dam (from WSD Archives)

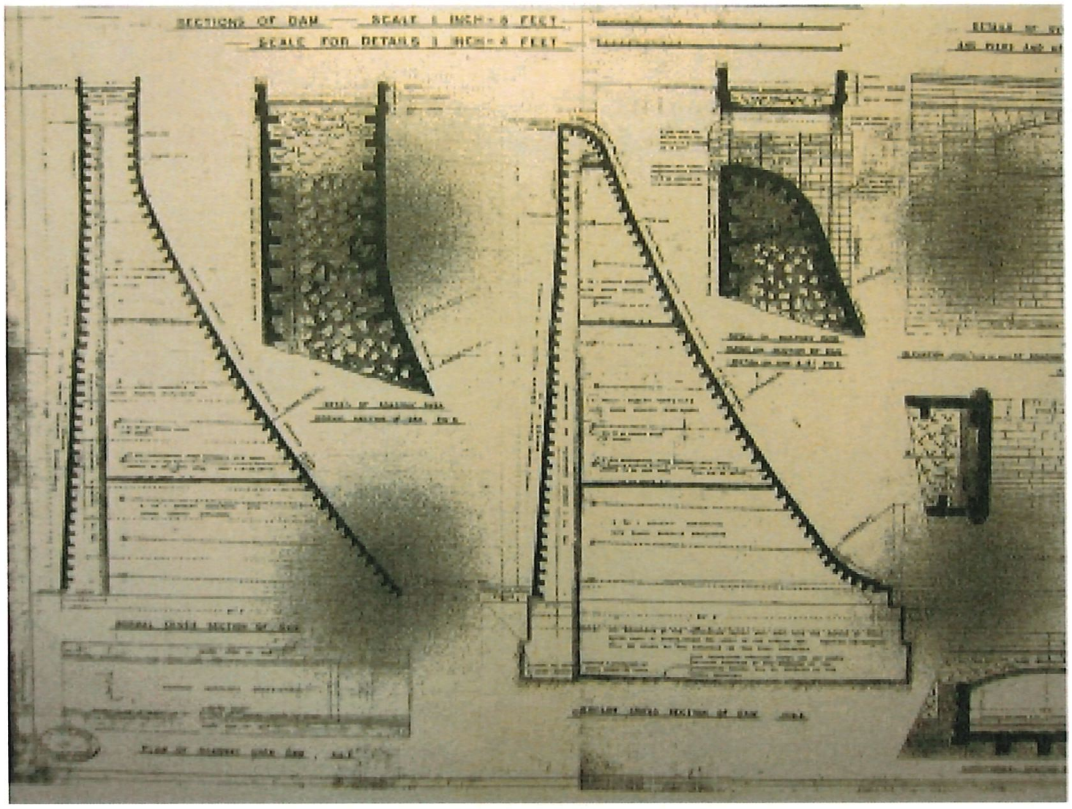


Figure 8 Cross Section of the Dam (from WSD Archives)

1914

Another contract for the supply and erection of two sets of pumping machinery at the PS was entered by the Crown Agents with Messrs. James Simpson & Co. Ltd. On 9th Jan 1914.

Further contracts were let to Sang Lee from time to time for the construction of the foundations for the pumping machinery, extension of the PS buildings, provision of a R.C. landing stage for the station, laying of the suction and rising mains and other minor works.

Discussion

The wells were sunk in order to determine the level of bedrock during the process of selecting the site for the reservoir dam. Due to deviations in findings from the first two wells, further sinking of Well No. 2 was necessary to confirm the presence of bedrock. The wells serve a very good case to illustrate the importance of adequate site investigation prior to the design and construction of a major project. It is rare to see the physical remains of the investigation work other than from the archives. Exactly one hundred years ago, construction of the Tai Tam Tuk Reservoir dam commenced. Sunk between 1902 and 1904, the brick wells are still standing in and above water today and should be regarded as part of the heritage of Hong Kong.

The brick wells show the evidence of the important investigation work prior to the selection of the dam site. Though the dam was finally decided at its present location, the brick wells serve as the evidence of the important pre-construction work. This is quite rare to see the robust remains of the site investigation work which was carried out more than a century ago. Built between 1902 and 1904, these wells can be treated as a kind of heritage.

The importance of implementing adequate site investigation in site selection for major construction work has been demonstrated by the case study of Tai Tam Tuk Reservoir dam. The Tai Tam Tuk Reservoir dam has stood the test of time since its completion in 1917. Had the dam been erected at the estuary of Tai Tam Bay, it would have become the first reservoir and dam built from the sea. However, as the site was below sea level substantial cofferdams would be required both upstream and downstream of the dam. The issue was confirmed by Mr. R.M. Henderson, the Waterworks Engineer, in his Report of Water Supply and Extension [29] submitted to the Director of Public Works, eleven years after the Tai Tam Tuk Reservoir dam was built.

The Institution of Civil Engineers in the U.K. considers that "Engineering history illuminates the development of civilisation through the study of the ideas and techniques in the past. Historic records and archives provide a rich resource of photographic and documentary evidence for engineers to understand and conserve the built environment and celebrate our civil engineering heritage". [28]

Summary on the Brick Wells

More than a century ago the wells were sunk in order to determine the depth of the rock surface for evaluating the options of siting the Tai Tam Tuk Reservoir dam. The location for the dam was finally decided after consideration of the difficulty and the associated cost in construction, besides the yield from the catchment area and the means of delivery of water to the city. The presence of the remaining four wells provides a strong evidence to support the importance of having adequate site investigation for a construction project.

Engineering history records the knowledge in the design and construction of heritage projects and permits appreciation of the ideas and techniques used in the past. The Tai Tam Tuk Reservoir dam is the final product of which construction commenced more than one hundred years ago, yet the four existing wells provides the evidence of essential investigation process of an engineering heritage for which all civil engineers can be proud of.

References

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[3] Hong Kong Government (1895) "Public Works Report for Year 1895".

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[25] Hong Kong Government (1916) "Report of Public Works for Year 1916".
[26] Hong Kong Government (1917) "Report of Public Works for Year 1917".
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[28] Institution of Civil Engineers (UK) Website.
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Construction History of the Dam

1912

The Public Works Department in 1912 reported [21] that the weirs constructed in 1906 for gauging the discharge of the main stream in the low level portion of the Tytam Valley were kept under observation. It was found that, during years of average rainfall, the yield from the valley would be sufficient to fill such a reservoir with a capacity of from 1,200 to 1,500 million gallons. In view of this, it was decided to construct the dam immediately below the village of Tytam Tuk instead of near the low water mark at Tytam Bay, as formerly proposed and a scheme was submitted to Government accordingly. A contract for the dam construction with Messrs. Sang Lee & Co. was signed on 24th Oct 1912. Excavation for the foundation of the dam and for the diversion of the main stream began on 7th Dec 1912 [22].

The total estimates: $2.4 million
Date of completion: 22 October 1917
Penalty: $150 per day

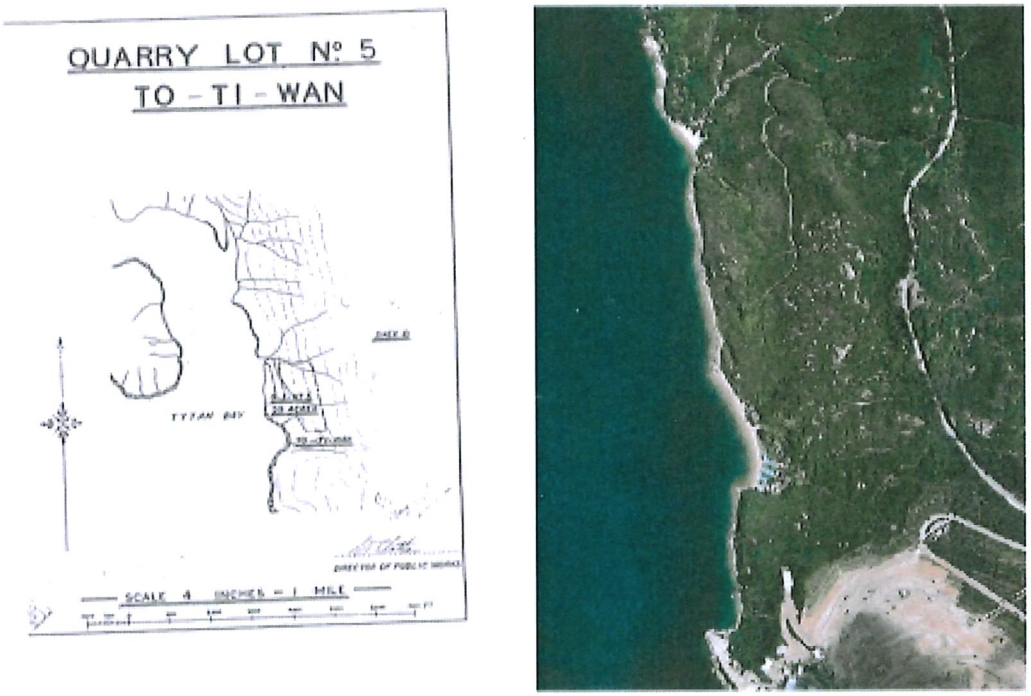
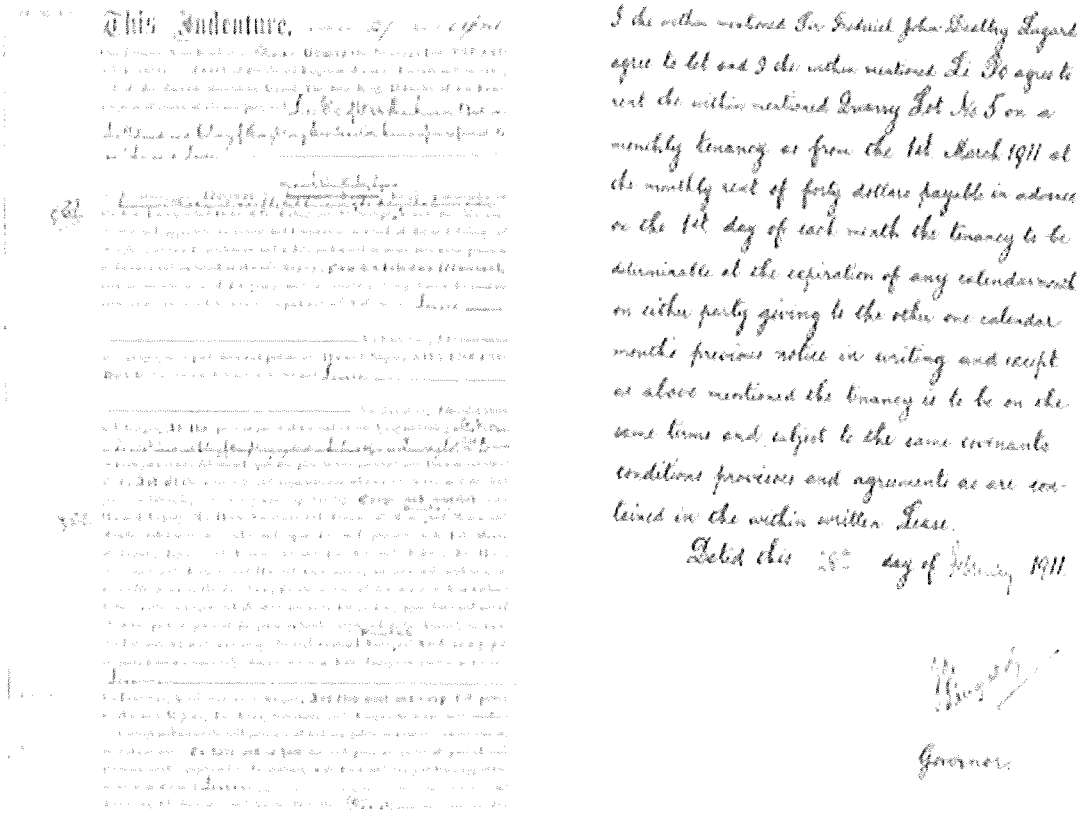


Figure 9 To Ti Wan Quarry



This Indenture,

I the within mentioned Sir Reginald John Stanley Lugard agree to let and I the within mentioned Li To agree to rent the within mentioned Quarry Lot No 5 on a monthly tenancy as from the 1st March 1911 at the monthly rent of forty dollars payable in advance on the 1st day of each month the tenancy to be determinable at the expiration of any calendar month on either party giving to the other one calendar months previous notice in writing and except as above mentioned the tenancy is to be on the same terms and subject to the same covenants conditions provisions and agreements as are contained in the within written Lease.

Dated this 25th day of January 1911

Governor.

Figure 10 Contract for Quarrying at To Ti Wan

One source of the quarried stones came from To Ti Wan Quarry. The captioned quarry, under a monthly tenancy, was determined on 15 November 1912 as the quarry was required for the reservoir and dam construction.

After signing the contract on 24th October 1912, Messrs. Sang Lee & Co. began to erect the necessary preliminary works and the quarters for workmen. Accommodation for 400 workmen near the dam site besides sheds for quarrymen at the neighbouring quarries, were completed at the end of 1912.

1913

Excavations for the foundations of the dam and the diversion of the main stream, begun on 7th December 1912 and continued this year. The excavations for the

dam were confined to a length of 380 feet and by end of the year 70 feet had been completed. Concrete pouring started on 24 December 1913. The inlet and outlet cuts for the stream diversion were nearly completed.

Providing stone for the dam construction, quarried stone of 14,200 cubic yards of ashlar facing had been prepared. A large quantity of displacers and 5,000 cubic yards of broken stone were also prepared for concrete work.

Quarters with rubble masonry on an elevated site about a quarter of a mile away from the dam site for 3 government Overseers and offices close to the site were erected. One Overseer occupied the quarters on 1st July 1913. The location of the quarters and the rubble remnants are shown in Figure 10 and 11 respectively.

Similarly, the quarters for 10 Government Foremen and for 4 Indian Police Constables were constructed of weather boarding and with tiled roofs. The former was occupied in June and the latter in August.

Figure 11 Location of the Overseers' Quarters

Figure 12 Remnants of the Overseers' Quarters

One major temporary works is the construction of steel sheetpiled cofferdam to enclose the site of the dam where it crossed the stream bed, both tidal and flood water had to be excluded. All the guided piles for the downstream cofferdam and 6 of those for the upstream were driven.

These cofferdams were being constructed to enclose the site of the dam where it crosses the existing stream-bed, both tidal and flood water having to be excluded from the sea. [22]

Figure 13 Cofferdam Downstream of the Dam

The first consignment of 246 tons of cast iron pipes, 18 inches in diameter, for the additional suction and rising mains arrived from England in December and would be laid shortly. The pipes were stacked on the reclaimed ground in front of the pumping station.

1914

The foundations of the large masonry dam were partially constructed over a length of 400 feet. In the old stream bed, the foundations were carried down to a maximum depth of 44 feet below ground level or about 40 feet below tidal low water level, at which depth sound water tight rock was found. Towards the end of the year, good progress was made with the concrete and masonry work, as well as laying of the additional pumping mains and with the foundations for the additional pumping machinery.

In the early part of the year, the cofferdams to enclose the site of the main dam where it crosses the stream bed were still in course of construction, the excavations over the remaining portion of 380 feet of foundation trench referred to in last year's report were completed and concreting over this length was proceeded with.

The cofferdams which consisted of a single row of sheet piling, 6 inches thick, V-grooved and tongued, driven down to the rock and backed up with earth in the case of the upstream dam and with stone downstream, were completed and the work of excavating the foundations within the area enclosed by them was begun in April. The water percolating through and around the cofferdams was removed at first by a centrifugal pump driven by an oil engine. As the excavation deepened, more pumping power was required and a steam-driven ram-pump and two additional centrifugal pumps were added, the latter being kept in reserve.

In excavating down to the rock bottom, with the exception of a layer of small water-worn boulders overlying the rock, the material met with was entirely sand. Rock was encountered at about the estimated depths, the general level at the deepest part being 30 feet below the stream bed. As the stream bed itself was at about mean sea level, the cofferdams were called upon to withstand a very considerable water pressure and they successfully withstood it notwithstanding the unfavourable nature of the ground in which they were situated. On the upstream or reservoir side of the foundation trench, a tongue, about 13 feet wide and 16 feet deep, was cut into the rock. The depth and width of the cutting varied with the soundness of the rock encountered.

To admit cutting the tongue and subsequent filling it with concrete, it was necessary to make arrangements for carrying off the water leaking through the upstream cofferdams and so prevent it flooding and cutting.

This was accomplished by constructing, parallel with the tongue and immediately clear of the base of the main dam, two concrete walls separated from each other by a distance of two feet, the upstream wall being on a foundation of dry rubble, and by laying a pipe from the space or channel so formed to lead the leakage water away to the pump sump. This arrangement was successful and by the end of the year, the cutting of the tongue had been completed and the depositing of the cement concrete in it had been begun.

The two large masonry culverts, each 12 feet wide by 10 feet high, provided for carrying off storm water whilst the foundations of the main dam were in course of construction, were completed in May. They came into operation on completion of the cofferdams in March. No very heavy rainfall occurred during the year though the total quantity of rain which fell was above the average. The culverts proved in consequence to be of ample size. At one time, after a thunderstorm, the water rose in them for a brief period to a height of 8 feet but this was partly due to the fact that the outlet end was obstructed by some centering.

Concrete work in the dam trench between the culvert and the stream bed was proceeded with and was carried to a height of about 40 feet above Ordnance Datum though the confined space available for working in necessarily slowed down the progress.

In all, 18,700 cubic yards of soft material and 5,900 cubic yards of rock were excavated during the year, 10,350 cubic yards of soft material and 2,800 cubic yards of rock being from the stream bed foundations. The quantities of cement concrete deposited and of granite masonry set were as follows:
Fine cement concrete: 3,092 cubic yards
Hearting concrete containing granite displacers: 3,906 cubic yards
Granular ashlar: 17,217 cubic feet

The remaining consignments of 18" cast iron pipes and specials, totalling 1,604 tons, for the suction mains and two additional rising mains, were received early in the year and a contract for laying them was let to Messrs. Sang Lee & Co. on 6 th March. Good progress had been made by the end of the year, 4,000 lineal yards of main having been laid whilst 2,100 lineal yards of pipes were distributed along the road in readiness for laying in the trench.

A contract was also let to Messrs. Sang lee & Co. in June for the construction of the pump pit required in connection with the pumping machinery which is on order and on the completion of this work a further contract was let to the same firm in September for the construction of the massive concrete foundations to support the pumping engines.

The first consignment of pumping machinery was due in November but, owing to delays resulting from the war, it had not arrived up to the end of the year.

1914 Estimate: $514,000.00
1914 Expenditure: $340,259.28
Total estimates: $2,400,000.00
Expenditure to 31 Dec 2014: $459,197.57

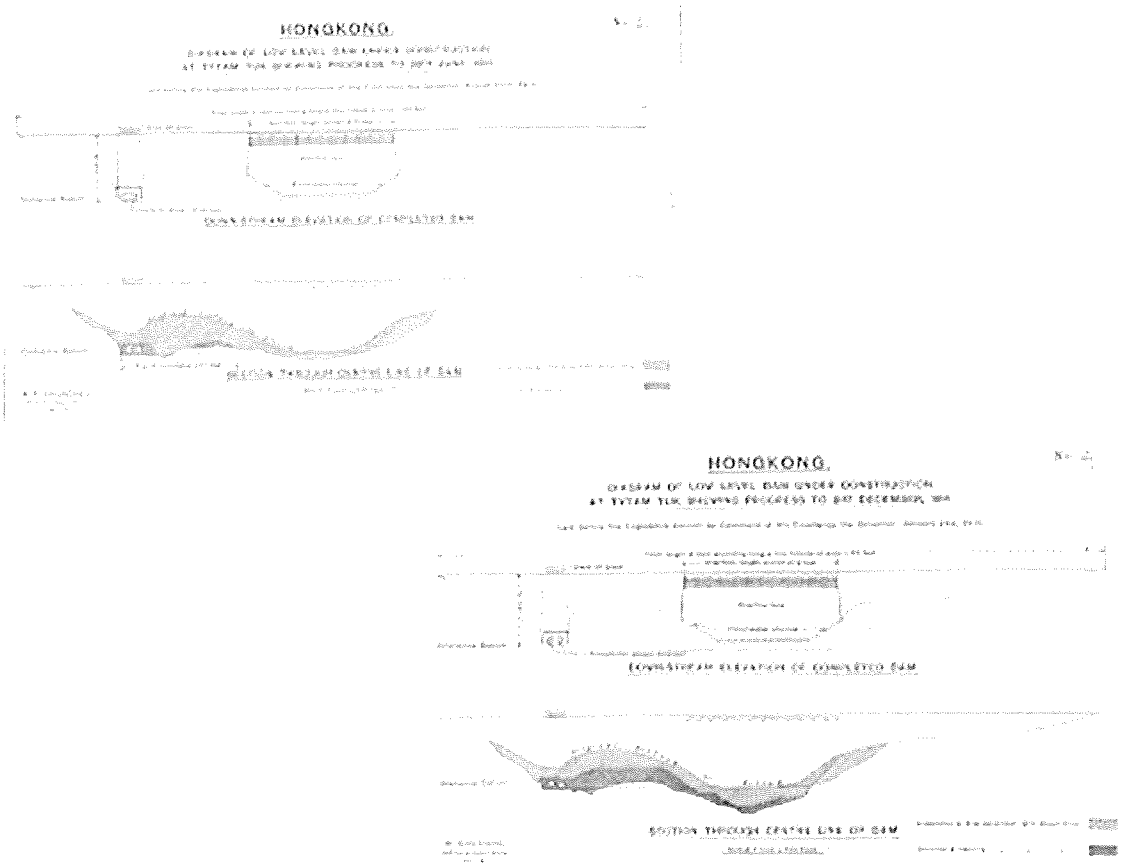


Figure 14 Progress of the Dam Construction

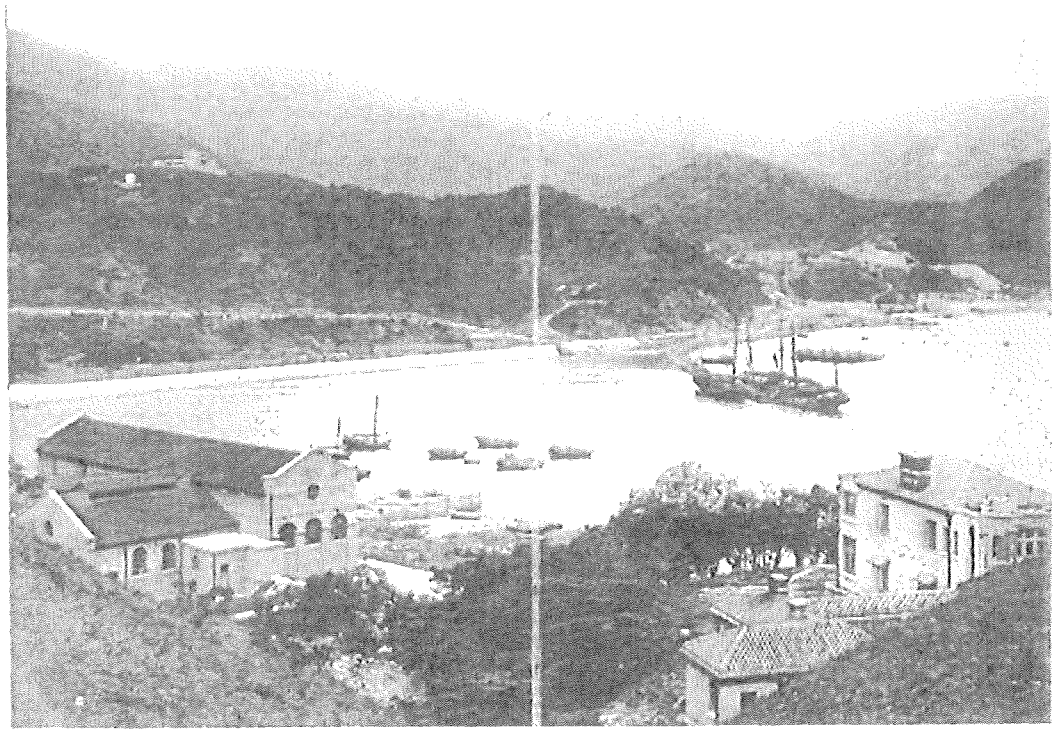


Figure 15 Delivery of Materials at the Pier for Dam Construction, the Pumping Station and the Senior Staff Quarters at the Foreground

1915

Very good progress was made with the construction of the dam. At the end of 1914, the total length over which excavations had been completed and concreting had been undertaken was 470 feet, whilst the height to which the concrete and masonry of the dam had been constructed varied from 32 feet below to 40 feet above Ordnance Datum.

By the end of 1915, the total length over which excavations had been completed was 630 feet, whilst the height to which the concrete ad masonry had been carried varied from 35 to 59 feet above Ordnance Datum. The height to which construction had been carried above the deepest part of the foundations, where the dam crosses the old stream bed, was 77 feet.

In all, 9,534 cubic yards of soft material and 2, 566 cubic yards of rock were excavated during the year. The quantities of cement concrete deposited and of granite ashlar set were as follows:
Fine cement concrete: 8,722 cubic yards
Hearting concrete containing granite displacers: 39,968 cubic yards
Granular ashlar: 49,074 cubic feet

In order to provide for impounding water during the dry season, the culverts were permanently closed with masonry and concrete at the end of May, and in September, the valves on the wash out pipes were closed to enable impounding to be begun, but, as the rainfall during September proved to be considerably below the average (5.71 inches compared with an average of 9.67 inches), it appeared as if little advantage would be gained from the new reservoir. The deficiency of rainfall during September was however made good in October, when 11.71 inches fell, resulting in filling the new reservoir to more than half its capacity at that period. The water attained its maximum height on the 10th November, when it stood at 10.5 feet above the lowest draw off, at which level the effective impound is 57 million gallons.

Pumping from the new reservoir was begun on the 22nd October and continued throughout the remainder of the year. In all, 85.75 million gallons were pumped from this reservoir up to the 31st December. During the period mentioned, 22nd Oct to 31Dec, the accounts from streams flowing into the reservoir amounted to 80.75 million gallons, or 1.10 million gallons per day.

The laying of the two additional 18" cast iron rising mains from the pumping station to the gauge basin at the inlet of the Tytam Tunnel was completed. The laying of the two 18" suction mains from the draw off tower of the low level reservoir to the pumping station was also completed.

As the 18" cast iron suction main laid in 1905-06 from the intermediate reservoir to the pumping station would have been submerged by the waters of the new low-level reservoir for practically its entire length, it was taken up, the pipes being re-used in laying the mains above referred to.

In February a contract was let to Messrs. Sang Lee & Co. for the construction of the foundations and flues for the additional boilers required in connection with the new pumping machinery and a further contract was let to the same firm in July for the extension of the pumping station buildings to accommodate the pumping engines. By the close of the year, both contracts were practically completed, as were also the contracts for the pump pit and engine foundations mentioned in last year's report.

The whole of the pumping machinery indented for from England arrived during the year. Under the contract entered into with makers (Messrs. James Simpson & Co. Ltd.) the machinery is to be erected, tested and maintained for four months by them. Their representative, Mr. Daniel Dyer, arrived in the Colony on the 27th March, and the first consignment of machinery arrived shortly afterwards.

By the end of the year, the boilers, superheaters and Green's fuel economiser had been erected, the pumps, valve chamber, etc., for both sets of machinery had been fixed in position in the pump pit and a commencement had been made with the erection of the first engine.

1915 Estimate: $700,000.00
1915 Sup. Vote: $105,000.00
Total: $805,000.00

1915 Expenditure: $800,701.25
Total estimates: $2,400,000.00
Expenditure to 31 Dec 2015: $1,259,898.82

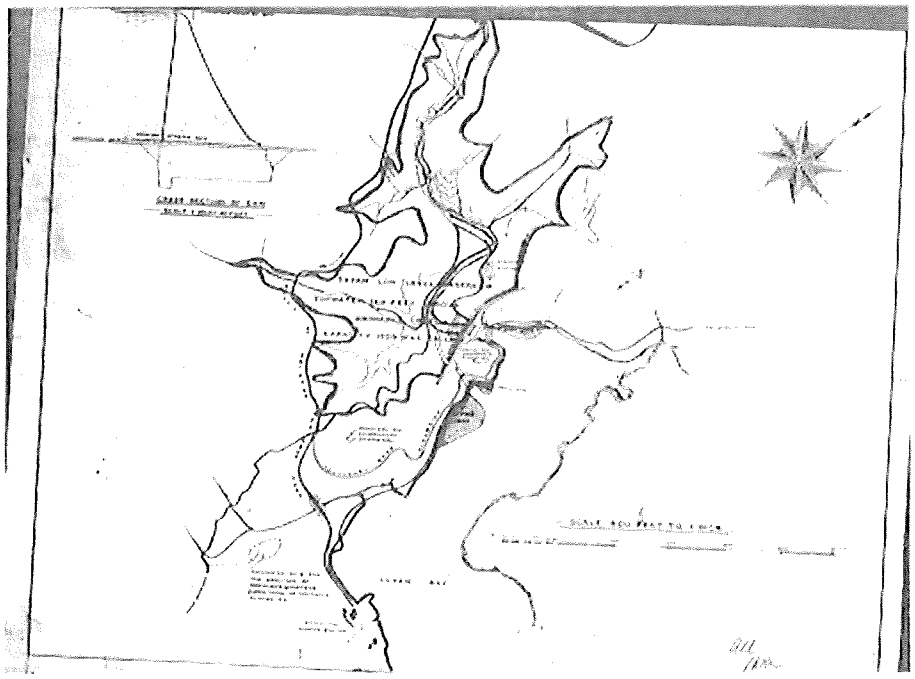


Figure 16 The Site Layout

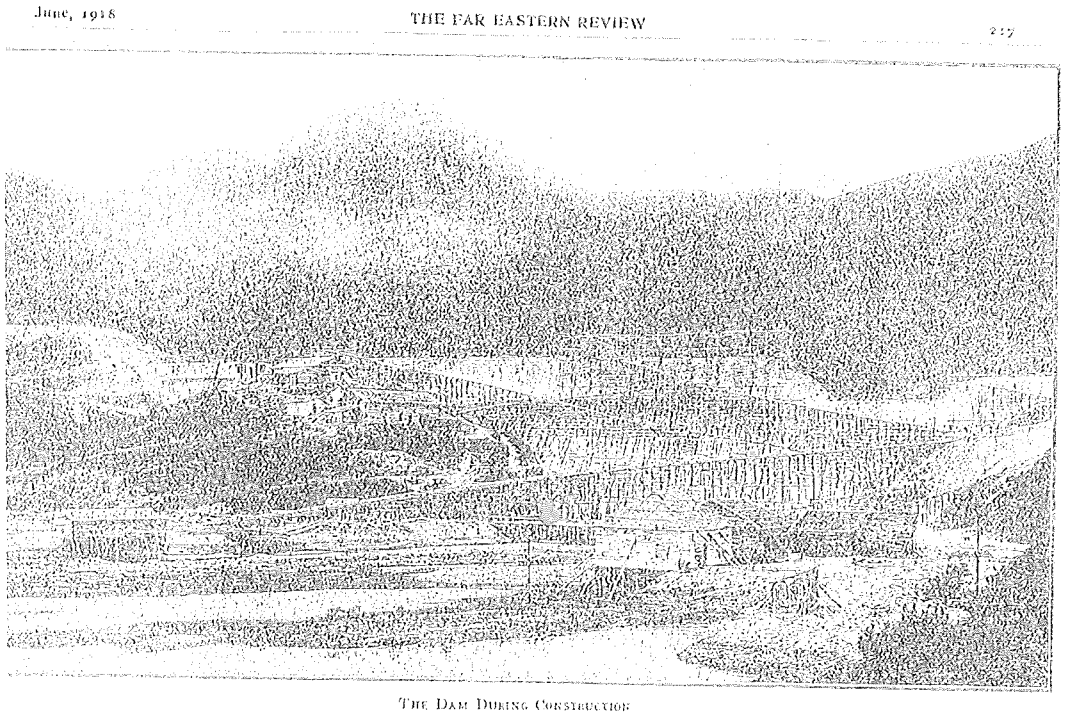


Figure 17 Progress in Dam Construction

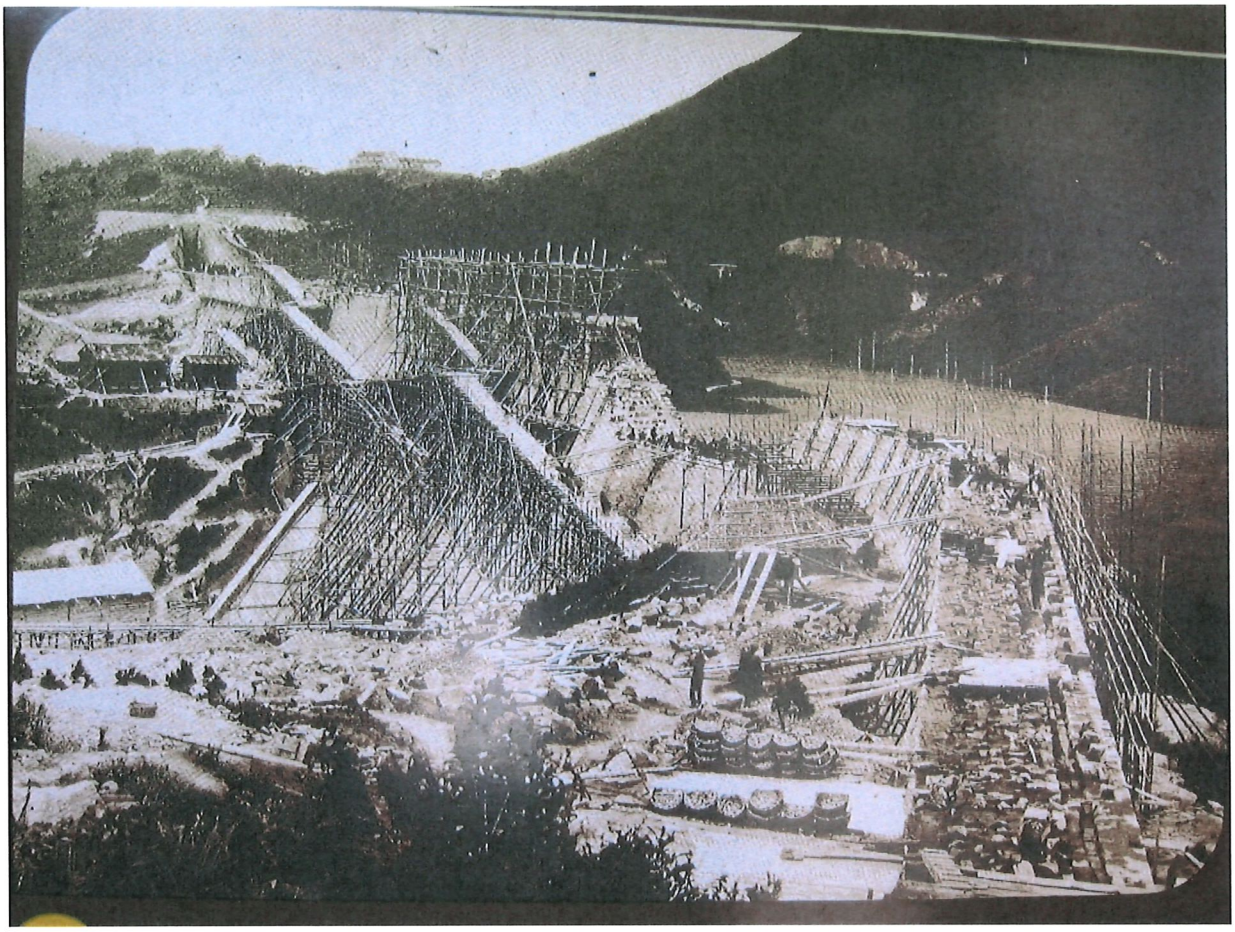


Figure 18 Progress in Dam Construction

1916

Good progress was maintained throughout the year. The total length over which excavation had been completed by the end of the year was 1,218 feet. The height to which the concrete and masonry had been carried, except in the case of a short length which was purposely kept low to provide a temporary overflow, varied from 102 to 118 feet above Ordnance Datum. For the temporary overflow already referred to, a length of 75 feet was kept down to 86 feet above Ordnance Datum.

In all, 9,533 cubic yards of soft material and 2,994 cubic yards of rock were excavated during the year. The quantities of cement concrete deposited and of granite ashlar and rubble set were as follows:
Fine cement concrete: 14,546 cubic yards
Hearting concrete containing granite displacers: 50,493 cubic yards

Granular ashlar: 114,603 cubic feet
Granite rubble: 43,983 cubic feet

The incidence of the rainfall during the year was very unfavourable for the storage water in the low level reservoir. Considerably more than half the total rainfall of the year fell in May and June, when, for constructional reasons, the water in the reservoir could not be maintained at a height higher than 40 feet above O.D. A great quantity of water consequently flowed to waste over the temporary overflow, which was then at a low level. From July onwards, when construction had reached such a stage as to admit the storage of water to a considerably great height, the rainfall was so small that full advantage of the additional capacity of the dam was not obtained. The water attained its maximum height on the 20th October when it stood at 30 feet above the lowest draw off, or 50 feet above O.D., at which level the effective impound is 211 million gallons. The dam was however capable of impounding 367 million gallons at the date mentioned.

The contract for laying the additional pumping and supply mains and executing certain contingent works, which was entered into in March 1914, was completed during the year.

The following three contracts for the foundations of the new Pumping Machinery and for the enlargement of the Pumping Station were completed during the year:

(a) Foundations for pumping machinery, signed in September 1914.
(b) Foundations of Boiler House extension and construction of flues for boilers, signed in Feb 1915.
(c) Extension of Pumping Station Buildings, signed in July 1915.

The erection of the two sets of additional pumping machinery was proceeded with under the supervision of Mr. Daniel Dyer, the representative of the makers of the plant (James Simpson) and by the end of the year one set had been tested under steam for short runs, amounting in all to 5,000 revolutions, whilst the second set was nearly ready for steam trials.

1916 Estimate: $700,000.00
1916 Sup. Vote: $130,000.00
Total $830,000.00

1916 Expenditure: $812,65.87
Total estimates: $2,455,000.00
Expenditure to 31 Dec 2016: $2,072,864.69

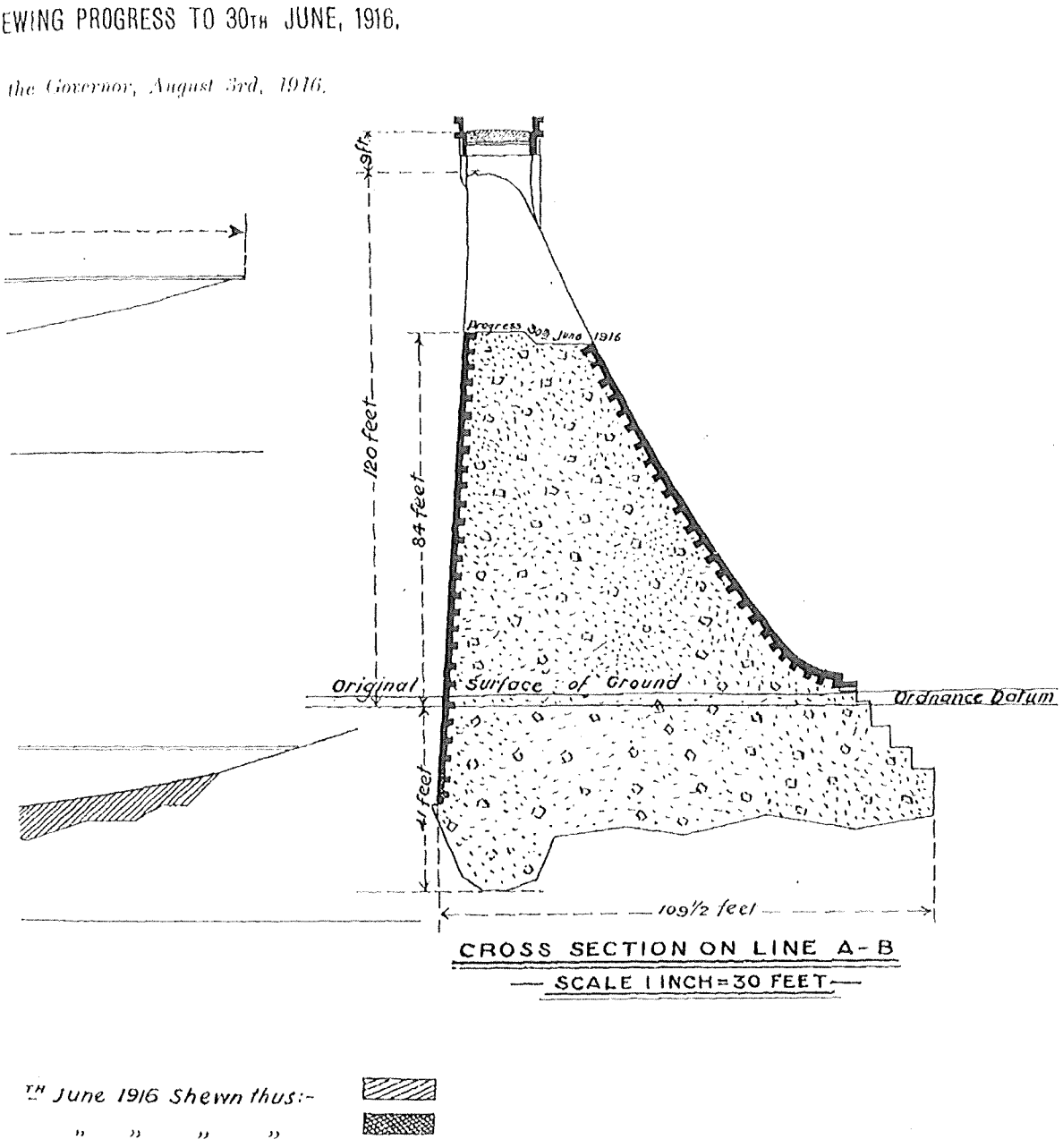


Figure 19 Section showing Construction of the Dam

1917

By the contract date of 21st October 1917, the whole project of constructing the Tai Tam Tuk Reservoir, except for a few minor details, was completed [10][11][12][13][14].

The length of the completed dam is 1,255 feet and its extreme height from the deepest part of the foundations to the roadway is 170 feet, or to the crest of the overflow is 161 feet. Its maximum thickness at the base is 115 feet. The foundations in the 238 feet stream bed were excavated below sea level. The general level of sound rock at the deepest part of the foundations being 30 feet below the stream bed (27 feet below low water ordinary spring tides). A tongue, varying from 10 to 20 feet in width, was cut into the rock to ensure greater watertightness and was carried down to a maximum depth of 41 feet below low water spring tides.

The dam is of cement concrete, faced on the inner side with granite ashlar and on the outer with granite rubble set and pointed in cement mortar. Except in the case of the backing of the inner facing, for which fine cement concrete varying from 10' thick at the base to 3'8" thick at the top was used, the whole of the cement concrete has granite displacers embedded in it.

The quantities of excavation for the dam and of cement concrete and granite masonry were as follows:
Soft excavation: 62,980 cubic yd
Rock excavation: 23,838 cubic yd
Cement concrete hearting (6 to 1) 31,209 (7 to 1) 39,000 (8 to 1) 28,654 cubic yd
Cement concrete backing of inner facing (4.5 to 1) 28,805 cubic yd
Lime concrete filling from top water level to road level: 3,338 cubic yd
Hand packed rubble filling from top water level to road level: 655 cubic yd
Ashlar masonry of inner face & of overflow section of outer face: 164,858 cubic ft
Rubble masonry of outer face, except overflow section: 59,400 cubic ft
Ashlar masonry in string courses, corbelling courses, parapets, culverts, valve house, etc.: 83,361 cubic ft

The valve tower contains two wells, each of 12' x 8' which connects at the base of the dam with two culverts, nearly circular in section, their dia being 12 feet and

their height 10 feet. Each well contains a stand pipe 18"dia, from which draw off pipes 15" dia connect with the reservoir. The draw off pipes are at intervals varying from 10 to 15 feet, connected alternatively with each stand pipe which are connected with 18" supply pipes leading to the PS. Valves for controlling the draw off pipes are contained within the valve wells and external penstocks are provided for cutting off the water in case of damage to any valve or pipe. A valve house 31' x 10' internally containing the valve operating gear surrounds the valve wells. The house is built entirely of granite ashlar and is roofed with R.C. The floor of the valve house and platforms in the valve wells are of R.C. removable slabs, whereas cast iron slabs are used for those supporting the head stocks.

The roadway over the dam has a clear width of 16'6" between the parapets, which are of ashlar masonry in bays of alternate rock-faced and rough-punched stones, surmounted by a rock-faced ashlar coping. It forms part of the main road encircling the greater part of the Island, which is being adopted for motor traffic. The overflow crest is 240 feet long, the roadway being carried over it on 12 arches each of 20 feet span. The arches are of R.C. faced with ashlar masonry and are supported by piers of ashlar masonry, the stones of which are bonded with steel rods.

At the base of the dam, there is a water cushion extending for a length of 153 feet, into which the overflow water is conducted by flood water channels. The water cushion discharges into the old stream bed.

Water was first impounded in the reservoir in September 1915, 85 million gallons being pumped from it in that year. In 1916, the quantity pumped was 325 million gallons. On 1st Jan 1917, the amount of water remaining in the reservoir was 182 million gallons and on 15th May, when it reaches its lowest level, the water in it had been drawn down to the level of the lowest draw off.

The extension of the PS for accommodation of the new machinery commenced in June 1914 and was completed by 1st Jan 1916 with erection of the machinery completed on 1st Dec the same year. The small masonry pier constructed in 1904 -1908 for landing purposes was extended by adding a T-shaped head of R.C. The T-shaped projects 40 feet from the old pier, its width at the inner was 27 feet and at the outer end is 40 feet with a double flight of landing steps. The depth of

water at the head is 7'6" at low tides in order to enable the coal junks and small crafts to come alongside.

At the end of the year, there were still some liabilities outstanding including a sum of $25,000 retained under the contract.

1917 Estimates: $320,000.00
Total Estimates: $2,455,000.00
1917 Expenditure: $262,422.40
Expenditure to 31 Dec 1917: $2,335,287.09

1918

Despite the project was substantially completed in 1917, a few details such as the provision of a grille on the outlet block at the outer end of the culverts and of a water service to the bungalow on the hill and to the permanent quarters for the police guard were completed.

A memorial stone to mark the completion of the work was laid by His Excellency, Sir Henry May on the 2nd Feb 1918. [14]

As the result of heavy rainstorms in June and August, the new reservoir filled up and commenced to overflow on 15th August. On the 21st September, after rainstorms extending over three days and amounting to almost 12 inches, the overflow amounted to 10 and half inches, the maximum overflow recorded during the year. The reservoir continued to overflow until 28th November 1918.

The expenditure including the sum of $25,000 which had been retained under the contract. At the close of the year, there was still a small balance outstanding for the pumping machinery.

1918 Estimates: $50,000
Total Estimates: $2,455,000.00
1918 Expenditure: $36,142.33
Expenditure to 31 Dec 1918: $2,371,429.42

Figure 20 Elevation of the Completed Dam

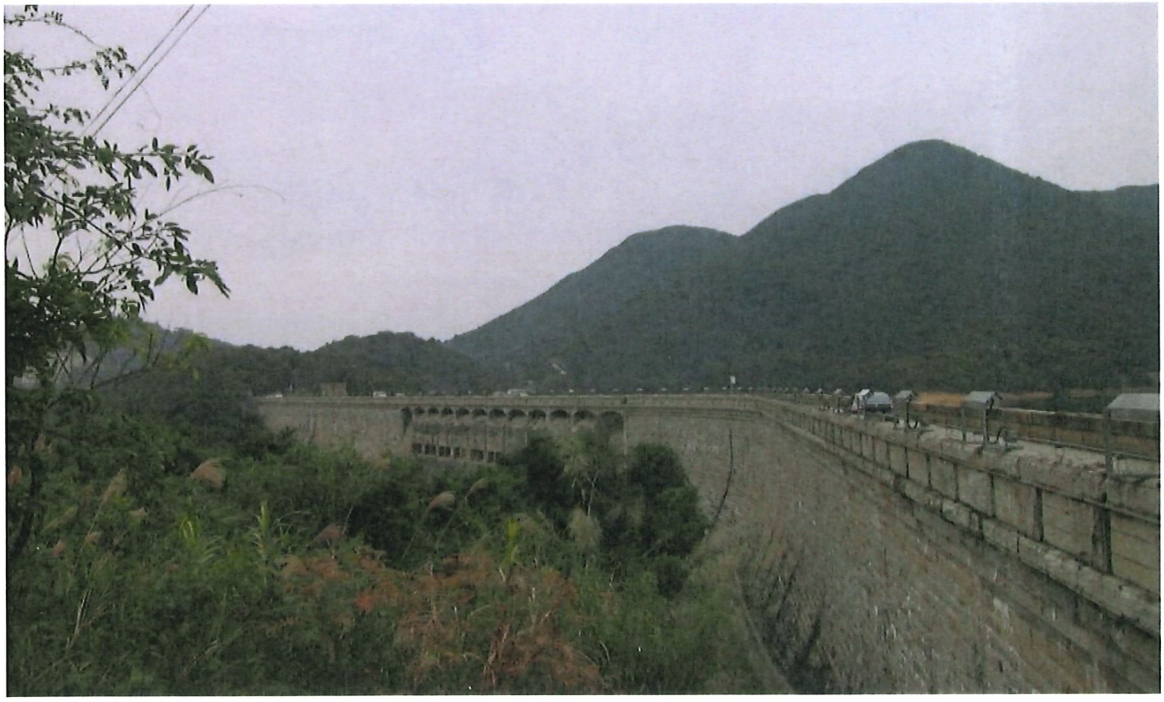


Figure 21 The Completed Dam

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[7] Hong Kong Government (1913) "Report of Public Works for Year 1912".

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[9] Hong Kong Government (1914) "Report of Public Works for Year 1913".

[10] Hong Kong Government (1915) "Report of Public Works for Year 1914".

[11] Hong Kong Government (1916) "Report of Public Works for Year 1915".

[12] Hong Kong Government (1917) "Report of Public Works for Year 1916".

[13] Hong Kong Government (1918) "Report of Public Works for Year 1917".

[14] Hong Kong Government (1919) "Report of Public Works for Year 1918".

The Submerged Tai Tam Tuk Village

James Hayes had been able to interview two ladies who lived in the Village before dam construction, a detailed account of his findings is resented in Chapter 4, Tai Tam Tuk, Village Under Water, of "The Rural Communities of Hong Kong – Studies and Themes".

Tai Tam Tuk Village was marked on the earliest map since the Island became a British Colony. It was a small and remote village situated at the head of a large inlet of the sea, surrounded on three sides by steep hill slope. Its scenery is grandeur and even today the surrounding area is still very impressive.

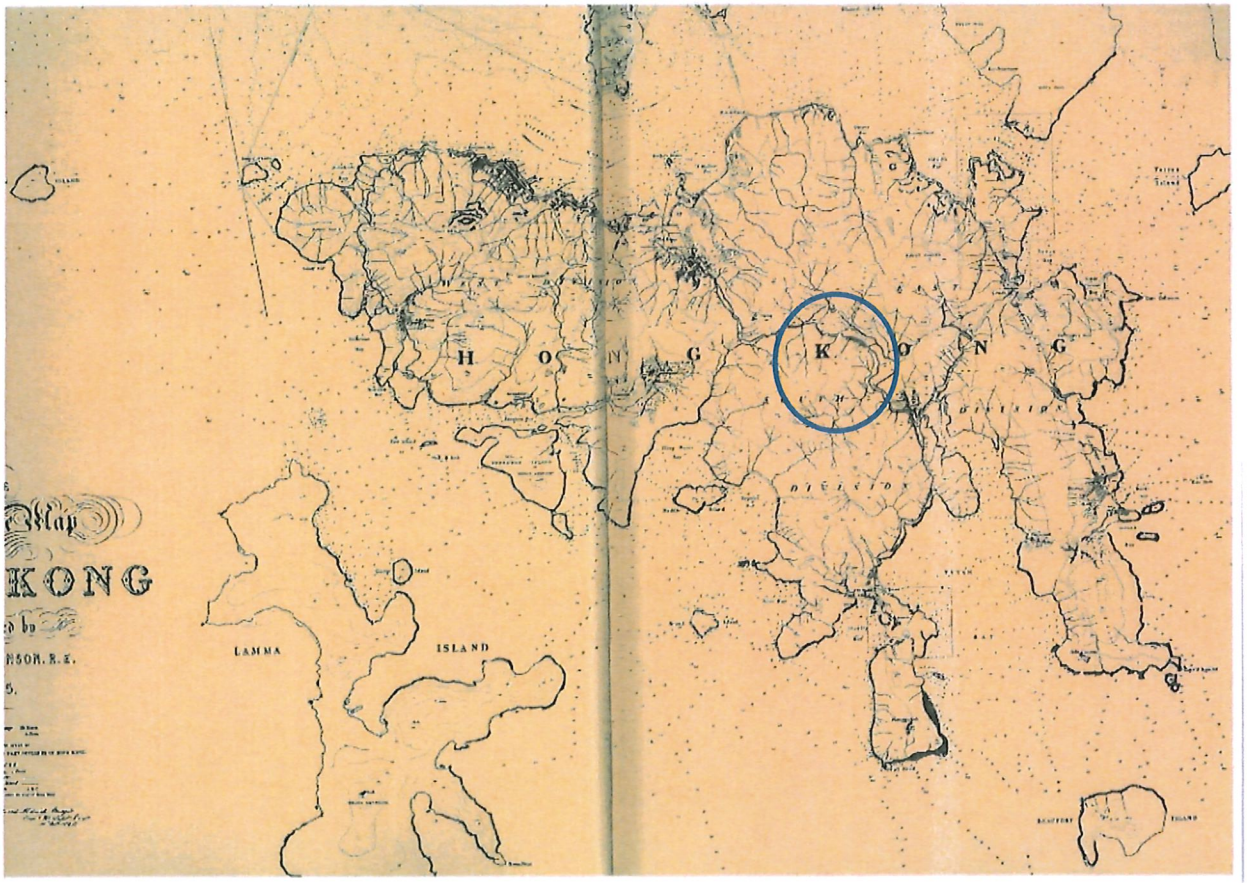


Figure 22 Location of Tytam Took Village from an Old Map

Figure 23 Location of Tytam Took Village

With a population of fifty persons in 1841, Hayes estimated, that the village was established sometime in the eighteenth century. In 1847's land survey, there were 13 houses and in 1887, 20 houses were recorded. In 1911 there were 52 men and 24 females. They were Hakkas originated from Mui Yuen of Ng Wah. The largest group of inhabitants were Chung families, of about three quarters of the total inhabitants. Two Yau families of 12 persons and two Chan brothers also lived in the Village.

Being the largest group, the Chungs had an ancestral temple among their houses. A small Tien Hou temple was outside the village. Grove of large trees e.g. banyans were situated at the rear of the village. There was a wooden bridge across the

stream in front of the houses. The houses stood in two rows. Some were in ruinous conditions in 1914 due to typhoons and heavy rain. No wall was erected to surround the houses.

Stood beside the main stream, the dwellings were of one storey. They were small with average size of 400 square feet. The roof had been covered with orange red tiles. The walls were constructed of mud bricks made with earth from the fields. Masonry foundations, beaten earth as flooring and Chunam paved areas were commonplace. Granite was used as door jambs, entrance posts and lintels.
The tombs were situated at a lucky site of 2 miles from the village. There was a stone statue which was weathered into the shape of a lion. In 1915, 15 houses from Nos. 1 – 6, 9 – 17 were resumed at a cost of $5,834.84. [PWD report for year 1914]

Confirmation of the existence of the Village

Tai Tam Took was the first ever submerged village in the Hong Kong's waterworks history. There are only documents mentioning the village but without a real photo taken. The only appearance evidence is probably the painting of the village by William W. Lodder, a British Officer, in 1850s. James Hayes in his book mentioned the interviews with two aged ladies who lived in the village before re-location to Chai Wan during the reservoir construction. The research team thus wished to explore and confirm the physical existence of the village.

Figure 24 Painting of Tytam Took Village by William W. Lodder

With the approval by Water Supplies Department, diving was carried out by experienced divers to search for the existence of the village houses. One major setback in the investigation is the lack of the exact location of the houses which are only shown diagramatically on drawings.

By trial and error, diving was undertaken twice but unfortunately no traces of village houses were spotted. However, physical existence of some civil engineering construction were found. Retaining walls made of granite blocks, slope protection by stones, a granite pillar and a large piece of timber block embedded in a granite wall were found. The timber block may be associated with the timber bridge mentioned by the old lady recorded by James Hayes.

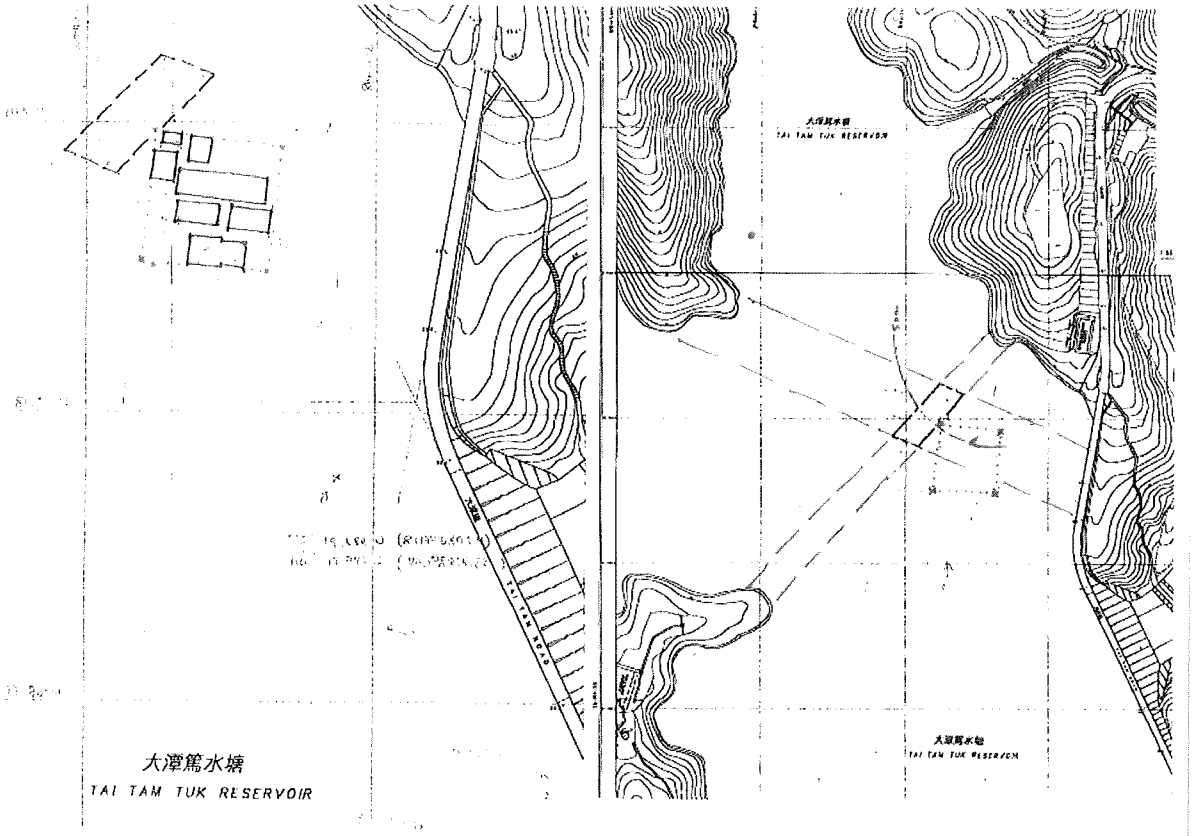


Figure 25 Diving Area

Figure 26 Divers inside the Impounding Reservoir

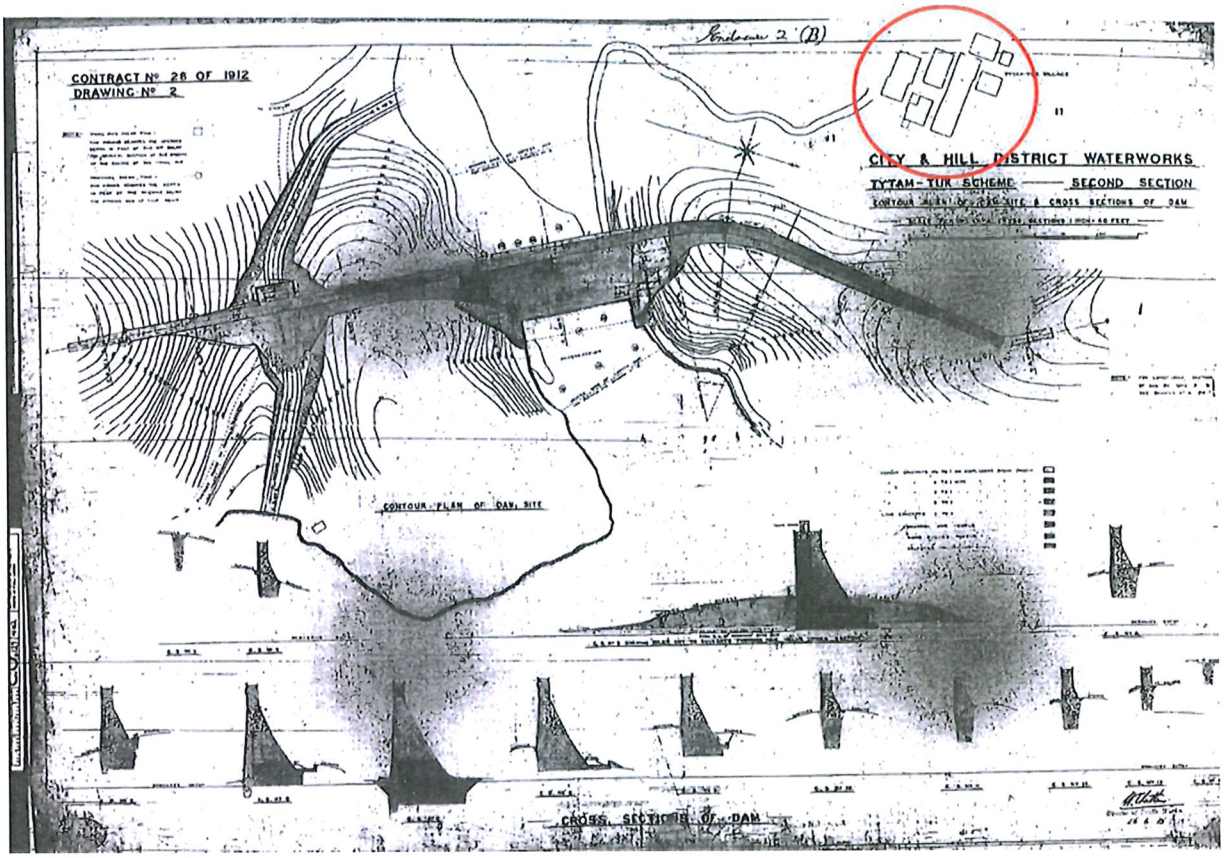


Figure 27 Rough Location of the Submerged Village (from WSD Archives)

The timber bridge near to the entrance of the village was shown on a drawing of Military Map in late eighteenth century. The map was retrieved from the National Archives in London.

Based on the two diving findings, it is strongly believed that the village houses could have been covered up by silts after dam construction or even by filling materials during construction stage.

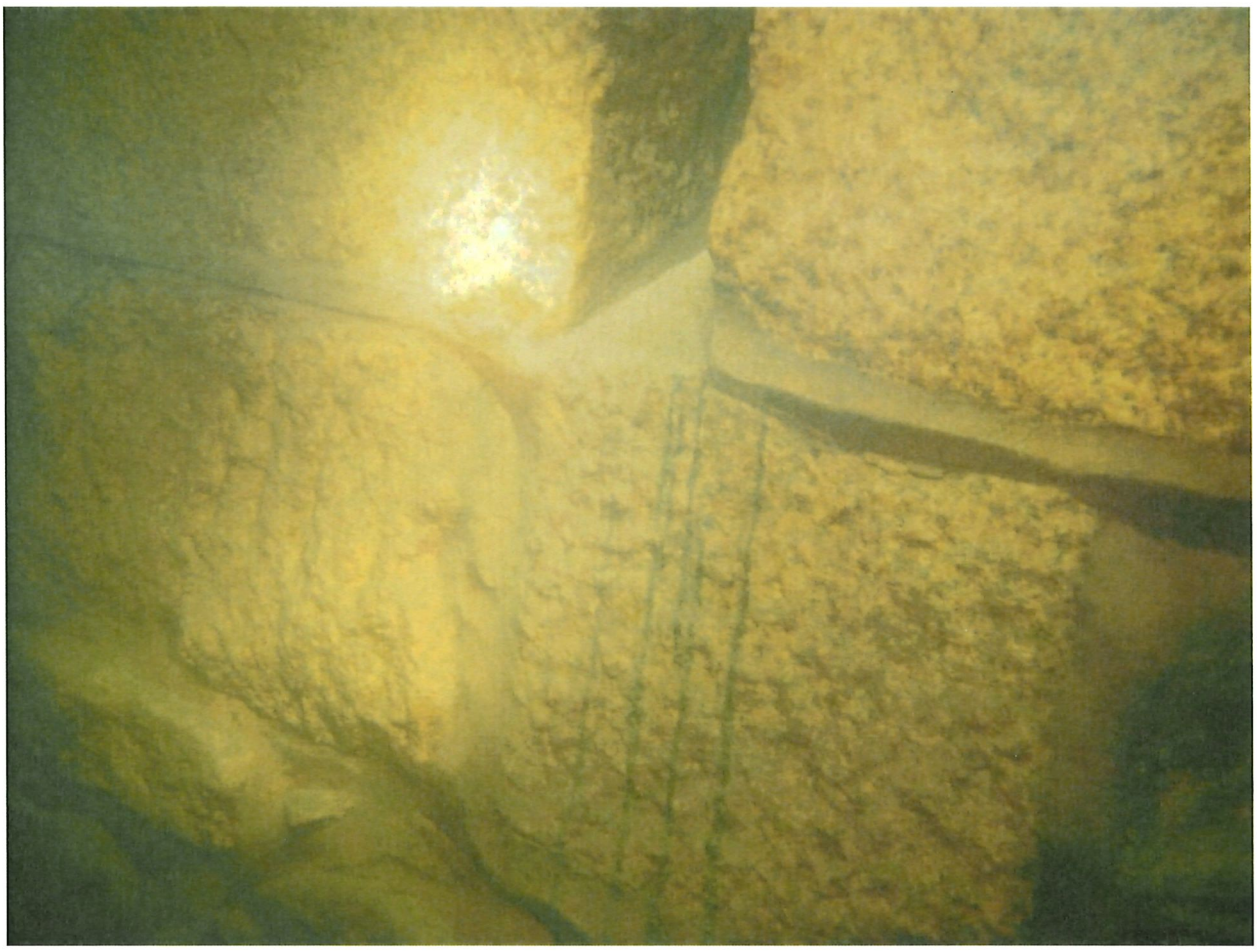


Figure 28 Submerged Retaining Wall near the Village

Figure 29 Timber Block and Retaining Wall

Figure 30 Masonry Pillar Underwater

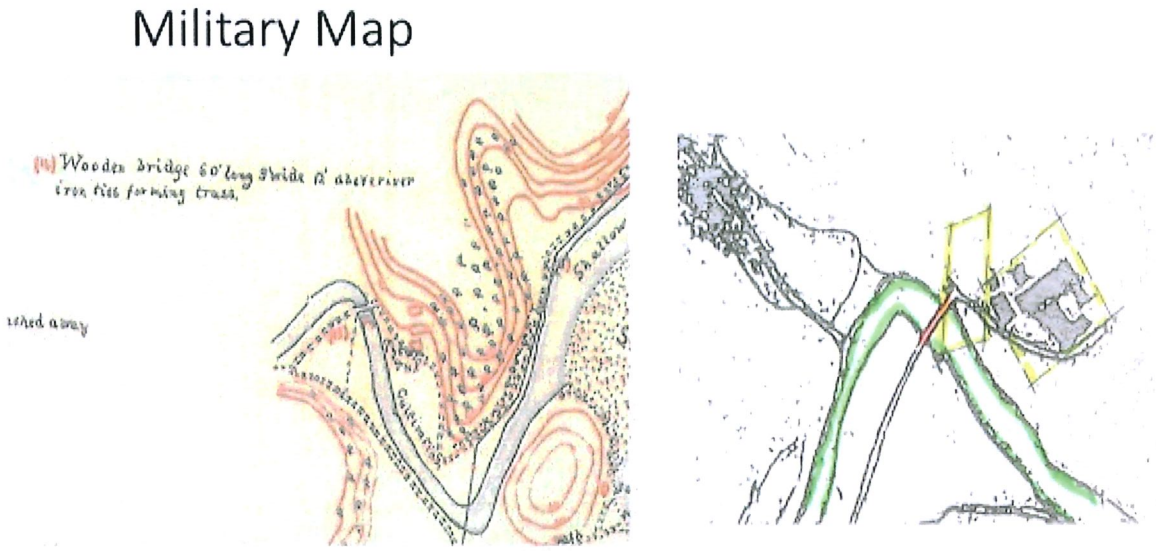


Figure 31 Military Map Showing the Timber Bridge

Archaeology

The site office had been shown on a drawing and from many photos taken after the dam was constructed. According to many residents, the remnants of the site office had been a place of attraction to them while they were kids. It was known also that some artefacts had been collected in areas where the site office and workers' quarters were erected.

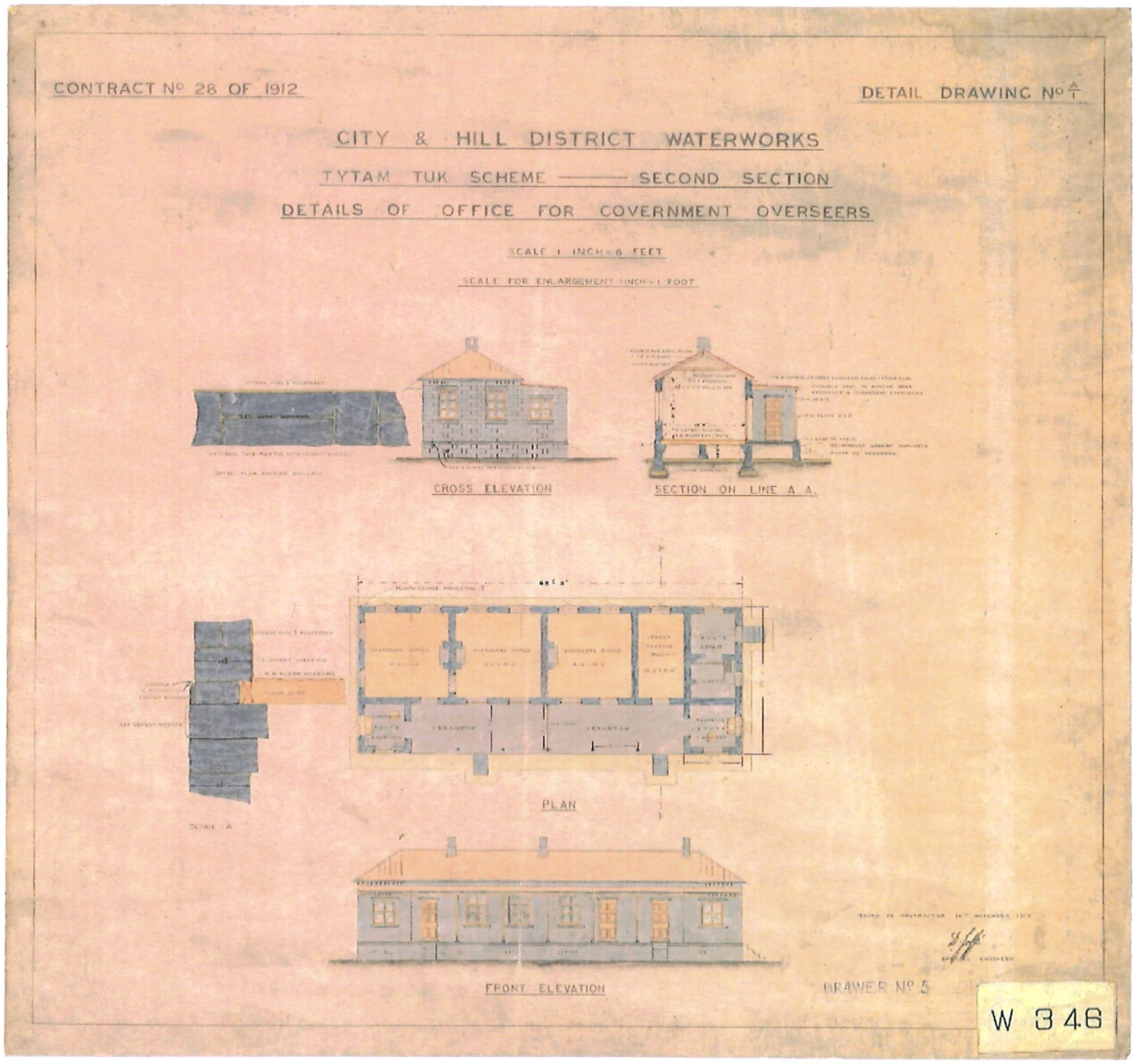


Figure 32 The Site Office (from WSD Archives)

An archaeological exploration was thus arranged by the PI together with the team members and several volunteers. Many artefacts were picked from the locations of the site office and workers quarters during the dam construction.

Figure 33 Roof Tiles Found near the Place Where Site Office was Erected

Artefacts

From the exploration, many earthen artefacts were dug and picked from the heaps near the site office. Most of them are broken pieces of the bowl or sauce pots. They have been confirmed the common utensils used in late nineteenth and early twentieth century. Among the findings, quite a number of the opium pots were unearthed and a torpedo shape aerated water bottle was found.

It was believed that workers in those days took opium at the end of the hard work, while the expatriates might enjoy the aerated soda water. The bottle was the product of the Royal Aerated Waters Manufactory Co. Ltd. with the name of the owner, F.P. Danenberg, marked on the bottle. This company was in business in 1903 but became liquidated in 1914. Such a bottle was a rare artefact to be found according to a glassware collector.

Figure 34 Opium Pots and Soya Sauce Pot

Figure 35 Soya Sauce Dish and Pot

Figure 36 Broken Pieces of Clay Pots and Bowls


香港華字日報

（消）（暑）（妙）（品）

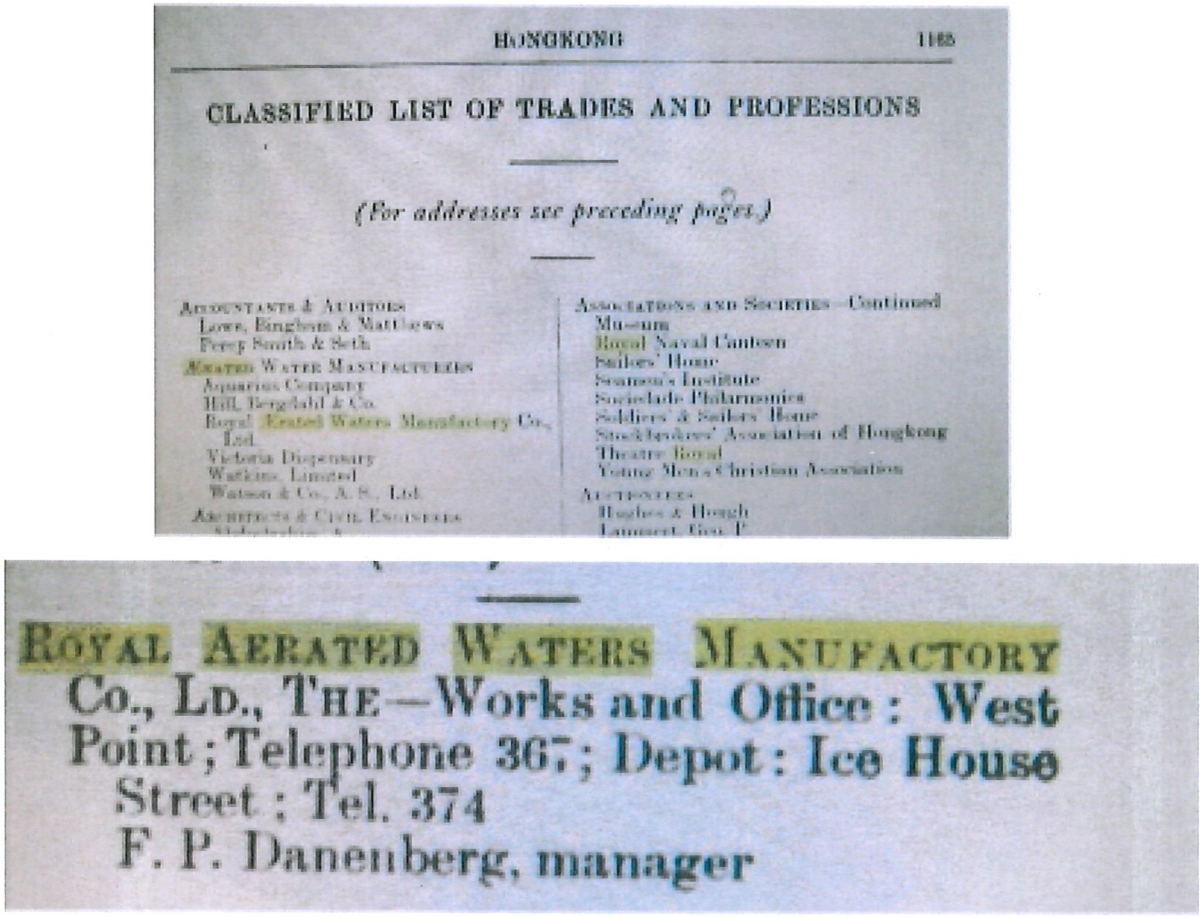
本藥房荷蘭水出世以來。大受社會歡迎 久已設行選選
良由製造得法。汽足香濃。水質清潔。飲之令人精神爽快
別家雖不能及。茲天氣漸熱。需用正合時宜。敬告眾家。購
宜從速。批發公道。恃候 光臨。

香港總代理 堅尼拿

警行所中理干諾道三十八號汽水房啓

●●歪鼻墜固本片。乃補腎●●花露水粉。乃化粧之妙
唯一之聖藥。著效彰彰。久已品。其質幼滑。傳面無痕。氣
其油極
節計開

Figure 37 Torpedo Shape Soda Water Bottle



HONGKONG 1185

CLASSIFIED LIST OF TRADES AND PROFESSIONS

(For addresses see preceding pages.)

ACCOUNTANTS & AUDITORS
Lowe, Bingham & Matthews
Percy Smith & Seth
AERATED WATER MANUFACTURERS
Aquarius Company
Hill, Bergdahl & Co.
Royal Aerated Waters Manufactory Co., Ltd.
Victoria Dispensary
Watkins, Limited
Watson & Co., A. S., Ltd.
ARCHITECTS & CIVIL ENGINEERS

ASSOCIATIONS AND SOCIETIES—Continued
Museum
Royal Naval Canteen
Sailors' Home
Seamen's Institute
Societade Philarmonica
Soldiers' & Sailors' Home
Stockbrokers' Association of Hongkong
Theatre Royal
Young Men's Christian Association
AUCTIONEERS
Hughes & Hough
Lammert, Geo. P.

ROYAL AERATED WATERS MANUFACTORY Co., LD., THE—Works and Office: West Point; Telephone 367; Depot: Ice House Street; Tel. 374
F. P. Danenberg, manager

Figure 38 Royal Aerated Waters Manufactory Co. Ltd.

Reference:

James Hayes "The Rural Communities of Hong Kong – Studies and Themes, Chapter 4 Tai Tam Tuk, Village Under Water", Hong Kong University Press, 2012.

Part 2 The People

Daniel Jaffe

Daniel Jaffe was born on 2nd November 1875 in London. He studied at the University College School, and attended between 1892 and 93 at King's College (Engineering) later at City and Guilds of London Central Technical College between 1893 and 1896. He became Associate of City and Guilds of London Institute in 1896 and an Associate Member of Institution of Civil Engineers in 1902.

After working from 1896 in a famous consulting firm for Birmingham Waterworks project, he joined Public Works Department (PWD) Hong Kong as an assistant engineer on 9th May 1902. He was promoted to Executive Engineer in 1906, earning an annum salary of six hundred pounds and a travelling allowance of 360 pounds per year.

In September 1904 he married Miss Hilda Maude Slemin of Canada. The bride was given away by the Director of PWD and the reception was held at the Director's residence and the honeymoon was being spent at Macao.

In October 1910 he submitted an application for promotion in other colony as he foresaw that his promotion aspect would not be possible in the years to come in Hong Kong. He regarded his training, experience and services should be deserved for a promotion.

On 1st Feb 1911, The Governor, F.D. Lugard, wrote "I concur in the report of the PWD that Mr. Jaffe is an officer of Special Merit" on his application form. Unfortunately Jaffe did not secure any senior appointment. By checking the Hong Kong Government staff list of the year, Mr. Jaffe was the most junior of seven Executive Engineer and it could not be possible for him to jump the queue for promotion.

Figure 39 Jaffe (circled) and His Staff in Front of the Site Office

Suffering from sprue and inflammation of the liver, he went home on leave in 1918 but failing to regain his health he retired in pension in the Autumn of 1919. He died on 11th June 1921 in England. He was regarded a most capable as well as a most conscientious and hardworking officer. He was entrusted the construction of Intermediate Reservoir Dam of Tytam Waterworks Scheme and the typhoon shelter of Mongkoktsui. He was the Special Engineer responsible for the design and superintendence of works of the Tytam Tuk Second Section.

In October 1931, a road commencing at the south-west corner of Inland Lot No. 2899, running in an easterly direction, parallel with Gloucester Road and terminating at its junction with Percival Street, was named after him.
Photo showing Mr. Jaffe taken with his site staff at the front entrance of the site office during Tai Tam Tuk reservoir Dam construction.

Figure 40 Jaffe Road

References:

Application for Promotion in the Colonial Service by Daniel Jaffe dated 7th October 1910.
Wedding Jaffe-Slemin, SCMP 30th Sep 1904.
Hong Kong Government Gazette 30th October 1931.

Mr. Chatham's and The Governor's Speech at the Opening Ceremony

The opening was performed by the Hong Kong Governor, Sir Francis Henry May, at 3:15pm on Saturday 2nd February 1918.

A pier was erected close to the pumping station which was about half a mile from the site of the ceremony. Those who wished to be present were reminded of their arrival not later than 3:00pm at the pier. The distance from Blake Pier was about 16 miles and the launches scheduled to start not later than 1:15pm.

At the end of the dam, two platforms were erected for accommodation of the visitors. The inscriptions of the stone was as follows:

"This stone was laid by H.E. Sir Henry May, KCMG, LL D. on the 2nd day of February 1918 to commemorate the completion of the Tai Tam Tuk Reservoir.

W. Chatham, CMG, MICE, Director of Public Works; D. Jaffe; AMICE, Engineer; Sang Lee and Co., Contractors."

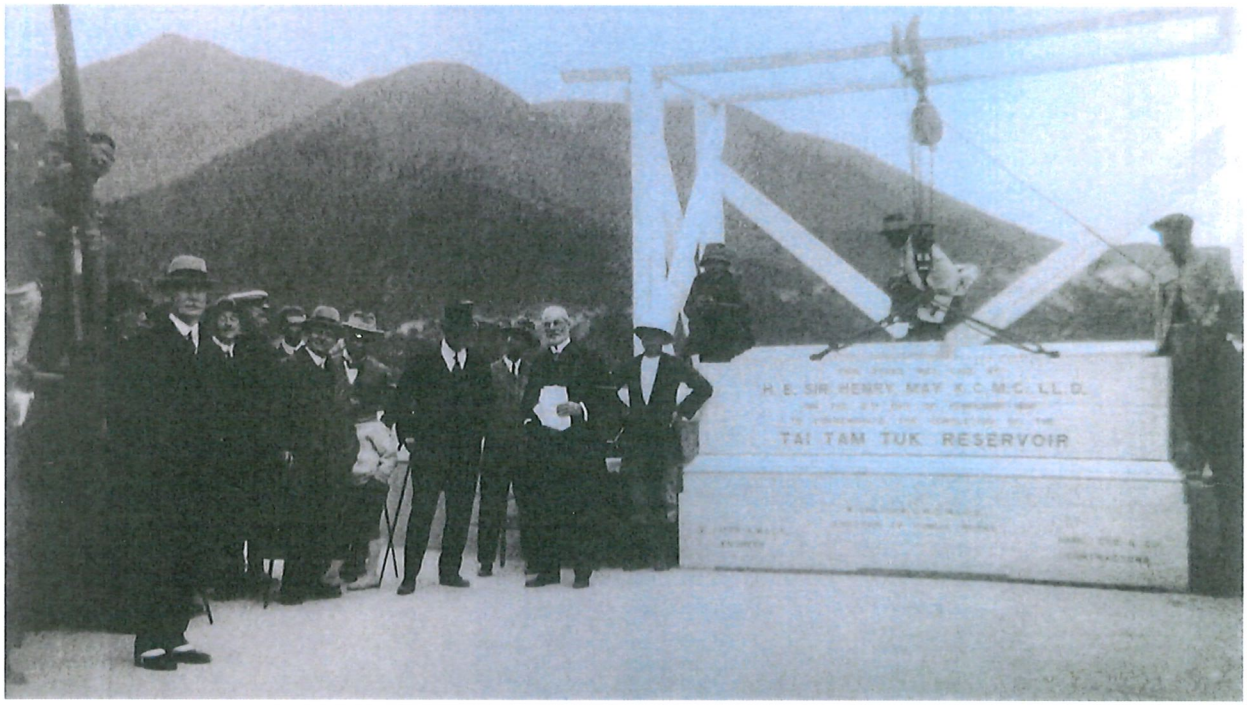


Figure 41 Laying of the Commemorating Stone on 2nd Feb 1928

His Excellency was presented with a silver trowel inscribed "Presented to HE Sir Henry May, KCMG, LL D on the occasion of the laying of the memorial stone to mark the completion of the Tai Tam Tuk Reservoir, Hong Kong 22nd December 1917" and also with a spirit level and a mallet, which were given as gifts of the contractor. It was originally to lay the stone in December.

In his speech, Chatham talked about the previous reservoir impounding capacity was doubled by the completion of this dam. He praised Mr. Jaffe for the works designed and supervised from start to finish, reflecting the highest credit on the engineering skill. The foundations had to extend to a depth of 49 feet below sea level and that provision had to be made for dealing with flood water from the Tai Tam Valley but also exclusion of water of the Bay. The dam was probably unique among works of its class for impounding fresh water. He also praised the work done by Sang Lee who executed the work of such nature within the contract time. Only two deaths were registered during work execution.

The dam was nearly a quarter of a mile, its extreme height from the deepest part of the foundations is 171 feet and its greatest thickness at the base is 115 feet. The foundations extend to a depth of 49 feet below sea level. The dam is capable of impounding 1,419 million gallons of water.

The Governor's Speech

The Governor declared that the stone was well and truly laid. He then congratulated the work done by Jaffe, his assistants and the Director of PWD. The work was unique because it had been carried out entirely departmentally without the assistant or advice of a Consulting Engineer in London. It is only today that in Hong Kong the means of impounding water has overtaken the population. He then went on to say that water should be taken as a beverage rather than alcoholic beverages. He reminded that 50 % of the lower ranks of civil servants lost their pensions from excessive use of alcohol.

Chatham called for three cheers for His Excellency and also for Mr. Jaffe.

References:

The China Mail Monday 4th Feb 1918.
SCMP 21st Jan 1918 & 4th Feb 1918

Interviews with people in connection with Tai Tam Tuk

Mr. Ma, one of residents of Tai Tam Tuk Village

He was born in 1944 in Toi Shan, Guangdong Province, and came to Hong Kong in 1946 together with his parents.

His father worked in the Pumping Station of Tai Tam Tuk, Water Supplies Department. As quarters were only provided for singles only, therefore the family lived in self built mat sheds near the seven battery station.

He remembered that the Staff Quarters, the European Quarters, the Pumping Station, the Chimney and the Pier were already there.

He walked to the school in Stanley for 25 minutes, and also walked to Shaukeiwan in one hour to sell the coal ash available from the pumping station to restaurants. In those days road traffic was rare, only vehicles of Water Supplies Department and military cars were seen.

During the decade from 1975, there were about 400 persons living in Tai Tam Tuk village. The Kai Fong Association大潭篤水陸居民聯誼會 was set up in 1980 and Mr. Ma was the founding Chairman. Now only around 50 souls are living in the village.

The remnants of the temporary pier near the Scout Club was formed of broken stones. The boat people used a kind of bigger boat 鶴佬艇 to transport heavy goods.

Tai Tam Bay is a natural typhoon shelter and around 100 boats took shelter before. During the low tide periods, one can walk across from one side of the Bay to the other.

Between 1950 and 1960, Yau Wing Company dragged a lot of the sand, thus the sea bed level of the Bay had been lowered. Previously he thought the six wells were used to form the foundation of the old dam.

Miss Wendy Lam, a resident of To Tei Wwan

The Lam藍, Lee and Wong are big families living in the village before. However, only Ms. Lam still resides in the Bay.

She had not heard of any existing quarry in To Tei Wan, but believed there should one in Shek O.

Ms. Lam elaborated that next to To Tei Wan were two quarry villages providing rock for the dam construction. She also mentioned that an archaeologist expert (Mr. Wong Chun Man?) lived nearby and told them the village is over 100 years old. On that day of the visit the research team members could not walk towards the two villages due to the high tide, so either walking from the other end or try to be there when the tide is low.

She mentioned that her aged father had worked at the nearby quarry. It is hoped that those villagers can tell more about the old quarries. When the team members walked down from Shek O Road, many large size perched boulders were quickly identified which could be related to quarrying. On the beach a lot of granite aggregates and many quarried blocks were seen, indicating rock quarrying was undertaken nearby and along the shore.

There exists a small shrine for worship Wong Yeh 黃爺.

Figure 42 Shrine for Worshiping Wong Yeh

Some years ago, the five villages 土地灣、銀坑、東鴉背、東鴉、爛泥灣 joined together to form the Association 5村聯誼會.

Ms. Lam had kindly shown the team some old photos about the residents and activities at To Tei Wan.

Figure 43 Activity on the Beach of To Tei Wan (from Ms. Lam)

Mrs. Lam (80 years old)

She said that her family, coming from Wei Yeung, was among the first to settle in To Tei Wan. She had not heard of any quarry at To Tei Wan; only fishing and selling goods were common activities in the old days.

Mr. Cheng Tak Fook (Deceased, aged 60 plus)

Mr. Cheng was a descendant of fishermen living in the Tai Tam Harbour. He was born abroad the boats and his whole life activities were in connection with fishing in the harbour. He passed away a year or so after the interview.

Figure 44 Mr. Cheng Tak Fook (Deceased)

Mr. Cheng [1] (nickname "small shark")

Mr. Cheng [1] was a relative to Mr. Cheng Tak Fook. The former told the team members about his life and work, very similar to those of the latter. He is the one in the photo of the front cover of the report and still active in fishing activities in the harbour.

Mr. Cheng [2] (Owner of Tsui Wah BBQ)

Mr. Cheng [2] also is a descendant of the fishermen living in the harbour before. However, he managed to build a house near to the shore and set up his BBQ business at Tai Tam Tuk. During the weekend and holidays, many people come to this place and enjoy the BBQ.

Mr. Chan (Owner of Foon Lok Store)

Similar to Mr. Ma, Mr. Chan was a descendant of a worker of the Pumping Station. He erected his house using the remnants from the Site Office for the dam construction. His family owns the Foon Lok store at Tai Tam Tuk.

Mr. Chengs and Mr. Chan shared their memories of playing hide-and-seek around the remnants of the Site Office when they were young.

Previous Residents in the European Staff Quarters

Helen Rigby (extracted from WSD archives)

Helen was born in 1929 in Hong Kong. Her father and husband were engineers of WSD. Between 1929 and 1939 Helen's family lived in the senior staff quarters next to the pumping station and the junior staff quarters. Nearby there were two other families and an Indian Police Station. She recalled her father everyday riding on a horse to inspect the catchment water channel and other reservoir facilities. She still remembered coal was transported to a furnace behind the pumping station and the use of the chimney. The rails left on the road surface outside the PS compound are the evidences. In 2000s she was writing her biography and visited the quarters she lived before in her childhood.

Figure 45 Photos of Helen Rigby (from WSD Archives)

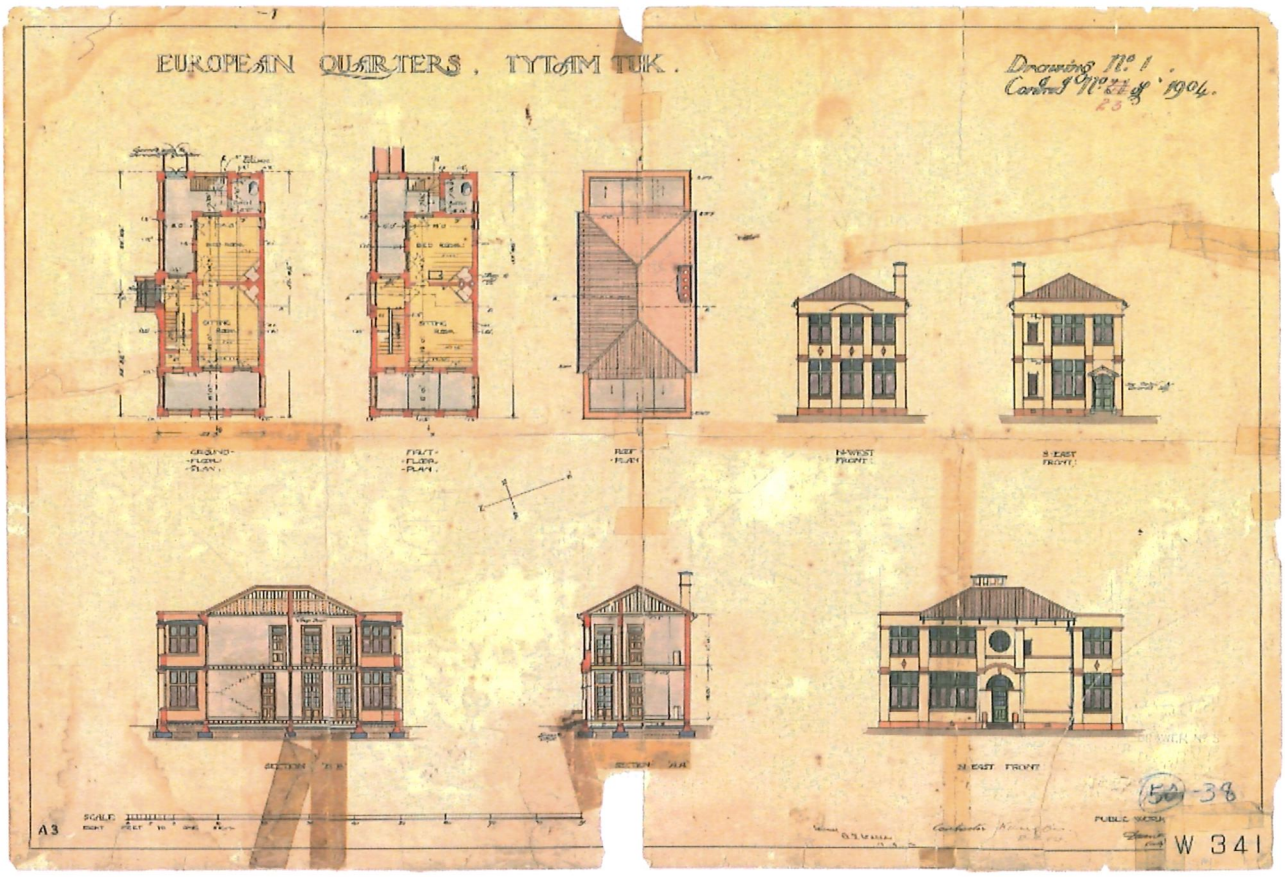


Figure 45 The European Quarters (from WSD Archives)

Mrs. Jenna Ho Marris

Her family was the leasing residents of the senior staff quarters from 2015 to 2018. An interview with her was held in March 2018 and a visit to her place was made in May the same year. Photos and videos were taken during the visit. Jenna briefed us about her plan to set up the Tat Tam Tuk Eco Education Centre and also ran a private play group for children at her residence. Through her now we are able to contact other previous resident, Dr. Jim Flegg, staying in the senior staff quarters.

Dr. Jim Flegg (extracted from Post Magazine, South China Morning Post, 4th Jan 2018)

Back in Hong Kong home from where Japanese took his father for execution, British scientist is 'very emotional'

Dr Jim Flegg, an ornithologist who was guest of honour at recent eco-education event, steps inside his former Hong Kong home for the first time since he was a child and wartime evacuation to Australia heralded a life steeped in nature.

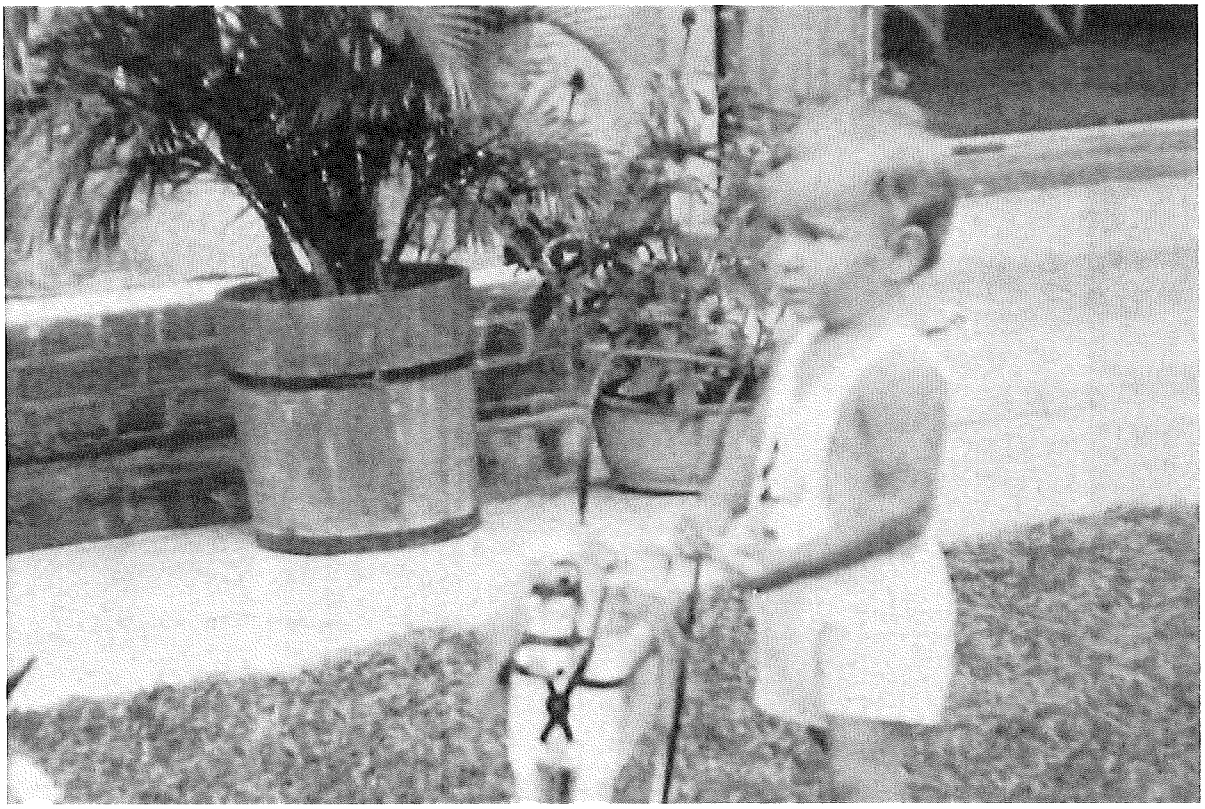


Figure 46 Jim Flegg at the cottage in Tai Tam Tuk next to the water pumping station where his father was the engineer in charge, in a picture taken around 1939.
Picture: courtesy of Dr Jim Flegg

His wide-ranging scientific expertise made Dr Jim Flegg the ideal guest of honour at November's Tai Tam BioBlitz. A prolific writer, broadcaster, speaker and television personality, and the recipient of an OBE in 1997 for his services to horticulture (although it could equally have been for his work as an ornithologist), it would have been hard to find a better fit for the event, in which teams work together to discover and identify as many species of plants, animals, microbes and fungi as they can.

For the British octogenarian, a compelling personal connection made this a special event: it was literally a homecoming, to a place where he had spent the first three years of his life.

Jim's father, Jack Sydney Flegg, was the engineer in charge of the pumping station that drew water from the Tai Tam reservoir, up beside the road between the city of Hong Kong and what was then the tiny village of Stanley. Accommodation in the Tai Tam Tuk senior staff quarters came with the job, which was to manage the sizeable crews involved in operating and maintaining the reservoirs, dams, aqueducts and tunnels. Despite the grand sounding name, the quarters, completed in 1905, comprised a two-storey, box-shaped cottage constructed on a platform perched above Tai Tam Bay, east of the main pumping house.

One of the few recollections Flegg has of his early years is of floating in a breeches buoy just off the stony beach immediately below the house while visitors swam around his father's yacht, High Heels. He remembers a police launch coming into the bay on patrol and he recalls stuffing leaves into the muzzle of Teddy, the family's long-suffering pet Chow. He has no memory of tumbling down the steps between the main entrance to the house and the path leading to the pumping station. In later years, Flegg's mother would narrate this horrifying episode along with descriptions of the family car, a 1933 Austin 7 Ruby saloon, the slimmest vehicle available and virtually the only one able to negotiate the narrow road to Stanley where it ran along the top of the Tai Tam dam.

Among a handful of precious photographs, Flegg has a picture of himself with his amah. He says he was aware of speaking Chinese although nothing has stayed with him beyond the Cantonese for "aeroplane", "windscreen wiper" and "hurry up!"

Figure 47 A young Jim Flegg in his mother's arms in the garden of the cottage at Tai Tam Tuk, on the south side of Hong Kong Island, circa 1939.
Picture: courtesy of Dr Jim Flegg

"Cantonese was probably my first language in those days as the cook, my amah and various junior engineers, stokers and mechanics were all Chinese," he says, when we meet in the Excelsior Hotel coffee shop, in Causeway Bay.

Both sets of Flegg's grandparents lived in Hong Kong from the 1920s, as civil servants attached to the Admiralty.

"My father arrived in 1920, at the age of 13, and my mother arrived with her parents in 1926, when she was aged 16. My mother taught herself shorthand and typing and worked as PA to the executive secretary of the Hong Kong Jockey Club, based at Happy Valley.

"Both families lived in Nathan Road and they enjoyed the typical expatriate social lifestyle: a hectic round of horse racing, tennis and swimming parties. My parents met in Hong Kong in 1928 and got engaged in November 1929; they were married in 1933, in Gillingham, Kent."

I have no horrific memories of the occasion – but I do recall 'God bless Daddy' in my bedtime prayers each evening

Flegg's maternal grandparents had retired to Gillingham in 1930, and his father's parents returned to England in 1932, on the P&O liner Rawalpindi.

Jim Fegg was born on April 23, 1937, at the British Military Hospital, on Bowen Road. A few weeks after his birth he was baptised James John Maitland Flegg in St John's Cathedral.

One of Flegg's earliest recollections is of "creating an awful fuss at having to wear a toddler's gas mask (piggy face)" when the family went on leave to Britain, probably in 1939. War was approaching and the Fleggs were soon back at sea, en route to Hong Kong. And little Jim and his mother would soon be on the move again, as part of the evacuation of women and children ahead of the anticipated Japanese invasion.

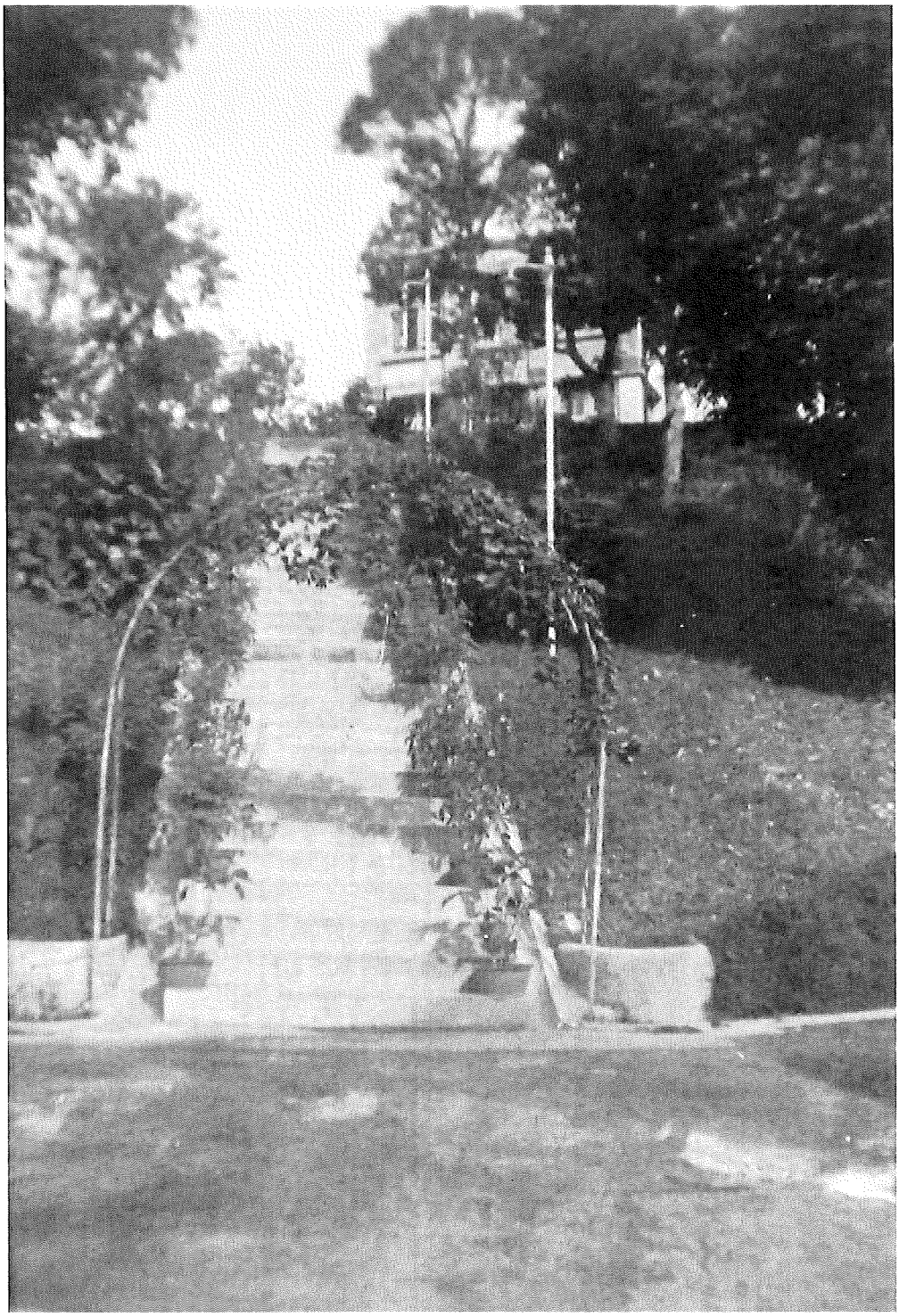


Figure 48 The steps leading to the cottage next to the reservoir in Tai Tam where Jim Flegg spent his early years. Photo taken circa 1939.
Picture: courtesy of Dr Jim Flegg

It would be another 77 years before he stayed again in the cottage at Tai Tam Tuk.

The first port of call for the evacuees from Hong Kong was Manila, where they were transferred to Baguio for a short stay in the cooler hills before embarking for the onward journey to Sydney, Australia. In the Philippines, Jim was diagnosed with suspected pneumonia and sent to Manila's American Military Hospital.

"According to my mother, the nurses were far keener to care for military men than children, and I was given a supply of sulfa drugs (then the latest medicine available to American soldiers) and packed off back to the ship. We continued to sail south, making landfall in daylight in Sydney Harbour, where I remember sailing under the spectacular bridge. We were then dispersed in groups to temporary accommodation."

Flegg and his mother were soon transferred south, to Melbourne, where they lived with other Hong Kong evacuees in a flat block on Queens Road. Funds from Hong Kong ceased soon after the colony fell to the Japanese on Christmas Day, 1941, so the British government provided money for the evacuees.

"It must have been while we were at Queens Road that the Japanese attacked Pearl Harbour [on December 7, 1941]. Australians were extremely anxious about an invasion, with all the able-bodied menfolk away fighting and just six fighter aircraft for defence. Darwin was bombed by Japanese warplanes," Flegg says. "This much we knew from radio bulletins, but what we were not to know until about nine months later were any details of the attack on Hong Kong or of any casualties."

Flegg's father was a staff sergeant in the Royal Hong Kong Volunteer Defence Force, in charge of a detachment of elderly armoured cars.

When Japanese soldiers swarmed across Hong Kong Island, so far as Arthur Clarke (Flegg's godfather and a pre-war family friend who would become financial secretary of Hong Kong in the 1950s) was able to piece the story together after the war, Flegg's father and those staff at Tai Tam who remained loyal were taken more or less immediately to the beach below the house and shot.

"Though the news of the fall of Hong Kong on Christmas Day was known worldwide soon after the event, it was not until some eight or nine months later

that the Red Cross obtained details of casualties and of those interned in prison camps in Hong Kong. In our group of evacuees, my father was the only fatality," Flegg says. "It is a tribute to my mother, and to the others around us that, although I must have been told, it was done in such a way that I have no horrific memories of the occasion – but I do recall 'God bless Daddy' in my bedtime prayers each evening. At that age, I have no doubt that memories dimmed swiftly to be replaced by the urgencies, changes and excitements of daily life."

The evacuee groups began to separate although they remained in touch. Flegg's mother became residential housekeeper to a family named White, who ran a laundry in Melbourne.

"The business was run by the wife while the husband was away fighting. They had a friendly teenage son, Roy, who occasionally took me to the laundry with its huge boilers, masses of suds and ironing boards. Soon after, the threat to Australian cities was perceived as intensifying, and many residents moved out to the surrounding and less threatened townships. Mother and I, and [fellow evacuees] Mary Wilson and John, moved to Bendigo, but only for a short while.

Figure 49 The cottage at Tai Tam Tuk today. Jim Flegg and his wife stayed there during their recent visit to Hong Kong.
Picture: Xiaomei Chen

As the war in Europe was coming to a close and, in the Pacific, the Japanese were struggling for survival, the conditions were deemed appropriate to repatriate the evacuees. Those who, like the Fleggs, elected to return to Britain left first, the Hong Kong-bound group having to wait until the colony had been liberated.

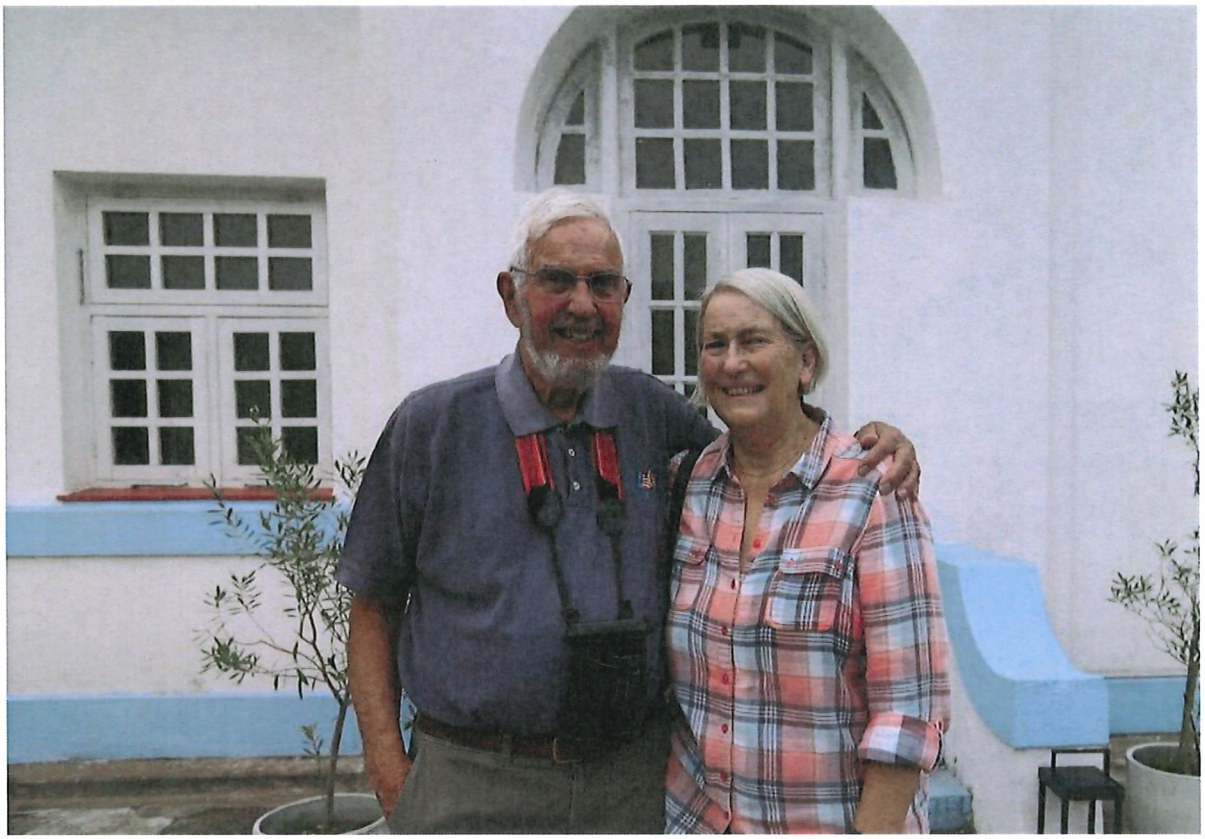


Figure 50 Jim Flegg and his wife, Caroline, at the cottage in November 2017. Picture: Xiaomei Chen

Flegg and his mother weathered the two coldest British winters on record and he continued his education at Gillingham Grammar School, leading to his enrolment at Imperial College, London, where he obtained a BSc and a PhD. He started his career as a soil zoologist for East Malling Research Station, where he remained for most of his working life, with the exception of seven years as director of the British Trust for Ornithology.

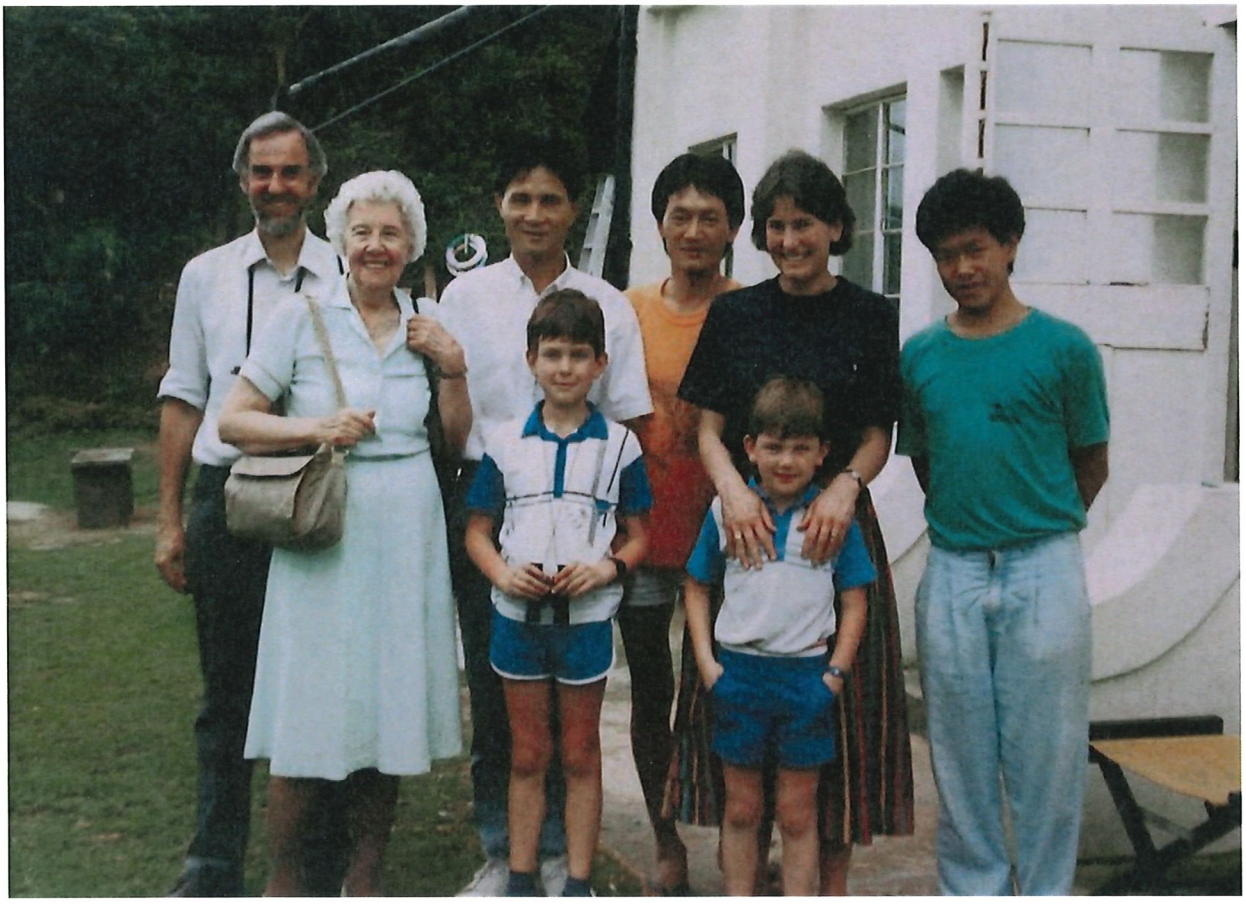


Figure 51 Jim Flegg outside the cottage with his mother (front, left) and other family members on an earlier visit in 1987.
Picture: courtesy of Dr Jim Flegg

Flegg's first return to Hong Kong was in 1987, when he turned 50.

"My mother wanted to show me where I was born, where my father was killed and where he was buried." Jack Flegg is at rest in one of the many "unknown" graves of the Hong Kong Volunteers in the Sai Wan War Cemetery.

"We decided to bring the whole family, our sons then aged eight and six. At that time, the cottage was a hostel for the rehabilitation of heroin addicts run by St Stephen's Church: it was a very sobering visit. My mother said the house did not seem to have changed much. We walked down the steep path to the beach where my father was killed; a very emotional experience."

That year, Flegg took part in Hong Kong's Big Bird Race (a birdwatching event staged by conservation organisation the World Wildlife Fund – now the WWF – to

raise funds). At the closing party, Flegg met Michael Lau Wai-neng, then a fresh university graduate.

Our sons have asked many times how one manages without a father to play games with and learn things from. I do choke up when I talk about it

Flegg spotted him as a talent in need of nurturing and they stayed in touch. Today, Lau is the director of wetlands conservation for WWF Hong Kong.

Last year, Lau contacted Flegg in great excitement to say he had met Jenna Ho Marris, who was living in the Tai Tam cottage with her family. A microbiologist turned lawyer (although currently not practising), she is the prime mover behind the Tai Tam Tuk Eco Education Centre and its many-faceted activities, including the recent BioBlitz. Ho Marris invited Flegg and his wife, Caroline, to stay in the cottage during the BioBlitz.

He could never have imagined this happening, he says. Stepping into the house for the first time in some 77 years was "very emotional", but Flegg had no sense of déjà vu and recognised nothing.

"As I have grown up and had children of my own, I appreciate more and more what I missed, which has probably led to my emotions being stronger. Our sons have asked many times how one manages without a father to play games with and learn things from. I do choke up when I talk about it. Over the years, I realise more and more what my mother [who died in 1998] had to contend with and I obviously owe her a great deal."

Figure 52 Flegg with his children at the beach in Tai Tam during their 1987 visit. Picture: courtesy of Dr Jim Flegg

An unexpected bonus for the Fleggs came at the end of the BioBlitz. The Water Supplies Department (WSD) was represented by an assistant director of development, Chau Sai-wai, who, on learning that Flegg had spent his early years at Tai Tam Tuk, took the couple on an impromptu tour of the pumping station, the key part of the Tai Tam raw water collection system. The red-brick building has changed little since it was built, in 1904.

In Jack Flegg's day, the pump was powered by steam engines fed by coolies shovelling coal into the furnace; then came diesel power and nowadays everything is operated by a computer-controlled electric pump.

In continual use since its completion, this is the WSD's oldest functioning pumping station. With its 12-metre-high pitched roof, the warehouse-style engine hall is a rare example of historic industrial architecture still functioning for its original purpose. It was declared a monument for conservation in September 2009 as part of the 5km Tai Tam Waterworks Heritage Trail, covering 21 historic structures linking the three reservoirs by dams, aqueducts and tunnels.

"I can't say I recognised the pumping station, but there was a huge drawing office table, looking virtually unchanged since the 1940s, and probably undusted also!"

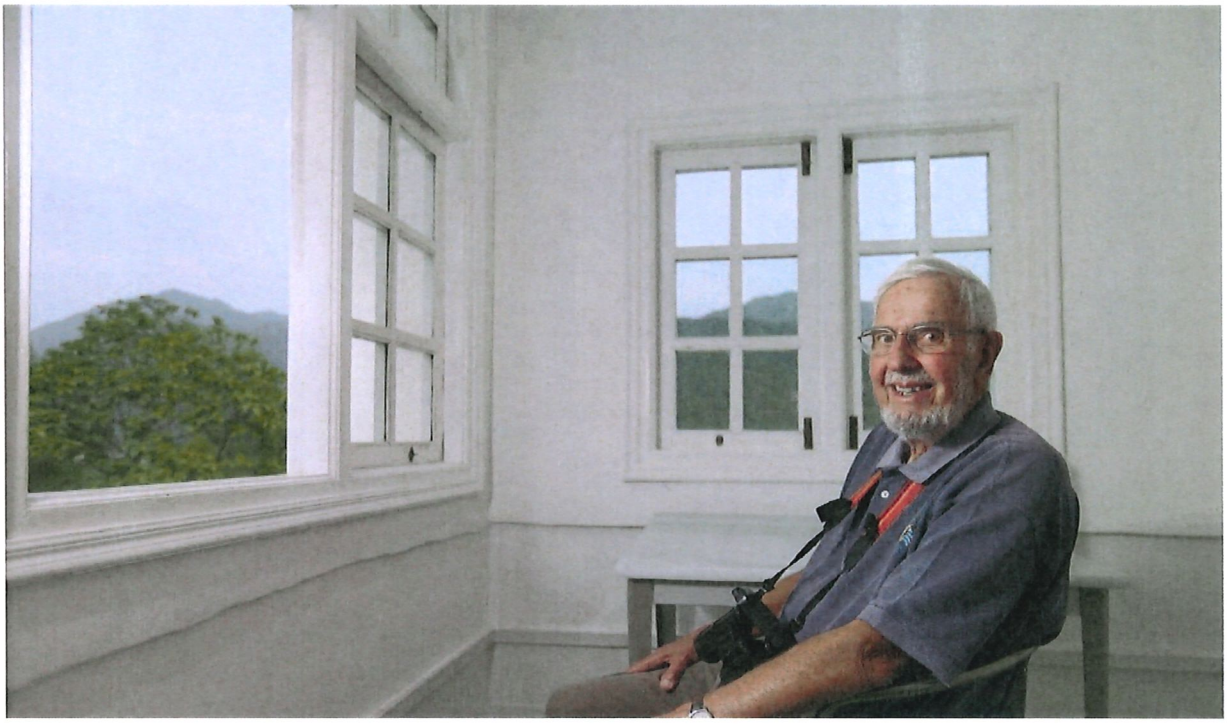


Figure 53 Flegg recognised nothing of the cottage's interior when he stayed there in November.
Picture: Xiaomei Chen

Flegg has made seven return trips to Hong Kong and he and his wife are already planning their next visit, which they hope can be timed to coincide with the next big Tai Tam Tuk project.

The Fleggs are full of praise for the BioBlitz, which was attended by more than 360 people – experts and participants who joined guided activities. Ages ranged from two to 80 and more than 500 species, including a seahorse and a spider that might be new to science, were recorded on the day.

"We've attended many citizen science projects in the UK," Flegg says, "but never anything to rival this in scope or expertise."

With its three reservoirs and tidal inlet, plus the historic village, Tai Tam remains idyllic. A water sports centre, it has substantial tangible and intangible heritage in addition to three sites designated as being of special scientific interest.

Early childhood experience is known to form the adult personality and it seems likely that Flegg's wide-ranging scientific interests owe more than a little to his younger days in Hong Kong.

Dr. Jim Flegg has recently been contacted by email and agreed to share more his stories and photos about his childhood in Tai Tam Tuk.

References: Post Magazine, South China Morning Post, 4th January 2018

Acknowledgement

The support from

Lord Wilson Heritage Trust, and

Water Supplies Department, HKSAR Government

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(Total: 14,313 words)