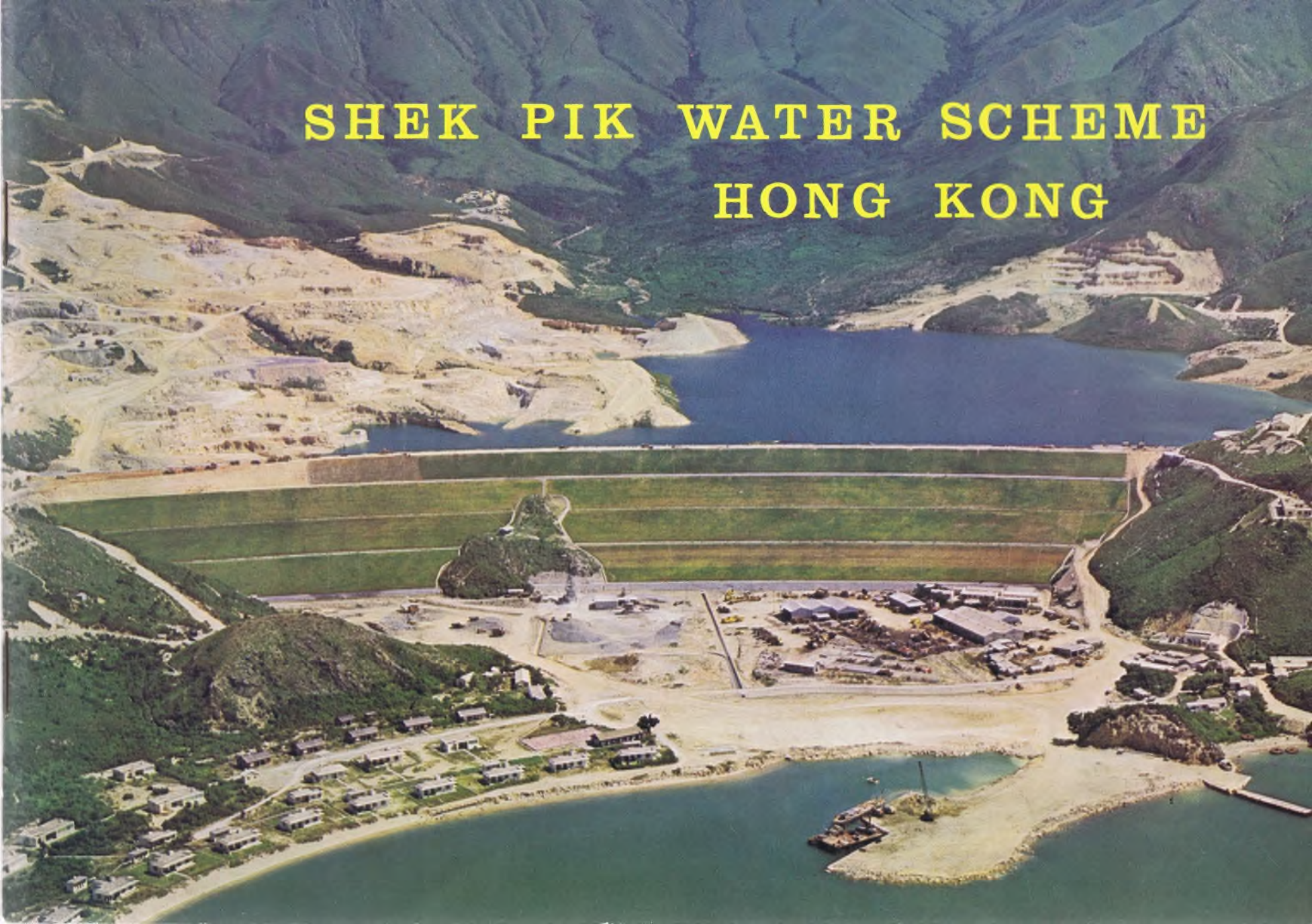
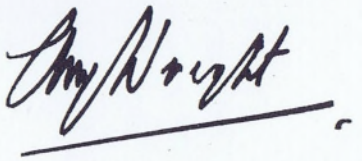

SHEK PIK WATER SCHEME
HONG KONG

SHEK PIK WATER SCHEME
HONG KONG

The completion of Shek Pik Water Scheme is a big step forward in our plans to provide a water supply adequate for the needs of Hong Kong. This is the story of Shek Pik. It records an achievement which is a credit to all concerned with it. To the engineers and contractors, and to the thousands of unnamed technicians, artisans and labourers who have worked on the Shek Pik Water Scheme, I offer my congratulations and thanks.



November, 1963.

Director of Public Works
Hong Kong.

The temple at Shek Pik is all that remains of the village which once stood on the site of the dam. As the water level in the dam rises the temple will be completely submerged.

ACROSS a valley, where village life has been unchanged for 400 years a dam has been built; on an island where until recently there was scarcely an automobile now runs a modern road and to the people of Hong Kong a major step forward has been made towards providing an adequate water supply.

All of this has been accomplished by the completion of the Shek Pik Water Scheme, the largest scheme of its kind so far completed for the Hong Kong Government's Water Works.

The Shek Pik scheme, however, has been more than an involved feat of engineering costing in excess of $200,000,000. It has, almost unconsciously, changed the social and economic standards of the people of Lantau Island—the largest of all the Colony's surrounding isles. The Shek Pik scheme has brought to the villagers new homes, schools, clinics, communications and public utilities.

The full effect of the scheme, however, could not be foreseen in 1954, when the Government first asked a London firm of consulting engineers to report on the feasibility of building a reservoir on this almost uninhabited island.

Announcing the Government's decision, the Director of Public Works at that time declared: "Shortage of water has been the curse of Hong Kong since the very earliest days of the Colony and is a matter of which no long-term resident

Left: This 86-year-old woman was one of the 200 residents of Shek Pik village. Right: Site preparations for the dam.

has to be reminded. Unfortunately, as the Colony has developed and prospered, the problem of water supply has become more and more acute".

Just how acute the water shortage was to become was best illustrated in the summer of 1963 when the strictest rationing ever experienced in Hong Kong had to be enforced.

Yet even before that, a winter supply of three hours a day seemed not only normal, but generous. New industries, so vital to the economy of Hong Kong, were making increasing demands on water reserves and it was estimated that if the Colony were to have an unrestricted 24-hour supply, nearly twice as much water would be needed as was then available.

The choice of building the new reservoir on Lantau Island was forced upon the Government. At that time it was thought to be the only practical remaining area which could be utilized without interfering with the Colony's agricultural development.

Although it was realised that Shek Pik could not solve this problem alone it was essential that work on a major project such as this should begin as soon as possible. So it was that the consultants chose a large valley in the south-western part of Lantau Island. In the centre of the valley was the small village of Shek Pik and its 200 inhabitants. A smaller village, Fan Pui, with its population of 62 people, stood at one end of the site which the consultants planned for the earth dam.

When the engineers first met these villagers there was hardly a road on Lantau Island. Their homes were older than many of the mainland settlements and their way of life had remained unchanged throughout the years. Some

Left: Construction work on the 162 ft. high valve tower which is linked to the dam by a 216 ft. long access bridge.

Above: A section of one of the catchwaters which feed into the dam. Below: Laying the eight-mile long twin submarine pipe-line between Lantau Island and Hong Kong Island.

had never seen a motor car before and one old woman of 86 had never left her village.

Now, while a fleet of tractors, earth moving equipment, excavators and dumper lorries were being assembled the people of Shek Pik and Fan Pui were asked if they would move their homes.

The villagers of Fan Pui wanted to remain in the area, and so, a completely new village was built a few miles from the dam, designed to meet their special wishes. Those in Shek Pik, however, elected to move to the mainland and in place of the 105 acres of land they had occupied they were offered flats and shops in new buildings at Tsuen Wan. The amount of compensation given to the villagers and the cost involved in resettling them totalled $3,255,000.

Meanwhile the consultants discovered that gravel and boulders across the centre of the Shek Pik valley went down to a depth of 40 ft. Below this was 97 ft. of decomposed granite. It was therefore decided that the traditional design was impracticable. Fortunately a new technique for dealing with such problems had become available. Two rows of interlocking concrete piles were driven into the firm rock and space between consolidated by a liquid mixture of cement and a special clay which was injected under pressure.

With a scheme of this size and complexity, the Government invited tenders from the world's major contractors and in July 1959, the contract to build the dam at the sea-front of the valley was awarded to the French firm of Societe Francaise d'Entreprises de Dragages et de Travaux Publics.

Meanwhile, an equally involved, if not more intricate facet of the work, was being planned. This was to lay a

Left: The overflow tunnel which connects with the bell-mouth spillway. Right: As work on the dam progressed, construction proceeded on the treatment works on Lantau Island.


1
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3
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4
5
6

twin submarine pipeline from Silver Mine Bay in the East of Lantau to Sandy Bay on the north-west corner of Hong Kong Island. The pipeline would carry treated water from Shek Pik to a new reception reservoir on Hong Kong Island.

Under normal circumstances the work of laying a long submarine water pipeline presents innumerable complications. In Hong Kong these were added to by the constant threat of a typhoon.

An American construction firm, Healy Tibbetts Construction of San Francisco in conjunction with J. L. Kier Ltd., of London and the Paul Y Construction Company of Hong Kong were given the contract to lay the pipeline.

The dam grouting work was entrusted to Messrs. Soil Mechanics Ltd. (London) in conjunction with Messrs. Soletanche (Paris).

In the summer of 1960, rock drilling and grouting in the valley began. A few months later work also began on preparing the foundations for the water treatment works at Silver Mine Bay and the pumping station mid-way between the dam and the treatment works. Meanwhile the complex

KEY:

1: Water-line when reservoir is full.
2: Consulting Engineer's and Contractors' staff quarters.
3: Earth for dam construction obtained from these areas.
4: Road across top of dam.
5: Contractors' workshops.
6: Off-loading jetty for sand used in dam construction.
7: Bellmouth overflow.
8: Outlet of discharge tunnel from bellmouth overflow.
9: Shek Pik Police Post.

system of catchwaters which would feed rain into the Shek Pik valley had been designed by the Waterworks Section of the Public Works Department and work began. Excavation had also started on the series of underground tunnels and pipes to link the dam, the pumping station and the treatment works together.

Soon Lantau had a new population of more than 2,000 men. Many of those from France and Britain had brought their wives and families and a complete township with its own school, hospital and even a helicopter landing stage had been constructed. Accommodation had also been built for the large labour force from Hong Kong; new access roads now spanned the island and the people of Lantau itself were trained to help with the work of reconstructing their island.

On Hong Kong Island, too, work had started on the new service reservoir that would be integrated into the Shek Pik scheme. This would have a capacity of 30,000,000 gallons of filtered water.

The completion of the dam came at a time when the Colony was undergoing its most critical water shortage and in April 1963 impounding began. The valve tower and the bellmouth spillway had already been completed ahead of schedule and by the summer of 1963 the dam was within a few feet of its full height and only the installation of pumps and final details of the treatment works remained unfinished.

The Shek Pik Water Scheme is one of the most advanced and comprehensive of its type in South-East Asia.

The scheme, too, is a tribute to engineers from all over the world who have collaborated so successfully in this vast project.

Left: The treatment works under construction. Here, 35,000,000 gallons of water can be treated daily and adjoining is a 5,000,000 gallons filtered water storage reservoir.

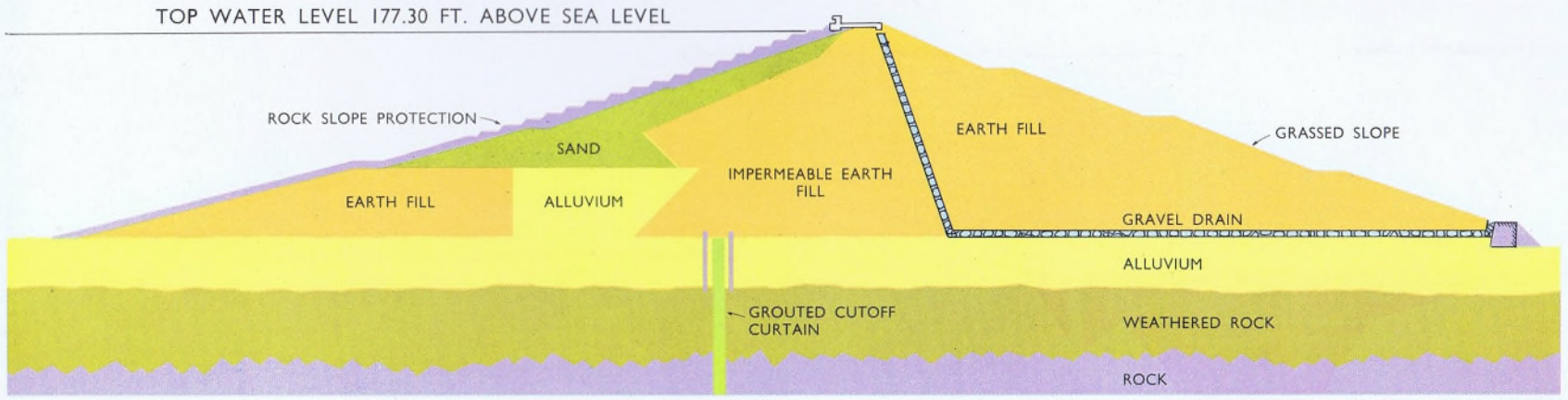
Above: The pumping station which can be remotely controlled from the treatment works. Below: The bellmouth spillway with a top diameter of 80 ft. and a depth of 165½ ft.

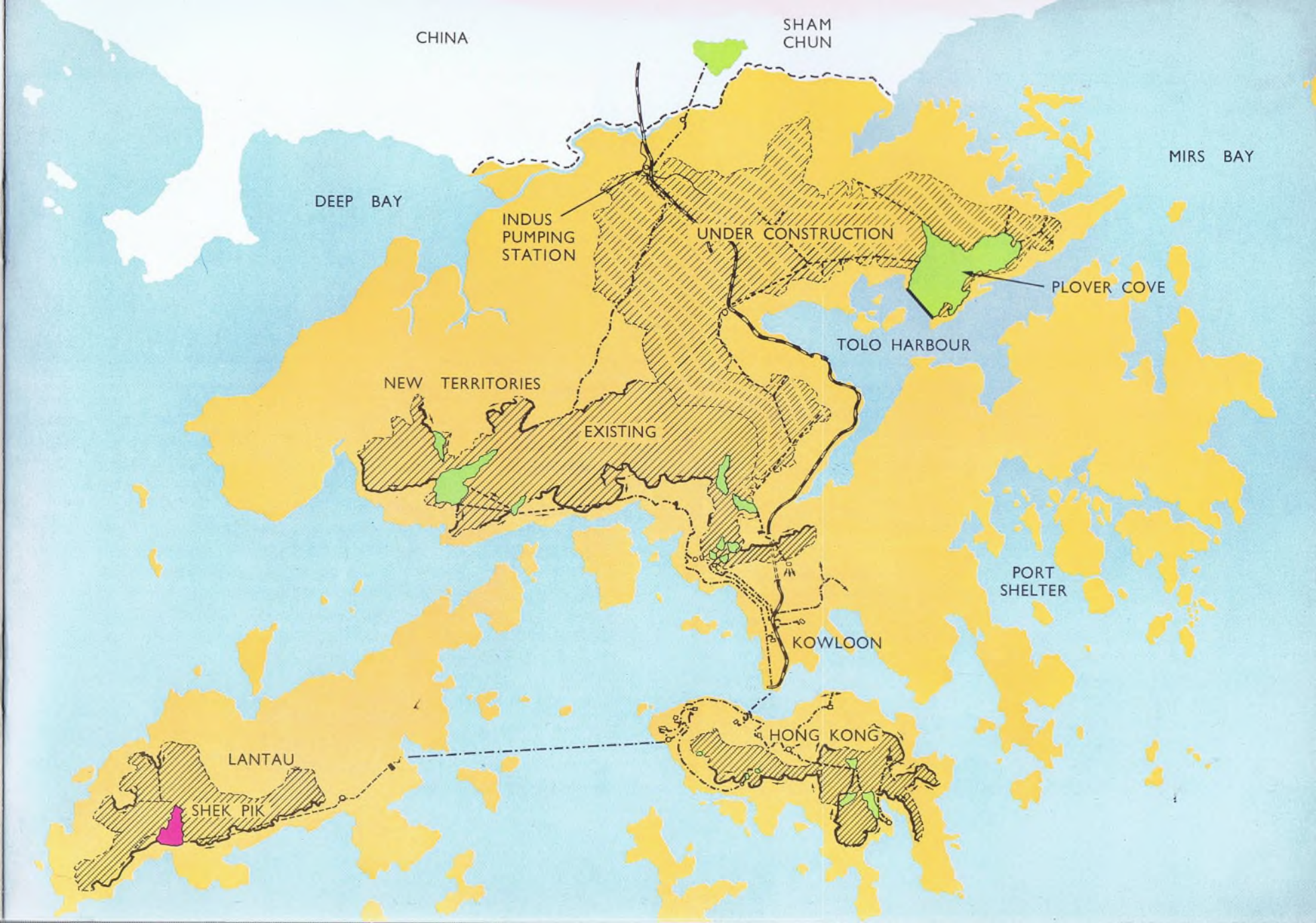
THE SHEK PIK DAM

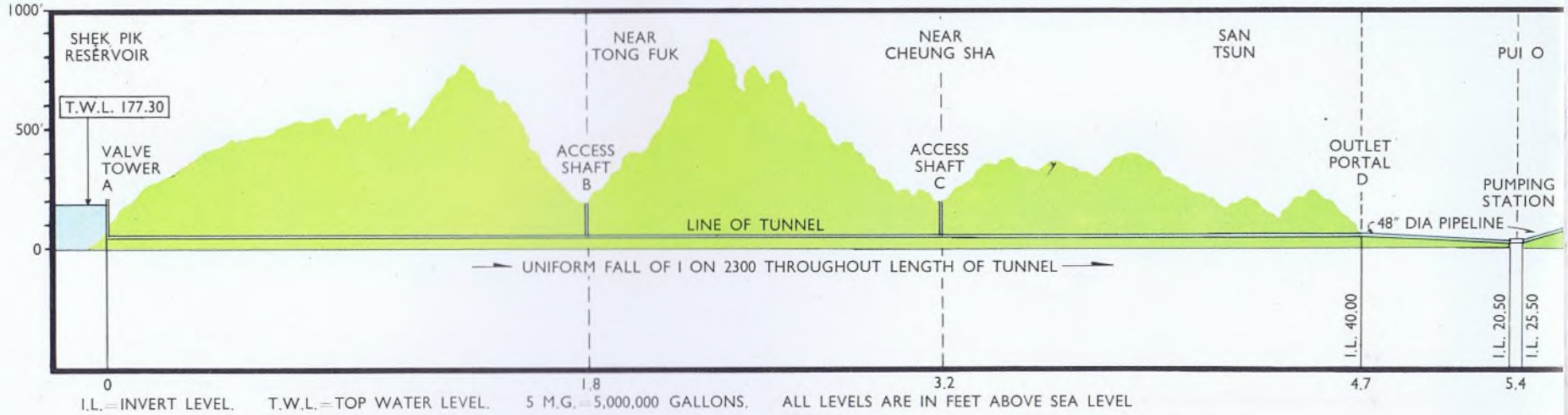
LENGTH OF DAM:	2,355 FEET
MAXIMUM HEIGHT:	178 FEET
WIDTH OF BASE:	1,160 FEET
QUANTITY OF FILL IN DAM:	6,250,000 CUBIC YARDS
CAPACITY OF RESERVOIR:	5,400,000,000 GALLONS
WATER AREA:	257 ACRES
TOTAL DRAINAGE AREA:	8,020 ACRES

HONG KONG'S WATER SUPPLY SYSTEM

	EXISTING AND UNDER CONSTRUCTION	SHEK PIK SCHEME
STORAGE RESERVOIRS		
CATCHMENT AREAS		
TRUNK MAINS		
TUNNELS		
CATCHWATERS		
PUMPING STATIONS		
FILTRATION STATIONS		
SERVICE RESERVOIRS		




CHINA
SHAM CHUN
MIRS BAY
DEEP BAY
INDUS PUMPING STATION
UNDER CONSTRUCTION
PLOVER COVE
TOLO HARBOUR
NEW TERRITORIES
EXISTING
PORT SHELTER
KOWLOON
HONG KONG
LANTAU
SHEK PIK



The Shek Pik Water Scheme

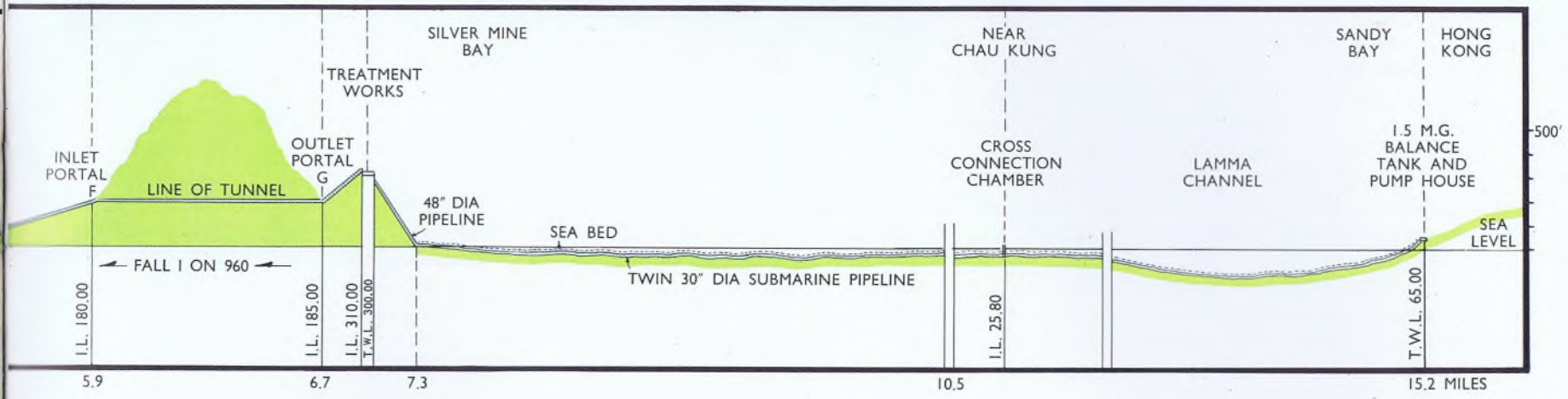
THE Shek Pik Water Scheme is designed to supply Hong Kong and Kowloon with up to a maximum of 35,000,000 gallons of treated water a day, and will increase the Colony's total existing storage capacity by about 50 per cent. The capacity of the Shek Pik Reservoir is 5,400,000,000 gallons.

The work entailed the construction of an earth dam, nine miles of supply and catchwater tunnels, a pumping station, treatment works and about 12 miles of catchwaters on Lantau, 10 miles west of Hong Kong, and eight miles of twin 30 inch diameter submarine pipeline between Silver Mine Bay on Lantau and Sandy Bay on Hong Kong Island.

Water is collected from the direct catchment area straight into the reservoir and from the indirect catchment areas by means of catchwaters grouped roughly east, west and north of the reservoir.

Those on the north side discharge into the reservoir via tunnels constructed under the ridge separating the Sham Wat and Keung Shan areas from Shek Pik. Tunnels are also utilised on the western catchwaters where site conditions for open channels were found to be unsuitable. In all, some 12 miles of catchwater and three miles of tunnel are involved in draining 9.6 square miles of land, making up more than 75 per cent of the scheme's total catchment area.

Most of the water entering the catchwaters is received from the streams they traverse by means of intake dams incorporating control gear which enables the flow into the catchwater to be manually controlled. Intakes are designed to pass a limited quantity of water, flood water normally bypassing the catchwaters to prevent possible overflowing.



To provide against the possibility of flood damage arising from blockages in the catchwaters, automatic syphons have been incorporated in the catchwaters to discharge excess water into the stream courses below. The catchwaters, which are open, trapezoidal channels, vary in size according to the design capacity and are all concrete lined. Where considered necessary due to the presence of poor quality of rock, the tunnels are also concrete lined.

The dam is of earth construction of 178 ft. maximum height, with a maximum width at the base of 1,160 ft., and about 2,355 ft. long at the crest, and consists of four different kinds of rolled fill. All this material was obtained from the floor of the valley and adjacent hillsides and the free draining material from the beaches and will amount to a total of 6,250,000 cubic yards.

Investigations over the dam site produced discouraging results, revealing that gravel and boulders extended across the valley to a depth of 40 ft., with decomposed granite below to a depth of nearly 100 ft. It was considered that a conventional concrete filled cut-off could not be constructed economically, but that a watertight barrier could be formed by adopting a clay-cement method of grouting, used successfully in Europe under similar conditions. A trial section was undertaken in the first instance, and as the results were very satisfactory, the method was adopted. Briefly, it consists of two rows of bored and concrete filled piles driven to form a continuous wall down to rock, while the 20 ft. space between and for a certain distance outside each row is grouted with cement-clay grout by a special method.

The supply draw-off is controlled by a valve tower constructed with intakes at five different levels, access to the valve tower being by a three span prestressed concrete

footbridge approximately 216 ft. in overall length, connecting it with the top of the dam.

Overflow is dealt with by a bellmouth spillway connected to a tunnel driven through the hillside on the left side of the dam, discharging into the sea. This tunnel, 17 feet diameter concrete lined, carried off flood water during the construction of the dam and also houses the 36 inch diameter scour pipe.

A supply tunnel of 7 feet 3 inch diameter, unlined in good rock and 5 feet 3 inch diameter where concrete lining is necessary, carries the water from the dam for a distance of approximately $4\frac{3}{4}$ miles to where a 48 inch diameter pipeline picks it up and delivers it to the pumping station approximately 1,000 yds. further away at Pui O. A relatively short length of 48 inch diameter rising main carries the water to another tunnel nearly one mile long, which discharges water to the Filtration Plant erected near the sea and at an elevation of some 300 feet at Silver Mine Bay.

The filters are of the rapid gravity type, of most up-to-date design, and remote control of the pumping station is effected from the Filtration Plant control building.

The filtered and treated water discharges into a 5,000,000 gallon service reservoir near the filters and then gravitates to Hong Kong Island through eight miles of twin 30 inch diameter pipeline laid in a trench on the sea bed. At a point approaching the half way mark the pipelines pass close to Chau Kung Island where a valve house is constructed having isolating valves and a take-off for a future supply to the islands of Peng Chau and Hay Ling Chau.

The pipes are of steel, with butt welded joints, and have an internal lining of polyurethane, 0.006 inch thick. The external protection consists of three coats of plasticised coal tar base enamel each reinforced with fibreglass, and then cased with three inches of reinforced concrete.

Cathodic protection of the submarine pipeline is also provided.

The submarine pipelines emerge at Sandy Bay on the north-west corner of Hong Kong Island where the treated water is received by a small reception reservoir of approximately 1,500,000 gallons capacity and raised by high lift pumps through a 48 inch diameter steel pumping main to Mt. Davis Service Reservoir or by low lift pumps through a 36 inch diameter steel pumping main to the new Kennedy Town Service Reservoir and an existing service reservoir at Elliot.

The Mt. Davis Service Reservoir of 30,000,000 gallons capacity will be the largest service reservoir in the Colony when completed. It is of irregular shape in plan, in order to accommodate water economically at the required level. The walls have been designed as mass concrete gravity sections except where excavation has revealed rock sufficiently sound to require a lining wall only. The invert will be laid in two layers of plain concrete and an internal wall will divide the reservoir into two approximately equal sections for ease of cleaning. The Kennedy Town Service Reservoir of 5,000,000 gallons capacity is slightly different in design as reinforced concrete counterfort walls will be constructed in lieu of mass concrete in order to reduce pressures on the ground which was found to be of limited bearing capacity.

From the Mt. Davis Service Reservoir, steel trunk mains varying in size from 48 inch diameter down to 21 inch diameter are laid to the Central District to provide supplies to the existing service reservoirs and also to link into the existing cross-harbour mains at Queen's Pier to provide a supply for Kowloon. Altogether about $8\frac{1}{2}$ miles of steel pipes are incorporated in the pumping and trunk distribution mains. All joints are of the spherical spigot and socket type, welded on site, the protection of the joints being made good

as laying proceeds.

The submarine pipelines and all work on Lantau, with the exception of the catchwaters and catchwater tunnels, was carried out by the Consulting Engineers, Messrs. Binnie & Partners, London, but all works on Hong Kong Island and catchwaters on Lantau were designed and supervised by the Waterworks staff of Hong Kong Public Works Department.

The Scheme is now in operation, the total cost being estimated at HK$235,000,000 or £15,000,000 Sterling. This sum includes the cost of compensation and resettlement of villagers living at Shek Pik and forestry work.

Hong Kong And Its Water Problem

FROM its inception as a trading port to the time of its present high industrialisation and dense population, Hong Kong has always suffered from a shortage of water. Despite a post-war reservoir expansion policy the Colony's rapid growth has outstripped its water resources.

Hong Kong's predicament has been aggravated by the fact that the rainfall is not dependable. Too often, the so called 'wet season' has passed with insufficient water stored making additional restrictions necessary during long dry winter months.

Why then build more reservoirs like Shek Pik when they can be vulnerable to prolonged droughts? The short answer is that a reservoir with its attendant catchwaters is the most efficient and economical means of storing and gathering water. The miles and miles of catchments which surround the Shek Pik reservoir, as they do in the other 13 reservoirs throughout Hong Kong, ensure that the maximum amount of rain is collected.

For this reason Shek Pik will be followed by an even more ambitious scheme of water conservancy. Plans have been made and work began to enclose the large sea inlet of Plover Cove, in the east of the New Territories, to form a vast artificial lake of fresh water.

It has been estimated that water consumption in Hong Kong is increasing by 13 per cent each successive year, and while conventional reservoirs will continue to be the main source of supply, new ideas and thoughts on supplementing this supply are constantly under review and indeed, implementation.

One of the first such schemes was the construction in 1960 of a pipe-line from the Sham Chun reservoir in Po On County whereby the Chinese authorities agreed, subject to an annual rainfall of not less than 1600 mm (63 inches), to sell Hong Kong 5,000 million gallons a year. This agreement, provides for adjustment in the event of a lower rainfall than 63 inches.

Early in 1963, when it was realised that the Colony would be faced with a drought of unprecedented severity it was apparent that even the Sham Chun supply together with the Colony's own storage could not meet the demands. As an emergency measure the Government chartered a fleet of 10 water-carrying tankers. Drawing water from the Pearl River this fleet was able to bring 12,000,000 gallons a day into Hong Kong.

As the drought continued the Government decided to maintain this emergency fleet during the winter months although the costs placed a considerable burden on the Colony's financial resources.

To this end, other schemes were brought forward. These included pumping flood water from low-lying areas. The Government already has authorised an expenditure of $24,000,000 to cover the extraction of up to 200,000,000

gallons a day from the River Indus. The project calls for the building of a permanent pumping station at Shek Pai Tau, the installation of an inflatable nylon dam across the river and the laying of three and a half miles of twin pipe-line. During a year of average rainfall, the River Indus will give Hong Kong an extra 8,500,000,000 gallons of water. The scheme should be in operation by the summer of 1964. Three other suitable areas have also been selected for the extraction of flood water and a firm of consulting engineers has been appointed to carry out an immediate survey. It has been estimated that these three areas which are in the New Territories and on Lantau Island, could produce an additional 12,500 million gallons of water a year.

The possibility of building a pumping station in the lower reaches of the Shing Mun valley to enable additional flood water to be stored in the existing Jubilee Reservoir is also being explored.

Despite these new plans Hong Kong will always face the possibility of droughts, and there is no assurance that 1963 is the severest that could be experienced. The Government has therefore come to the conclusion that sea water desalinisation —which it has kept under review—must now find a place in the plans for increasing the Colony's water resources.

So, as part of a medium-term plan, a firm of consultants will be appointed to advise the Government on this latest proposal. Their particular concern will be on the quantity of water which can be obtained and the likely capital and recurrent costs. A target figure has been placed at between 10,000,000—20,000,000 gallons of water a day, and though the cost is high this figure will serve as an insurance against severe restrictions attendant on drought conditions.

As a further long-term measure, there is to be a full investigation into the over all requirements of the Colony with particular emphasis on the 10-year period between 1970 and 1980. For it is only by visionary planning in this way that the Colony's water problem can be solved.

THE HONG KONG PUBLIC WORKS DEPARTMENT

Director (until 7th March, 1963): A. Inglis, C.M.G., M.I.C.E.
(since 7th March, 1963): A. M. J. Wright, A.R.I.B.A., F.R.I.C.S.
Deputy Director (Waterworks): T. O. Morgan, B.Sc., A.M.I.C.E.

MESSRS. BINNIE AND PARTNERS

Partner in charge: G. A. R. Sheppard, M.A., M.I.C.E.
Chief Resident Engineer (until July, 1961): S. C. M. Cutting.
(since July, 1961): W. Phillips, B.Sc., A.M.I.C.E.

LIST OF MAIN CONTRACTORS — CONSULTING ENGINEERS

Shek Pik Dam Cut-Off—Soil Mechanics Ltd., London; Soletanche, Paris. **15 ft. Embankment**—Gammon (H.K.) Ltd. **Shek Pik Dam**—Societe Francaise d'Entreprises de Dragages et de Travaux Publics, Paris. **Supply of Sand to Shek Pik**—Yau Wing Co. Ltd., Hong Kong. **Supply Tunnels**—Paul Y. Construction Co. Ltd., Hong Kong. **Pui O Pumping Station**—Paul Y. Construction Co. Ltd., Hong Kong. **48 in. dia. Pipeline**—Wa Hing & Co. Ltd., Hong Kong. **Silvermine Bay Treatment Works**—Paul Y. Construction Co. Ltd., Hong Kong. **Submarine Pipeline: Silvermine Bay to Sandy Bay, Hong Kong**—Healey Tibbitts, San Francisco; J. L. Kier Ltd., London; Paul Y. Construction Co. Ltd., Hong Kong. **Supply of Valves** etc.—Glenfield & Kennedy Ltd., Kilmarnock. **Supply and Erection of Pumps**—The Harland Engineering Co. Ltd., Alloa. **Supply of Steel Pipes**—Hume Industries Ltd., Singapore. **Polyurethane Lining to Steel Pipes**—Prodorite Ltd., Wednesbury. **Supply and Installation of Treatment Works Plant**—Paterson Engineering Co. Ltd., London.

LIST OF MAIN CONTRACTORS — WATERWORKS OFFICE

Catchwaters A, B, D, E, and F—Paul Y. Construction Co. Ltd., Hong Kong. **Catchwater Tunnels 1 and 2, Lantau**—Paul Y. Construction Co. Ltd., Hong Kong. **Catchwater C, Lantau**—Societe Francaise d'Entreprises de Dragages et de Travaux Publics, Paris. **Catchwater Access Roads, Lantau**—Societe Francaise d'Entreprises de Dragages et de Travaux Publics, Paris. **Outlet Channel to Section E Catchwater, Lantau**—Societe Francaise d'Entreprises de Dragages et de Travaux Publics, Paris. **Mt. Davis Service Reservoir**—Lam Woo & Co., Hong Kong. **48″, 36″, 24″ and 21″ Mains in Hong Kong**—Union Construction Co., Hong Kong. **42″ Main in Hong Kong**—Cheong Lee Construction Co., Hong Kong. **Sandy Bay Balance Tank and Pumping Station**—Chi Fuk Construction Co., Hong Kong. **Supply and Installation of Pumps at Sandy Bay**—Drysdale & Co., Glasgow.

DESIGNED BY THE INFORMATION SERVICES DEPT., AND PRINTED AT THE GOVERNMENT PRESS, HONG KONG

TECHNICAL DATA ON THE SHEK PIK WATER SCHEME

SHEK PIK RESERVOIR

Total storage: (estimated)	5,400,000,000 gallons
(actual)	5,515,000,000 gallons
Direct catchment area:	1,917 acres (3 sq. miles)
Indirect catchment area:	6,017 acres (9.58 sq. miles)
Length of catchwaters:	12.3 miles
Length of catchwater tunnels:	3.2 miles

SHEK PIK DAM CUT-OFF

Length of cut-off in alluvium (in valley):	1,100 ft.
Length of cut-off on left and right banks:	1,400 ft.
Number of concrete piles constructed:	1,077
Total length of piles:	37,050 ft.
Quantity of cement used:	8,500 tons
Quantity of bentonite used:	650 tons

SHEK PIK DAM

Max. height from original ground level to crest roadway:	178 ft.
Max. width at original ground level:	1,160 ft.
Length at crest roadway level:	2,355 ft.
Volume of materials in dam:—	
Beach material:	797,800 cu. yds.
Hillside material:	4,386,800 cu. yds.
Alluvium:	484,000 cu. yds.
Rock, etc:	565,800 cu. yds.
Total volume of materials:—	6,234,400 cu. yds.

DIVERSION TUNNEL

Length:	1,660 ft.
Internal diameter:	17 ft.
Capacity:	6,500 cu. ft./sec.

BELLMOUTH OVERFLOW

Depth:	165½ ft.
Diameter at top:	80 ft.
Diameter at bottom:	17 ft.

SUPPLY TUNNELS*

Length "A-B-C-D":	25,051 ft. (4.75 miles)
Length "F-G":	4,754 ft. (0.90 mile)
Diameter of unlined sections of tunnel:	7¼ ft.
Diameter of concrete lined sections of tunnel:	5¼ ft.
Height of valve tower at "A":	162 ft.
Internal diameter of valve tower:	16 ft.
Depth of shaft at "B":	122 ft.
Depth of shaft at "C":	137 ft.
Internal diameter of shaft "B" and "C":	13 ft.

48 IN. DIAMETER AQUEDUCTS*

Length "D"—pumping station:	3,270 ft.
Length pumping station—"F":	2,580 ft.
Length portal "G" to treatment works:	725 ft.
Length treatment works to submarine pipeline:	1,200 ft.

* See diagram of tunnel and pipeline.

PUI O PUMPING STATION

Reinforced concrete, overall size:	100 ft. × 85 ft.
Pumps:—	
Three electrically driven 11,000,000 gallons per day	625 h.p.
Three vertical spindle 5,500,000 gallons per day	320 h.p.
Working head	270 ft.

Remote controlled from treatment works.

SILVERMINE BAY TREATMENT WORKS

Capacity:	35,000,000 gallons per day of treated water
Sedimentation tanks:	3 No. 161 ft. dia. centrifloc clarifiers
Filters:	10 No. 35 ft. × 65 ft. rapid gravity filters overall size 400 ft. long × 90 ft. wide
Administration building:	60 ft. × 45 ft. × 33 ft. high
Chemical House:	145 ft. × 42 ft. overall
Wash water tank capacity:	200,000 gallons overall size 80 ft. × 40 ft. × 12 ft. deep
Service reservoir capacity:	5,000,000 gallons overall size 280 ft. × 170 ft. × 25 ft. deep
Total excavation:	224,000 cu. yds.
Total concrete:	27,000 cu. yds.

SUBMARINE PIPELINE

Distance between Silver Mine Bay, Lantau and Sandy Bay, Hong Kong:	Approx. 8 miles
Inside diameter of steel pipes:	30 ins.
Thickness of steel pipes:	½ ins.
Total length of pipe laid:	84,000 ft.
Thickness of polyurethane internal lining:	0.006 ins.
Thickness of reinforced concrete and fibreglass external sheathing:	3 ins.
Inside diameter of cross-over chamber at Chau Kung:	28½ ft.
Thickness of walls of cross-over chamber:	3 ft.

SANDY BAY PUMPING STATION

Building of reinforced concrete size:			120 ft. × 80 ft.
Total excavation:			18,500 cu. yds.
Total concrete:			1,200 cu. yds.
Pumps:—			
Electrically driven	3 No. high level	11 M.G.D.	1,100 h.p.
	2 No. high level	7 M.G.D.	820 h.p.
	2 No. low level	7 M.G.D.	525 h.p.
	2 No. low level	5 M.G.D.	365 h.p.
Installed capacity:		78 M.G.D.	
Max. rate of flow:		35 M.G.D.	

SANDY BAY BALANCE TANK

Capacity:	1,500,000 gallons
T.W.L.:	65.00 A.D.
Depth of tank:	20 ft.
Roof:	180 ft. × 90 ft.
Total excavation:	36,000 cu. yds.
Total concrete:	3,900 cu. yds.

MT. DAVIS RECEPTION RESERVOIR

Capacity:	30,000,000 gallons
T.W.L.:	465.00 ft. A.D.
Depth of reservoir:	30 ft. to 40 ft.
Roof area:	15,900 sq. yds. (3.3 acres)
Total excavation in soft:	179,300 cu. yds.
Total excavation in rock:	337,000 cu. yds.
Length of mass concrete wall:	1,520 L.F.
Length of lining wall:	840 L.F.
Total amount of concrete:	40,500 cu. yds.

KENNEDY TOWN SERVICE RESERVOIR

Capacity:	6,000,000 gallons
T.W.L.:	302.25 A.P.D.
Depth of reservoir:	16 ft. to 23 ft.
Roof area:	52,000 S.F.
Total concrete:	9,000 C.Y.
Total reinforcement sheet:	9,000 cwt.
Total excavation:	180,000 C.Y.

SHEK PIK CATCHWATERS

Section	Length (yards)	Catchment area (acres)
A	2,200	417
B	2,100	568
C	3,750	1,246
D	3,200	1,382
E	4,350	1,092
F	5,120	1,312
	20,720	6,017

PIPE LINES ON HONG KONG ISLAND

Diameter	Length (ft.)	Thickness of Pipe	Thickness of Lining
48″	1,700	7/16″ & 3/8″	$\frac{1}{4}$″
42″	20,300	7/16″ & 3/8″	$\frac{1}{4}$″
36″	4,900	3/8″	$\frac{1}{4}$″
24″	13,800	$\frac{1}{4}$″	$\frac{1}{2}$″
21″	4,200	$\frac{1}{4}$″	$\frac{1}{2}$″
	44,900		

The Shek Pik Water Scheme

Order of Ceremony

Guests are requested to stand when His Excellency arrives and when His Excellency leaves after unveiling the plaque.

1. The Director of Public Works, the Honourable A.M.J. Wright, will welcome His Excellency the Governor, Sir Robert Black, G.C.M.G., O.B.E.
2. The Director of Public Works will address the gathering and invite His Excellency to declare the Shek Pik Water Scheme complete.
3. His Excellency will address the gathering and will unveil a plaque to mark the formal completion of the scheme.
4. His Excellency will depart.

Guests will be invited to inspect the dam after the opening ceremony. Engineers will be available to explain the salient points.

Guests should remain seated until an announcement is made over the public address system.

Programme

8.30 a.m.	The special ferry will depart from Queen's Pier.
10.00 a.m.	The ferry will arrive at Shek Pik.
10.00 a.m.—10.30 a.m.	Light refreshments will be provided at the Shek Pik Club en route to the site of the ceremony on the dam. Transport will be provided as far as possible but in view of the number expected, it may be necessary to request some guests to walk.
10.45 a.m.—11.15 a.m.	The ceremony will take place.
11.15 a.m.—11.45 a.m.	Guests will have an opportunity to inspect the dam before returning to the ferry. Cocktails will be served on the ferry during the journey back to Hong Kong.
1.15 p.m. (approx.)	The ferry will arrive at Queen's Pier.