For discussion **BOARD PAPER**
on 2 September 2011 **AAB/21/2011-12**

MEMORANDUM FOR MEMBERS OF THE
ANTIQUITIES ADVISORY BOARD

PROGRESS REPORT ON ROCK CARVINGS CONSULTANCY STUDY

PURPOSE

This paper informs Members of the progress of the Rock Carvings[1] Consultancy Study and implementation of the recommendations of the consultancy reports.

BACKGROUND

2. There are currently eight rock carvings and one rock inscription in Hong Kong which have been declared as monuments under the Antiquities and Monuments Ordinance (Cap. 53). The eight rock carvings are Rock Carving at Big Wave Bay, Rock Carvings on Po Toi, Rock Carving on Tung Lung Chau, Rock Carving at Shek Pik, Rock Carving on Kau Sai Chau, Rock Carvings on Cheung Chau, Rock Carving at Lung Ha Wan and Rock Carvings at Wong Chuk Hang. They form a homogeneous group with basically geometric patterns, some of which give hints of human or animal images. It is difficult to establish when, how and by whom the carvings were made. Since their patterns resemble strikingly those on the Bronze Age stamped pottery and bronze vessels unearthed locally, it is believed that the rock carvings belong to Hong Kong's Bronze Age, i.e. about 3 000 years ago. As regards the Rock Inscription at Joss House Bay, it is the oldest dated inscription in Hong Kong recording a visit by an officer in charge of the salt administration during the Southern Song Dynasty. The rock

[1] The term "rock carving" in the study is referred to as "rock engraving" or "petroglyph" in international rock art literature which describes a motif that has been pecked into the bedrock resulting in a lowering of the surface to form the motif. "Rock carving" is commonly used in general publications.

carvings and inscription are scattered mainly along the coastal areas and have undergone weathering for many years. Brief information on the rock carvings and inscription is at **Annex A**.

3. In 1977, in order to arrest the weathering process and to improve the physical stability of the rock carvings on Po Toi, Mr. Richard L. Thomas, an expert in geotechnical engineering, was commissioned to develop proposals for the preservation of the rock carvings. A further study covering all the rock carvings was conducted in 1979. Both studies recommended the construction of a surface channel to intercept groundwater and surface water flow, the provision of viewing platform and shelter to protect the rock face from wave attack and sea water spray, and the construction of concrete buttress to enhance the overall stability of the block of rock. In the light of the recommendations, the Antiquities and Monuments Office (AMO) implemented measures as recommended in the studies over the past decades to protect the declared rock carvings and inscription with assistance from the former Public Works Department, the Architectural Services Department (ArchSD) and the respective District Offices.

4. In October 2007, Mr. William Meacham, an AAB Member in 1987-1988, expressed his views on the inadequacy of the conservation measures adopted for the Rock Carvings on Po Toi and proposed a consultancy study to look into the issue. The Central Conservation Section of the Leisure and Cultural Services Department (LCSD) briefed Members of the Antiquities Advisory Board (AAB) on the conservation treatment of the rock carvings on 26 June 2008. The meeting concluded that Mr. Meacham be provided with relevant technical data and the results of scientific analyses, and an open attitude be adopted for further discussion with experts. On 25 September 2008, at the request of Mr. Meacham, AAB invited him to give a presentation to Members. Thereafter, AAB advised AMO to review the conservation measures of rock carvings by consulting international experts. AMO and the Central Conservation Section of LCSD subsequently prepared the specifications for the Rock Carvings Consultancy Study with the dual objectives of safeguarding the monuments and enhancing their significance as part of Hong Kong's heritage resources. A copy of the study brief is at **Annex B**.

PROGRESS OF CONSULTANCY STUDY AND IMPLEMENTATION OF RECOMMENDATIONS OF THE CONSULTANCY REPORTS

5. In July 2009, AMO identified four specialists, namely Dr. Richard Engelhardt, Mr. William Meacham, Prof. Clifford Price and Mr. Andrew Thorn with expertise in heritage preservation, local archeology, archaeological conservation and rock art conservation respectively, to conduct the Consultancy Study. Prof. Price withdrew in August 2009 due to personal reasons, and Dr. Valérie Magar, who is also a rock art conservation expert and was the Coordinator of the International Council of Museums - Committee for Conservation's Working Group on Mural Paintings, Mosaics and Rock Art, took up the consultancy in March 2010. AMO has reported the progress of the Consultancy Study at previous AAB meetings. Background information on the four appointed experts is at **Annex C.**

6. Each expert was asked to produce an independent report addressing each of the following main aspects of the rock carvings and inscription under their respective areas of expertise as set out in paragraph 5 above:

(a) The present condition of the rock carvings/inscription and the potential hazards that will affect the well being of the monuments;
(b) Review of the current preservation and conservation practice;
(c) Enhancement of the preservation strategy;
(d) Evaluation of the current display settings and their improvement measures; and
(e) The management plan.

The consultancy reports were received from December 2009 to July 2010. They are attached in CD format at **Annex D**. The recommendations arising from the consultancy reports are summarized in **Annex E**.

7. According to the reports, the overall condition of all declared rock carvings and inscription is stable but improvement works are recommended to protect, preserve and manage them in a better way. AMO collaborated with the Central Conservation Section of LCSD, ArchSD and the Civil Engineering and Development Department (CEDD) to follow up the recommendations in the reports.

8. To examine the practicability of the recommendations of the reports, AMO, after receiving the consultancy reports, launched a number of studies by phases, including geological surveys of all the sites, hydrological assessments of two rock carvings (i.e. Rock Carvings on Po Toi and Cheung Chau) and analyses of environmental data to ascertain the micro-climate within the protective shelters. The Central Conservation Section of LCSD has also been studying the suitability of the recommended materials for the replacement of the water diversion dams above the rock carvings at Cheung Chau, Po Toi, Shek Pik and Wong Chuk Hang.

9. For the recommended short-term measures, ArchSD has assisted in removing the Perspex screen of the Rock Carving at Lung Ha Wan, the shelter for the Rock Carving on Kau Sai Chau and the cement water diversion dams above the Rock Carving at Big Wave Bay and the Rock Inscription at Joss House Bay. The Correctional Services Department has also cleaned up the surrounding area of the Rock Carving at Shek Pik and ArchSD will arrange renovation works for the refuse collection point for completion by end 2011 tentatively. As for the Rock Carvings on Cheung Chau, the Central Conservation Section of LCSD has removed the cement capping on the surface of the rock around the carving and the hotel located above the rock carving site has removed the plants above the rock carving to address the water seepage problem. Hydrological assessments of the rock carvings (except Rock Carvings on Po Toi and Cheung Chau, the assessments on which have been completed as mentioned in paragraph 8 above) and the rock inscription will be arranged in due course. Photos showing the work that has been completed are at **Annex F**.

10. For the recommended medium-term and long-term measures, the Central Conservation Section of LCSD has adopted the chemical treatment recommended by the consultants to arrest the bio-contamination on the rock surface and will assist AMO in monitoring the construction works for the replacement of the dams. AMO will commission a contractor to arrange 3D laser scanning for collecting information on the monuments and monitoring the rock carving surface. Appropriate measures will be arranged based on the scanning findings.

11. The consultancy reports also suggest enhancing visitor interpretation of each rock carving and its linkage with other rock carving sites in Hong Kong to

promote public awareness as well as the value of the rock carvings as public educational resources. AMO has recently commissioned the Community Project Workshop of the Faculty of Architecture, The University of Hong Kong to design new protection and visitor facilities for the sites. It is expected that the result of the design study will be available later this year.

12. AMO's responses to the recommendations of the consultancy reports, which have been reviewed and commented on by the consultants, are at **Annex E**.

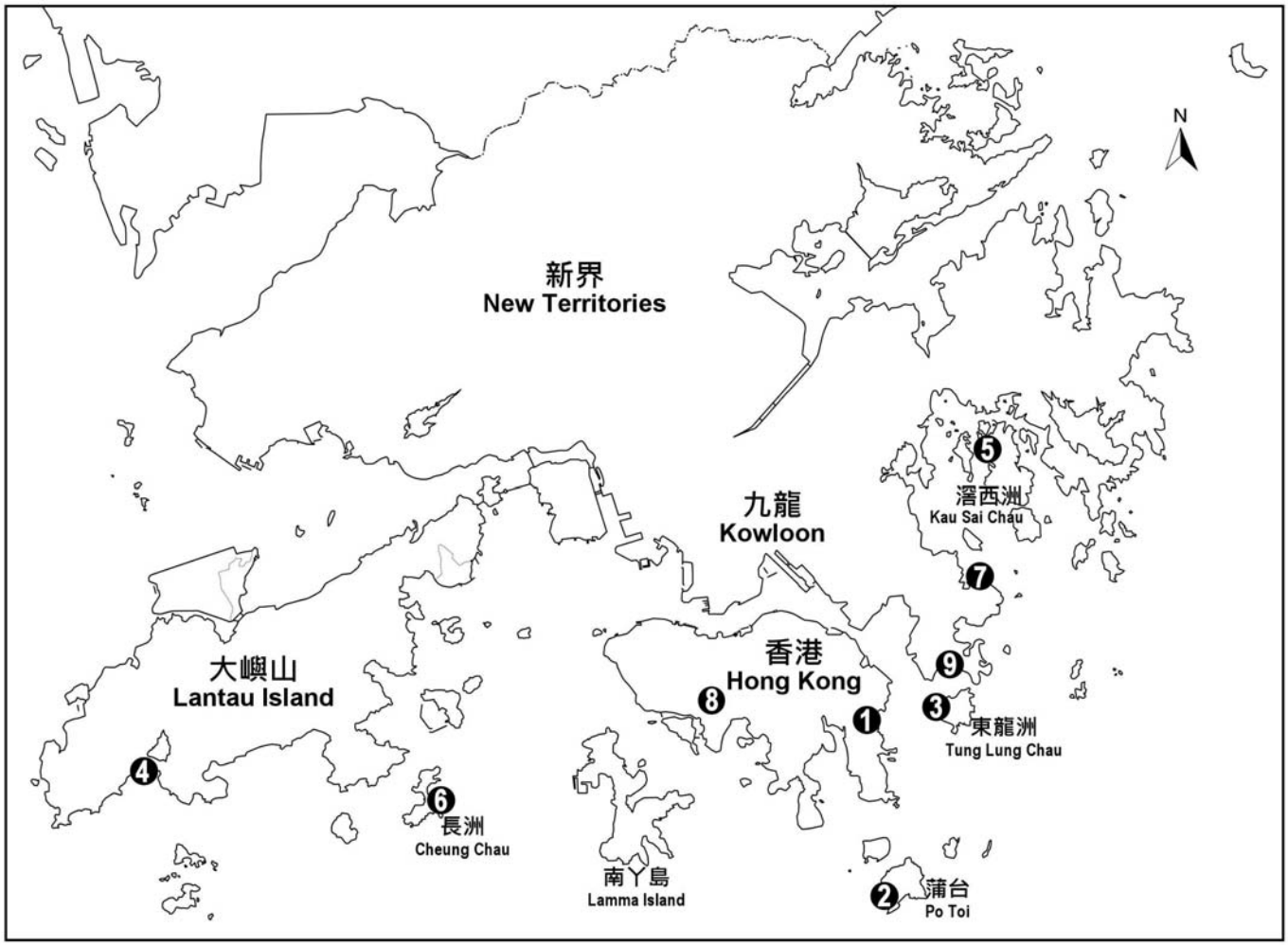
WAY FORWARD

13. The Consultancy Study has furnished AMO with a blueprint to conserve and manage the declared rock carvings and inscription more effectively. Some of the recommendations have been implemented immediately while those requiring further study or planning are being followed up by AMO. Members are invited to offer their views on the recommendations in the consultancy reports and AMO's responses.

Antiquities and Monuments Office
Leisure and Cultural Services Department
September 2011
Ref : LCS AM 22/3

Annex A

Declared Rock Carvings and Rock Inscription in Hong Kong



Location map of rock carvings and rock inscription which have been declared as monuments in Hong Kong

LEGEND 圖例

1. Rock Carving at Big Wave Bay (大浪灣石刻)
2. Rock Carvings on Po Toi (蒲台島石刻)
3. Rock Carving on Tung Lung Chau (東龍洲石刻)
4. Rock Carving at Shek Pik (石壁石刻)
5. Rock Carving on Kau Sai Chau (滘西洲石刻)
6. Rock Carvings on Cheung Chau (長洲石刻)
7. Rock Carving at Lung Ha Wan (龍蝦灣石刻)
8. Rock Carvings at Wong Chuk Hang (黃竹坑石刻)
9. Rock Inscription at Joss House Bay (大廟灣刻石)

Item 1 Rock Carving at Big Wave Bay

Year of monument declaration	Location	Size (W) x (H)	Pattern
1978	On a rock cliff at the eastern end of the Big Wave Bay, Hong Kong Island	Approx. 200cm x 110cm	Geometric and animal patterns

Item 2 Rock Carvings on Po Toi

Year of monument declaration	Location	Size (W) x (H)	Pattern
1979	On two coastal rock cliffs located at the southern part of Po Toi	Left side: approx. 160cm x 200cm Right side: approx. 200cm x 140cm	Patterns on the left consist of lines resembling stylized animal and fish patterns, while the right is arranged in spirals with inter-locking style

Left side

Right side

Item 3 Rock Carving on Tung Lung Chau

Year of monument declaration	Location	Size (W) x (H)	Pattern
1979	On the northern coast of Tung Lung Chau overlooking Joss House Bay	Approx. 300cm x 200cm	The carving features a dragon pattern

Item 4 Rock Carving at Shek Pik

Year of monument declaration	Location	Size (W) x (H)	Pattern
1979	On a slope near the base of the Shek Pik Reservoir dam	Approx. 30cm x 80cm	Geometric patterns composed of spiral squares and circles

Item 5 Rock Carving on Kau Sai Chau

Year of monument declaration	Location	Size (W) x (H)	Pattern
1979	A flat vertical rock surface at the northwestern coast of Kau Sai Chau	Approx. 80cm x 100cm	Zoomorphic motif similar to other rock carvings

Item 6 Rock Carvings on Cheung Chau

Year of monument declaration	Location	Size (W) x (H)	Pattern
1982	On a boulder below the Warwick Hotel, East Bay, Cheung Chau	Right side: approx. 110cm x 250cm Left side: approx: 30cm x 40cm	Carvings consist of two groups of similar design with several carved lines surrounding small depressions

Left side

Right side

Item 7 Rock Carving at Lung Ha Wan

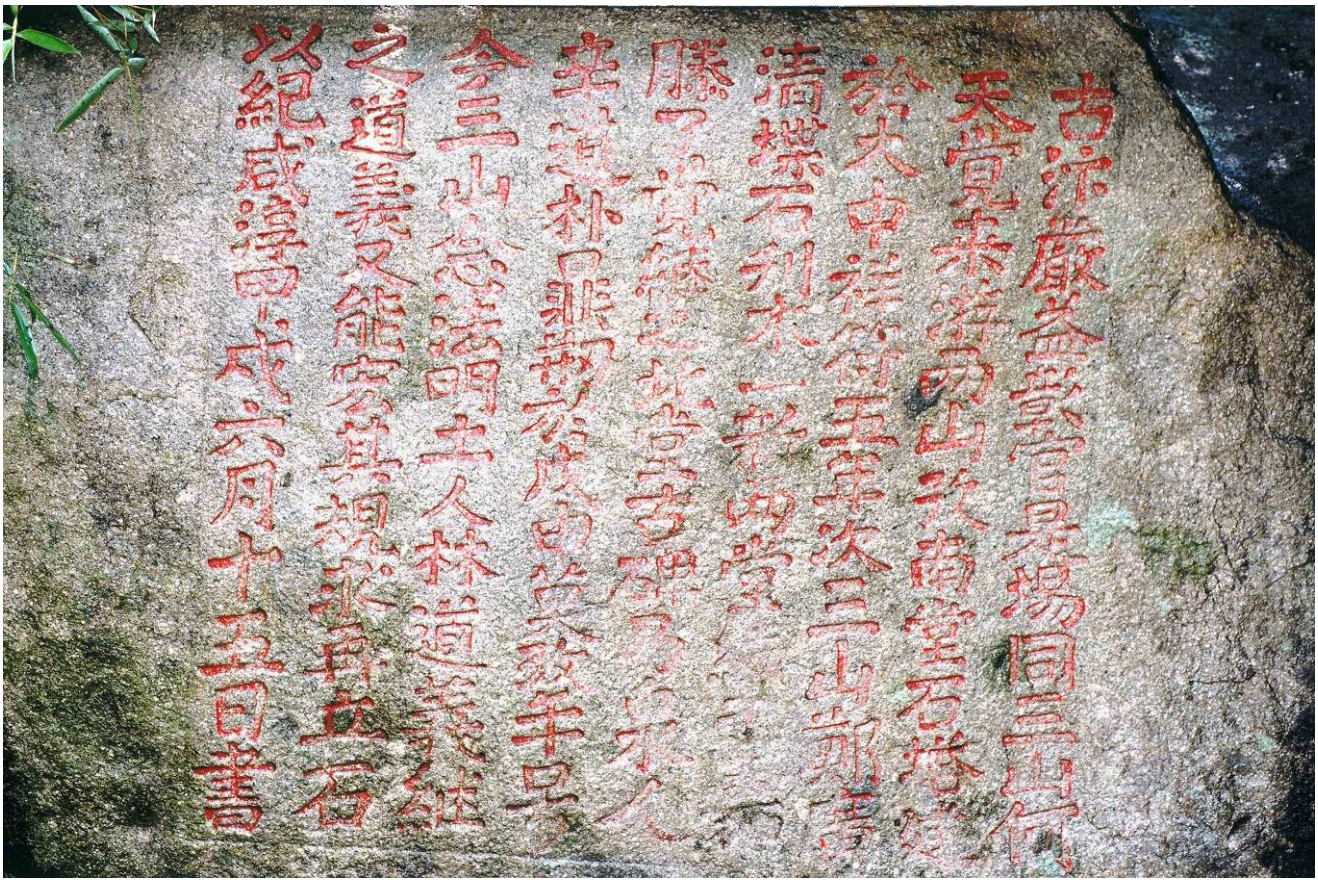
Year of monument declaration	Location	Size (W) x (H)	Pattern
1983	On a vertical face of a badly weathered boulder facing east at Lung Ha Wan	Approx. 140cm x 140cm	Geometric patterns that may resemble stylized animals or bird forms

Item 8 Rock Carving at Wong Chuk Hang

Year of monument declaration	Location	Size (W) x (H)	Pattern
1984	Three main groups of carvings on a vertical rock surface at the side of a stream course at Wong Chuk Hang	Approx. 200cm x 300cm	Meandering and spiral designs suggesting stylized animal motifs

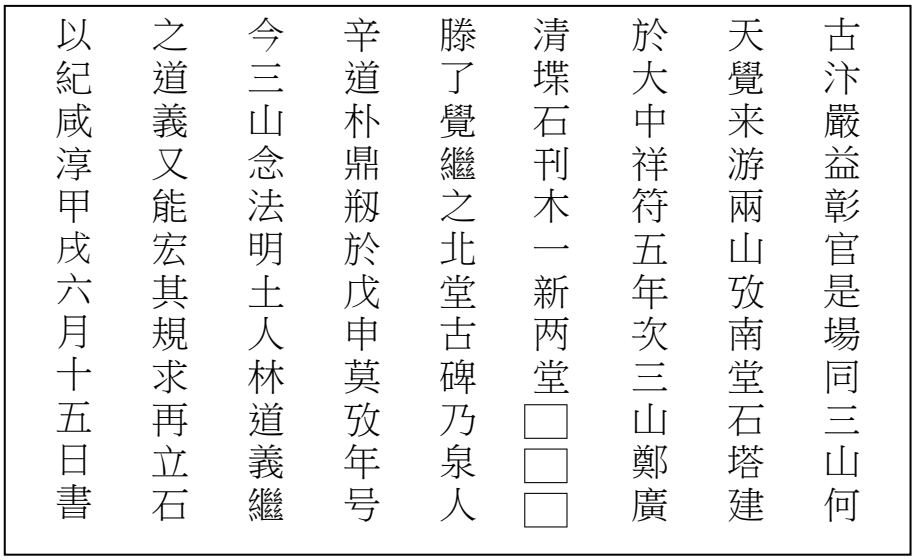
Item 9 Rock Inscription at Joss House Bay

Year of monument declaration	Location	Size (W) x (H)	Pattern
1979	On a boulder near the Tin Hau Temple at Joss House Bay	Approx. 150cm x 120cm	Inscription



Annex A

Text of the Rock Inscription at Joss House Bay



刻石的語譯如下：
汴梁人(河南開封)嚴益彰，為本場(官富場)鹽官，和三山(福建福州)人何天覺，同來南北佛堂遊覽。據考證所得，南佛堂的石塔在宋大中祥符五年(即一零一二年)建成。其後，三山人鄭廣清，搬運石材，砍伐木料，將兩堂重修。【脫字】滕了覺也曾修葺南北兩堂。至於北佛堂的古碑，則是泉州人辛道朴在戊申年所立；不過，究竟是哪一年號的戊申，已無法查考。現在，三山人念法明和本地人林道義，又再修繕南北佛堂；林道義更擴充其規模，同時請求再次書文立石，記述南北佛堂修廟的經過。咸淳甲戌年六月十五日(即一二七四年七月二十日)。

Modern paraphrase of the inscription:
Yan Yizhang of Bianliang (Kaifeng, Henan), Officer-in-charge of this Salt Administration (Guanfu Chang), paid a visit to these two places together with He Tianjue of Sanshan (Fuzhou, Fujian). There is evidence to show that the stone pagoda at Nam Tong (Southern Temple) was built in the 5th year of Dazhong Xiangfu reign (i.e. the year 1012). Later, Zheng Guangqing of Sanshan, after transporting stones and hewing timber, renovated the two temples. [unrecognized characters] Teng Liaojue again carried out renovation work on the two temples. The old stone tablet at Pak Tong (Northern Temple) was erected by Xin Daopu of Quanzhou in the cyclical year Wushen. To which reign this Wushen year belonged is now a mystery. Now, Nian Faming of Sanshan and a native, Lin Daoyi, have continued to carry out renovation work on the two temples. Lin Daoyi has even managed to extend the original structures. He has requested to erect another tablet to mark the occasion. This is written on the 15th day of the 6th month in the cyclical year Jiaxu of the Xianchun reign (i.e. 20 July 1274).

Annex B

Study Brief of the Rock Carvings Consultancy

Purpose

To review the conservation methodology and to work out a long-term preservation and management plan for 9 ancient rock carvings of Hong Kong. These rock carvings have been declared as monuments and are protected under the Antiquities and Monuments Ordinance of Hong Kong. They are located at:

(1) Shek Pik, Lantau;
(2) Po Toi;
(3) Tung Wan, Cheung Chau;
(4) Kau Sai Chau, Sai Kung;
(5) Lung Ha Wan, Sai Kung;
(6) Tung Lung Chau, Sai Kung;
(7) Big Wave Bay, Hong Kong Island;
(8) Wong Chuk Hang, Hong Kong Island and
(9) Joss House Bay, Sai Kung.

The goal of the long-term preservation and management plan is to conserve, enhance and communicate the cultural significance of the 9 ancient rock carvings.

Scope of Study

The scope of the study shall include but not limited to the following:

1. To assess the present condition of the rock carvings and identify the potential hazards that will affect the well being of the rock carvings;
2. To review the current preservation and conservation practice;
3. To advise on a practicable preservation strategy for the rock carvings;
4. To examine the display settings and advise on improvement measures;
5. To devise a comprehensive management plan for the rock carvings.

Study Plan

The consultancy study shall comprise site inspections of the 9 rock carvings listed above and attendance at work meetings as and when required in seven consecutive days with the dates to be agreed by the Government and the Advisor after signing of the Agreement. Thenceforth, the Advisor is required to render a

study report on the listed rock carvings covering, but not limited to the aspects as described in the following section for submission to the Government within 1 month after the inspection visits.

Study Report

Based on the background information provided by the Government as well as the findings of the Advisor in the site inspections and meetings, the Advisor shall deliver to the Government a study report in English of not less than 4,500 words for all 9 rock carvings while not less than 500 words for each rock carving within 1 month after the site visits. The report shall address all the 5 aspects stipulated in the scope of study for each of the 9 rock carvings and include but not limited to the following contexts:

1. Present situation
   - Context, merits and issues (if any) of the current conservation practice
   - Physical condition of the rock carvings
   - Diagnosis of the preservation problems (if any)
   - Site constraints and environmental settings

2. Proposed solutions/improvements (both interim and long-term)
   - Preservation and/or conservation strategy
   - Requirements for intervention treatment
   - Follow-up evaluation and documentation work
   - Resources implications

3. Risks (if any)
   - Identification and assessment of the risk factors
   - Risk management

4. Conservation plan
   - Priority for intervention treatments
   - Detail implementation plans
   - Suggestion on timeline for conservation work

5. Recommendations on specialist supplies
   - Sources of specialist materials and/or service suppliers
   - Recommendations for outsourcing of site management (if necessary)

Annex C

Rock Carvings Consultancy Study
Background Information on the Four Appointed Experts

Dr Richard A. Engelhardt

Dr Richard A. Engelhardt is a celebrated heritage expert and the Charge de Mission and Senior Advisor for Culture of the United Nations Educational, Scientific and Cultural Organization (UNESCO). He is also the Founder and Executive Secretary of UNESCO-International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) Asian Academy for Heritage Management. He has directed heritage projects throughout Asia and the Indo-Pacific region for the past 30 years. From 1991 to 1994, he served as the Head of the UNESCO Office in Cambodia, where he launched the international safeguarding campaign for Angkor. He was also the UNESCO Regional Advisor for Culture for Asia and the Pacific based in Bangkok from 1994 to 2008.

Dr Valérie Magar

Dr Valérie Magar is the Senior Conservator of the Coordinación Nacional de Conservación del Patrimonio Cultural (CNCPC–INAH) in Mexico from 1993 to 2003 and since 2010. She specializes in conservation of archaeological heritage, especially mural paintings and rock art. From 1993 to 2004, she taught archaeological conservation, theory of conservation and preventive conservation at the Escuela Nacional de Conservación, Restauración y Museografía (ENCRM) in Mexico City. She was also the Coordinator of the Working Group of Mural Paintings, Mosaics and Rock Art of ICOM-CC from 2003 to 2005 and worked as a conservation specialist at ICCROM.

Mr William Meacham

Mr William Meacham is an experienced archaeologist specializing in South China. He has directed more than thirty archaeological excavations in Hong Kong and Macau. The largest one of these was the 16-month survey and salvage excavation of Chek Lap Kok Island, the site of the Hong Kong International Airport, from 1991 to 1992. He has written and edited books on archaeology, including two books on Rock Carvings in Hong Kong, *Archaeology in Hong Kong (1980)* and *The Archaeology of Hong Kong (2009)*. He has also published extensively on various aspects of South China archaeology in international journals and written on subjects related to the Turin Shroud. His other research interests are the origins of the Austronesian-speaking peoples and genealogy. Since 1980, he has been the Honorary Research Fellow at the Centre of Asian Studies, the University of Hong Kong. He was also the Editor of the Hong Kong Archaeological Society from 1973 to 1985 and the Chairman of the Society from 1985 to 1996.

Mr Andrew Thorn

Mr Andrew Thorn is a renowned rock art expert from Australia, specializing in the conservation of glass, mud brick, stone and wooden objects. He is the Coordinator of the Murals, Stone, and Rock Art Working Group of the ICOM–CC. He is also a consultant practising the conservation of mural paintings, sculpture and rock art and undertaking research into deterioration and preservation of indigenous paintings on stone. From 1978 to 1980, he served as Stone Mason and Assistant Restoration Supervisor at the National Trust of South Australia. He was also the Assistant Co-ordinator of the Mural, Mosaic and Rock Art Working Group of ICOM–CC from 2005 to 2008.

Annex E

Recommendations of the Rock Carvings Consultancy Study and the Responses of the Antiquities and Monuments Office

I. Study Reports submitted by the consultants

1. *Consultancy Study on the Preservation of Ancient Rock Carvings of Hong Kong* by Dr Richard A. Engelhardt
2. *Study Project on the Preservation of Nine Rock Art Carvings in Hong Kong* by Dr Valérie Magar
3. *Preservation of Nine Rock Carvings in Hong Kong: A Consultancy Study of Ancient Rock Carvings* by Mr William Meacham
4. *Condition Survey of Nine Rock Carvings: A Study of the Condition, Management and Treatments of Nine Sites within the Hong Kong Autonomous Boundaries* by Mr Andrew Thorn

II. Short-Term, Medium-Term and Long-Term Recommendations on Issues Applicable to All the Rock Carvings and Rock Inscription Sites

■ ***Short-term Recommendations***

Protection Facilities

Recommendations	Consultants	Follow up actions/ Responses
1. Removal of the shelter / Perspex screen of the rock carvings	R.A. Engelhardt V. Magar W. Meacham A. Thorn	Architectural Services Department (ArchSD) removed the shelter of the Rock Carving on Kau Sai Chau **(Photos 5 and 6 in Annex F)** and the Perspex screen of the Rock Carving at Lung Ha Wan **(Photos 12 and 13 in Annex F)** in June 2011.
2. Removal or replacement of the cement water diversion dams with siliceous grout or other materials	V. Magar A. Thorn	ArchSD has removed the dams at the Rock Carving at Big Wave Bay **(Photos 1 and 2 in Annex F)** and the Rock Inscription at Joss House Bay **(Photos 14 and 15 in Annex F)** and will replace other dams with suitable material by phases.

Baseline Studies

Recommendations	Consultants	Follow up actions/ Responses
3. Collection and assessment of the geological information of the rock carvings and inscription	R.A. Engelhardt W. Meacham A. Thorn	Civil Engineering and Development Department (CEDD) has studied the geology of all the sites. The findings facilitate the design work commissioned by the Antiquities and Monuments Office (AMO) to enhance the protection and visitor facilities for the rock carvings. Based on the results, improvement work will be arranged by phases.
4. Collection and assessment of the hydrological condition of the bed rocks of the rock carvings and inscription	R.A. Engelhardt V. Magar A. Thorn	CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on other sites will be arranged. The findings will be used in the design work commissioned by AMO to enhance the protection and visitor facilities for the rock carvings.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations	Consultants	Follow up actions/ Responses
1. Enhancement of the interpretation of the monuments by providing additional visitor facilities	R.A. Engelhardt V. Magar W. Meacham A. Thorn	A consultant has been commissioned to design new protection and visitor facilities. AMO will arrange improvement work by phases based on the recommendations from 2012 onwards.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations	Consultants	Follow up actions/ Responses
1. Redesign of the shelter for better protection of the rock carvings and	R.A. Engelhardt V. Magar	A consultant has been commissioned to design new protection and visitor

Recommendations	Consultants	Follow up actions/ Responses
inscription	W. Meacham A. Thorn	facilities. AMO will, based on the recommendations, arrange improvement work by phases from 2012 onwards.
2. Re-instatement of the natural features such as ledges and platforms that form an integral and important part of the archaeological site	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

Visitor Facilities

Recommendations	Consultants	Follow up actions/ Responses
3. Enhancement of the accessibility to the sites	R.A. Engelhardt V. Magar A. Thorn	A consultant has been commissioned to design new protection and visitor facilities. AMO will, based on the recommendations, arrange improvement work by phases from 2012 onwards.

Conservation Measures

Recommendations	Consultants	Follow up actions/ Responses
4. Use of chemical treatment to control bio-growth	R.A. Engelhardt V. Magar A. Thorn	The Central Conservation Section of the Leisure and Cultural Services Department (LCSD) has been monitoring the effect of chemical treatment closely.
5. Do not disturb the equilibrium that has preserved the rock carvings for several thousand years	R.A. Engelhardt W. Meacham	

Baseline Studies

Recommendations	Consultants	Follow up actions/ Responses
6. Use of 3D laser scanning technique to monitor the monuments	R.A. Engelhardt V. Magar W. Meacham	AMO will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monuments.

III. Major Site-Specific Recommendations / Comments

1. Rock Carving at Big Wave Bay

Shelter of the Rock Carving

Front view of the shelter

Water diversion dam above the Rock Carving

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. The cement water diversion dam should be removed as it is ineffective to intercept the water flow below the rock surface and soluble salts will be leached out from the cement and affect the rock carving.	R.A. Engelhardt A. Thorn	Agreed. ArchSD removed the dam in August 2011 **(Photos 1 and 2 in Annex F)**.
2. The cement water diversion dam is ineffective to intercept the water flow below the rock surface and soluble salts will be leached out from the cement and affect the rock carving.	W. Meacham	
3. The cement water diversion dam should be removed as soluble salts will be leached out from the cement and affect the rock carving. Besides, all the cement and elements from previous structures and signage should be removed.	V. Magar	Agreed. ArchSD removed the dam **(Photos 1 and 2 in Annex F)** and all the cement left over will be demolished.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
4. Studying the moisture distribution to determine whether water seepage occurs on the rock surface	R.A. Engelhardt A. Thorn	Noted. AMO will invite CEDD to conduct a hydrological study.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. A better-designed shelter and visitor interpretation kiosk should be constructed.	R.A. Engelhardt	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
6. Any protective structure should prevent visitors from touching the carved rock face, but should not block any natural elements such as wind, rain, sunshine and sea spray.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
7. The current level of protection for the site should be maintained as the site is close to busy recreational areas.	A. Thorn	
8. The site has too many structures made of Portland cement. The use of cement as construction material should be avoided.	R.A. Engelhardt W. Meacham A. Thorn	
9. The natural platform in front of the rock carving was buried in cement structure. This platform along with the cement steps, footpath and all other cement structures within 10m of the carving should be removed to reinstate the natural setting.	W. Meacham	
10. The roof of the pavilion, which creates a micro-climate underneath	W. Meacham	Noted. The Central Conservation Section of LCSD will continue

Recommendations / Comments	Consultants	Follow up actions/ Responses
the rock carving, should be redesigned.		carrying out climatic studies and monitor the site closely.
11. The installation of CCTV to monitor the site is recommended.	W. Meacham	Noted. Difficult to implement due to site constraint.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
12. The treatment by non-ionic surfactant appears to be effective in cleaning the rock surface without any negative effect. On site control tests should be made to monitor the effects of chemical treatment.	R.A. Engelhardt	Noted. The Central Conservation Section of LCSD has been monitoring the effect closely. No adverse effect was noted so far.
13. Consolidation of the rock carving with ethyl silicate is beneficial and makes its surface more durable and resistant to abrasion, but it is not essential to be applied to this site for the time being.	A. Thorn	Noted.
14. The site should be monitored and maintained regularly.	R.A. Engelhardt V. Magar W. Meacham	Agreed. AMO has increased the frequency of site inspection and housekeeping work.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
15. The condition of the rock surface should be monitored by 3D laser scanning.	R.A. Engelhardt	Agreed. AMO will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.

2. Rock Carvings on Po Toi

Shelter of the Rock Carving (left side) and barrier of the Rock Carving (right side)

Barrier of the Rock Carving

Water diversion dam above the Rock Carving

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Reconstruction of the cement water diversion dam above the right engraving	R.A. Engelhardt	Agreed. ArchSD will reconstruct the dam with suitable material above the right engraving.
2. Reconstruction of the cement water diversion dam above the right engraving by small granite stones and lime-sand mortar	V. Magar	
3. Reconstruction of the cement water diversion dam above the right engraving by siliceous grout materials	A. Thorn	
4. Removal of the dam above the left engraving	R.A. Engelhardt V. Magar A. Thorn	Agreed. ArchSD will remove the dam above the left engraving.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Geo-technical study of water infiltration should be done so that the trapped water could be directed away from the rock surface.	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. AMO will invite CEDD to give further technical advice.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
6. Provision of signage or information plaque to reinforce positive value and importance of the engravings to prevent vandalism	V. Magar	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. The shelter cannot protect the carving and it should be redesigned. It is suggested that visitor facilities should also be enhanced.	R.A. Engelhardt	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
8. The shelter and the Perspex screen affect the visibility of the rock carvings and offer minimum protection to the rock carvings. The approach of separating visitors from the carvings should be considered so that artificial installations around the rock carvings could be minimized.	A. Thorn	
9. The shelter and the Perspex screen adversely affect the micro-climate of the rock carvings. Any protective structure should prevent visitors from touching the carved rock face, but should not block any natural elements such as wind, rain, sunshine and sea spray.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged. Furthermore, repeated climatic studies have been carried out by the Central Conservation Section of LCSD within the shelter and no notable deviation from the patterns of the ambient condition has been found.
10. The approach of separating visitors from the carvings by psychological barrier should be considered.	V. Magar	Noted. The consultant commissioned by AMO to design the new protection and visitor facilities will take the comment into account.
11. The destruction of a protection case in 2009 had completely exposed one of the rock carvings to possible vandalism.	W. Meacham	Noted. A barrier was installed at the site to protect the exposed rock carving in 2009. Furthermore, the consultant commissioned by AMO to

Recommendations / Comments	Consultants	Follow up actions/ Responses
		design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.
12. There are too many concrete facilities at this site that affect the rock carving. These concrete structures should be removed in long term.	A. Thorn	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
13. There are too many concrete facilities at this site that affect the rock carving and alter beyond recognition the natural setting which is of archaeological significance. These concrete structures should be removed to reinstate the natural setting of the site.	W. Meacham	
14. The installation of CCTV to monitor the site is recommended.	W. Meacham	Noted. Difficult to implement due to site constraint.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
15. Sealing of the cracks on the rock surface with ethyl silicate-sand mortar or clay	V. Magar	Noted. AMO will invite CEDD to give technical advice.
16. Siloxane can be applied at more dilute concentrations as a water repellent agent for the rock surface.	A. Thorn	Noted. The Central Conservation Section of LCSD has been monitoring the effect closely.
17. The treatments with non-ionic surfactant and biocide can partly control the growth of micro-organisms on the rock surface. Periodic monitoring of the bio-growth is required.	R.A. Engelhardt	
18. Control of biota is better achieved by applying ethanol as prescribed	A. Thorn	The Central Conservation Section of LCSD has carried out the treatment as

Recommendations / Comments	Consultants	Follow up actions/ Responses
intervals.		recommended and has been monitoring its effectiveness.
19. Stopping the chemical treatment of the site. Future removal of bio-film should be done by mechanical means. Further study should be conducted to determine the exact biological agent responsible for the bio-film, using live samples and sophisticated analyses to determine if cyanobacteria is present.	W. Meacham	The Central Conservation Section of LCSD will continue to monitor the effect of the treatment closely.
20. Improvement of the housekeeping and maintenance of the site	R.A. Engelhardt	Agreed. AMO has increased the frequency of site inspection and housekeeping work.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
21. The condition of the rock surface should be monitored more frequently.	V. Magar	Noted. AMO will keep track of the change of the rock carvings by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
22. The condition of the rock surface should be monitored by 3D laser scanning.	R.A. Engelhardt	Noted. AMO will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.

3. Rock Carving on Tung Lung Chau

Overview of the Rock Carving and walkway towards the site

Shelter of the Rock Carving

Walkway towards the Rock Carving

■ ***Short-term Recommendation***

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Geo-technical study on water infiltration and its effects on slope stability is required.	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Carving on Tung Lung Chau and other sites will be arranged.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
2. Provision of better interpretative and visitor facilities	R.A. Engelhardt	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
3. The Perspex screen affects the visibility of the carving. The approach of separating visitors from the carving should be deliberated.	A. Thorn	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
4. The Perspex screen affects the visibility of the carving. The approach of separating visitors from the carving by psychological barrier should be deliberated.	V. Magar	

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. The Perspex screen affects the visibility of the carving and the platform is too close. Because of the large size and height of the carving, the viewing platform should be further away so that the impressive carved patterns can be fully appreciated.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
6. The shelter must be redesigned to prevent vandalism and protect the carving from wind erosion.	R.A. Engelhardt	
7. The shelter alters the micro-climate of the rock carving. All concrete structures and the shelter should be removed to reinstate the natural setting of the site. Any protective structure should prevent visitors from touching the carved rock face, but should not block any natural elements such as wind, rain, sunshine and sea spray.	W. Meacham	Noted. The Central Conservation Section of LCSD will continue carrying out climatic study and monitor the site closely.

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
8. Construction of an alternative path along the coast to the site to avoid climbing a steep staircase	W. Meacham	Noted. Difficult to implement due to site constraint.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
9. The treatment appears to be effective in cleaning the rock and control the biological growth. Close monitoring of the effect of the biocide should be maintained.	R.A. Engelhardt	Noted. The Central Conservation Section of LCSD has been monitoring the effect closely.
10. Residue of chalk is suspected to be found on the carving.	V. Magar A. Thorn	Noted. The Central Conservation Section of LCSD will assist to assess

Recommendations / Comments	Consultants	Follow up actions/ Responses
		the contamination and remove the residues if necessary.
11. A company or local villagers should be contracted to monitor and manage the site and its facilities when required.	W. Meacham	Noted. AMO has arranged a contractor to keep the site clean regularly.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
12. Finding of geo-technical solutions to stabilizing the slope and supporting plinth	R.A. Engelhardt	Noted. AMO will invite CEDD to give technical advice.
13. Monitoring of the condition of the engraving surface by 3D laser scanning	R.A. Engelhardt	Noted. AMO will keep track of the change of the rock carving and the cracks by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
14. Monitoring of the condition of the engraving surface and the cracks at the base of the overhanging rock	V. Magar	

4. Rock Carving at Shek Pik

Shelter of the Rock Carving

Part of the Rock Carving is buried by soil

Refuse collection point at the entrance of the Rock Carving site

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. The cement water diversion dam will leach out soluble salts and affect the rock surface.	V. Magar W. Meacham A. Thorn	Agreed. ArchSD will reconstruct the dam with suitable material.
2. The cement water diversion dam should be reconstructed with small stones, lime-based mortar and applied clay layer on the drainage channel.	V. Magar	
3. The cement water diversion dam should be reconstructed with siliceous grout.	A. Thorn	

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
4. Geo-technical study on water infiltration	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Carving at Shek Pik and the other sites will be arranged.

■ ***Medium-term Recommendations***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Construction of a better- designed shelter and visitor interpretation kiosk	R.A. Engelhardt	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
6. Provision of more interpretative facilities for visitors	V. Magar	
7. Provision of more visual and interpretative information of the rock carving	W. Meacham	

Recommendations / Comments	Consultants	Follow up actions/ Responses
8. The refuse collection point should be relocated further away from the site.	R.A. Engelhardt V. Magar W. Meacham	Correctional Services Department cleaned up the surrounding area of the rock carving **(Photos 3 and 4 in Annex F)**. Renovation works of the refuse collection point will be arranged by ArchSD and completed by end 2011 tentatively.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
9. The existing shelter cannot cover the entire rock carving and it should be redesigned to provide better protection for the site. Any protective structure should prevent visitors from touching the carved rock face, but should not block any natural elements such as wind, rain, sunshine and sea spray.	W. Meacham	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.
10. All concrete should be removed from the rock outcrop in the surrounding area of the rock carving.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.
11. Removal of the soil to expose the buried part of the carving	V. Magar W. Meacham	Noted. It will be deliberated in the new protective facilities.
12. Draining water away from the shelter by leveling the soil around the site	V. Magar	Noted. AMO will invite CEDD to give technical advice.

Annex E

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
13. Provision of alternative access to the site or construction of a physical barrier to separate the rock carving from the prison compound	R.A. Engelhardt	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
14. Application of biocide if contamination with micro-organisms is identified.	R.A. Engelhardt	Noted. The Central Conservation Section of LCSD has been monitoring the effect closely.
15. The application of biocide appears to control the growth of micro-organisms on the rock carving. Periodic monitoring should be undertaken.	V. Magar	
16. There is some degree of friability. Consolidation of the rock carving with ethyl silicate could be considered.	A. Thorn	Noted. The Central Conservation Section of LCSD will carry out the consolidation treatment as recommended.
17. Improvement of the housekeeping and maintenance of the site	R.A. Engelhardt	Agreed. AMO has increased the frequency of site inspection and housekeeping work.
18. Accumulated vegetation litter and soil will block the drainage channel and lead to water overflow on the carving surface. Periodic maintenance is required.	V. Magar	Noted. AMO has arranged a contractor to clean the drainage channel regularly.

Annex E

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
19. Monitoring of the carving surface by using 3D laser scanning	R.A. Engelhardt	Noted. AMO will keep track of the change of the rock carving by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
20. Monitoring of the carving surface by using photographic record and 3D laser scanning	V. Magar	

5. Rock Carving on Kau Sai Chau

Front view of the shelter

Landscape of the surrounding area

Front view of the Rock Carving after removal of the shelter

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Although the site is located in a remote area, the shelter may draw the vandals' attention. It is recommended to remove the shelter and maintain the routine site maintenance works.	R.A. Engelhardt V. Magar W. Meacham A. Thorn	Noted. ArchSD removed the shelter in June 2011 **(Photos 5 and 6 in Annex F)**. AMO will continue monitoring the site frequently.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
2. Geo-technical study on water infiltration and its effects on slope stability is required.	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Carving on Kau Sai Chau and the other sites will be arranged.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
3. Provision of more visual and interpretative information of the rock carving	W. Meacham	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
4. Removal of all infrastructure and reduction of the signage to a discreet locally visible sign	A. Thorn	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Periodic monitoring of the bio-growth on the rock surface is needed. Application of an appropriate biocide if contamination of micro-organisms is identified.	R.A. Engelhardt	Noted. The Central Conservation Section of LCSD has been monitoring the site closely.
6. Keeping vegetation away from the carving surface	V. Magar A. Thorn	Agreed. AMO has arranged a contractor to clear vegetation regularly.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. Monitoring of the rock carving surface closely by 3D laser scanning	R.A. Engelhardt	Agreed. AMO will keep track of the change of the rock carving by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
8. Monitoring of the rock carving surface closely	V. Magar	
9. Monitoring of the rock carving surface closely by photographic records and 3D laser scanning	W. Meacham	
10. Stabilization of the rock above the carving so as to protect the rock carving from failing rock	R.A. Engelhardt	Noted. AMO will seek CEDD's technical advice.

6. Rock Carvings on Cheung Chau

Shelter of the Rock Carvings

Planter above the Rock Carvings

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Removal of all cement capping on the surface of the rock around the carving	V. Magar A. Thorn	Noted. The Central Conservation Section of LCSD removed the cement capping in June 2010 **(Photos 10 and 11 in Annex F)**.
2. Replacement of the cement water diversion dam with stone, lime-based mortar and clay	V. Magar	Agreed. ArchSD will reconstruct the dam with suitable material.
3. Fixing the water leakage problem with the shelter's roof as it led to the strips of micro-organisms growth right under the joints.	V. Magar	Noted. The shelter was repaired in January 2011 **(Photo 9 in Annex F)**.
4. Solving the water seepage problem caused by the planter of a hotel above the site	R.A. Engelhardt A. Thorn	Noted. The hotel removed some plants and stopped watering the planter from May 2010 **(Photos 7 and 8 in Annex F)**.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Geo-technical study on water infiltration and its effects on rock surface is needed.	R.A. Engelhardt A. Thorn	Agreed. CEDD has studied the hydrological condition of the rock carvings on Cheung Chau and Po Toi. Study on other sites will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
6. The glass enclosures will create a micro-climate around the rock carving and should be replaced.	R.A. Engelhardt	The in-situ environmental data collected by the Central Conservation Section of LCSD reveal that the micro-climate within the enclosure follows the same patterns of the ambient condition.

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. The glass enclosures will create a micro-climate around the rock carving and should be replaced, since they clearly prevent rain and sea spray, and partially block wind and sunshine, from reaching the carving.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
8. The glass enclosures should be retained due to the high visitor traffic in the vicinity of the site.	A. Thorn	
9. The installation of CCTV to monitor the site is recommended.	W. Meacham	Noted. Difficult to implement due to site constraint.

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
10. Removal of all stone rubble structures at the viewing platform and reinstatement of the natural setting of the site	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
11. Degradation or de-lamination of rock surface is noted on the upper part of the slope.	R.A. Engelhardt V. Magar W. Meacham A. Thorn	The Central Conservation Section of LCSD would study the cause and identify suitable preservation and conservation methodology.
12. Periodic monitoring of the bio-growth on the rock surface is needed. Application of an appropriate biocide if contamination of micro-organisms is identified.	R.A. Engelhardt	Agreed. The Central Conservation Section of LCSD has been monitoring the site closely.
13. Increasing the frequency of site inspection and housekeeping work	W. Meacham	Agreed. AMO has increased the frequency of site inspection and housekeeping work.

Annex E

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
14. Monitoring of the rock carving surface by 3D laser scanning	R.A. Engelhardt	Agreed. AMO will keep track of the change of the rock carving by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
15. Monitoring of the rock carving surface periodically	V. Magar	

7. Rock Carving at Lung Ha Wan

Protection screen of the Rock Carving and the railings nearby

Staircase leading to the Rock Carving

Front view of the Rock Carving after removal of the protection screen

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. The Perspex screen does not protect the rock and affects visitors' appreciation of the engraving. A better-designed shelter and visitor interpretation kiosk with supportive facilities should be constructed.	R.A. Engelhardt	Agreed. ArchSD has removed the screen **(Photos 12 and 13 in Annex F)**. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and the improvement work, based on the consultant's recommendations, will be arranged.
2. The Perspex screen does not protect the rock and affects visitors' appreciation of the engraving. It should be removed.	W. Meacham	
3. The Perspex screen does not protect the rock and affects visitors' appreciation of the engraving.	A. Thorn	

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
4. Geo-technical study on water infiltration and its effects on rock surface is needed.	R.A. Engelhardt	Agreed. CEDD studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Carving at Lung Ha Wan and the other sites will be arranged.

■ ***Medium-term Recommendations***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Improvement of visitor facilities and enhancement of the interpretation of the rock carving	V. Magar	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the

Recommendations / Comments	Consultants	Follow up actions/ Responses
6. The size of the viewing platform is too small for visitors.	A. Thorn	comments into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. Removal of all the facilities from the site, and it is proposed that the site be reduced to a recorded site with no infrastructure.	W. Meacham	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
8. It is proposed that the site be reduced to a recorded site with no infrastructure.	A. Thorn	

Conservation Measures

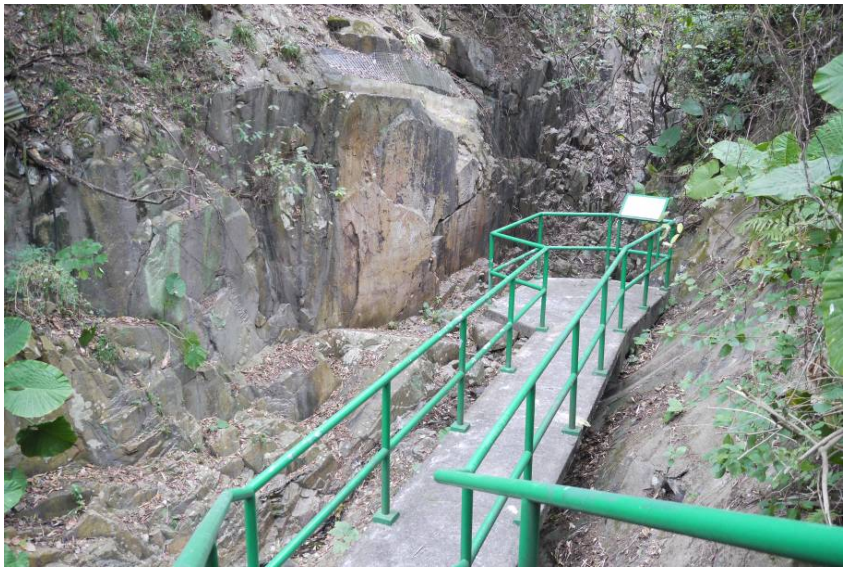
Recommendations / Comments	Consultants	Follow up actions/ Responses
9. The water repellent (siloxane) treatment remains and is still visible on the rock surface: they form a greylish layer, now peeling off in various areas. There is an undergrowth of microorganisms under treated areas.	V. Magar	Noted. The Central Conservation Section of LCSD has been monitoring the site closely.
10. Siloxane (chemical compounds) applied to the rock was not well absorbed as the rock (Rhyolite) is very dense, leaving gray residues on the rock surface. Future treatments required suitable dilution of the chemical.	A. Thorn	
11. Periodic monitoring of the bio-growth on the rock surface is needed. Application of an appropriate biocide if	R.A. Engelhardt	Agreed. The Central Conservation Section of LCSD has been monitoring the site closely.

Recommendations / Comments	Consultants	Follow up actions/ Responses
contamination of micro-organisms is identified.		
12. Stopping chemical treatment on the carving	W. Meacham	The Central Conservation Section of LCSD will continue to monitor the effect of the treatment closely.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
13. Monitoring of the site by 3D laser scanning	R.A. Engelhardt	Noted. AMO will keep track of the change of the rock carving by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
14. Monitoring of the site by photographic records and laser scanning	V. Magar W. Meacham	

8. Rock Carvings at Wong Chuk Hang



Walkway to the viewing platform of the Rock Carvings

Viewing platform of the Rock Carvings

Water diversion dam with mesh placed above the Rock Carvings

Annex E

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Reconstruction or removal of the cement water diversion dam above the rock carving if there is evidence of leaching of concrete and soluble salts down to the rock carving surface.	R.A. Engelhardt	Agreed. ArchSD will replace the dam with suitable material.
2. Reconstruction of the cement water diversion dam above the rock carving if there is evidence of leaching of concrete and soluble salts down to the rock carving surface.	A. Thorn	
3. Removal of the cement water diversion dam above the rock carving because it is ineffective to drain water away and the cement has deleterious effects over the long term.	W. Meacham	

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
4. Geo-technical study of water infiltration	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Carvings at Wong Chuk Hang and the other sites will be arranged.

■ ***Medium-term Recommendation***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Provision of more interpretative information of the rock carving	R.A. Engelhardt V. Magar W. Meacham	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged.

■ ***Long-term Recommendation***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
6. Clearing the remnants of squatter huts and concrete capping on the slope. It should be planted with low brush or vegetation to increase the slope stability and water absorption.	W. Meacham	Noted. AMO will seek CEDD's technical advice.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. Monitoring of the growth of micro-organisms and the chemical treatments on the rock carving surface	R.A. Engelhardt V. Magar W. Meacham	Noted. The Central Conservation Section of LCSD has been monitoring the site closely.
8. Application of appropriate biocide if contamination with micro-organisms is identified.	R.A. Engelhardt	
9. Discontinuation of the treatment of the rock carving with chemicals	W. Meacham	The Central Conservation Section of LCSD will continue to monitor the effect of the treatment closely.
10. Control of the moss growth by consulting an expert	W. Meacham	Noted. AMO will invite an expert to give advice.

Recommendations / Comments	Consultants	Follow up actions/ Responses
11. Improvement of the housekeeping and maintenance of the site	R.A. Engelhardt V. Magar	Noted. AMO has increased the frequency of site inspection and housekeeping work.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
12. Monitoring of the site by 3D laser scanning	R.A. Engelhardt	Noted. AMO will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
13. Adoption of an alternative method to stabilize the hill slope above the carving, including plant re-growth, should be considered to avoid leaching of soluble salts to the rock carving surface.	A. Thorn	Noted. AMO will seek CEDD's technical advice.

9. Rock Inscription at Joss House Bay

Protection screen of the Rock Inscription

Surrounding area of the Rock Inscription

Visitor facilities of the Rock Inscription

■ ***Short-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
1. Removal of the cement water diversion dam above the rock inscription if it cannot divert water.	R.A. Engelhardt	Agreed. ArchSD removed the dam in August 2011 **(Photos 14 and 15 in Annex F)**.
2. Removal of the cement water diversion dam above the rock Inscription	V. Magar	

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
3. Geo-technical study on water infiltration and its effects on rock surface is needed.	R.A. Engelhardt	Agreed. CEDD has studied the hydrological condition of the rock carvings on Po Toi and Cheung Chau. Study on the Rock Inscription at Joss House Bay and other sites will be arranged.
4. The rock type should be identified before deciding further conservation and management strategy.	W. Meacham	Agreed. CEDD has studied the geology of all the sites and submitted a preliminary report in January 2010.

■ ***Medium-term Recommendations***

Visitor Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
5. Enhancement of interpretative and visitor facilities	V. Magar	Agreed. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
6. Enhancement of interpretative and visitor facilities plus better maintenance of the area	W. Meacham	

■ ***Long-term Recommendations***

Protection Facilities

Recommendations / Comments	Consultants	Follow up actions/ Responses
7. The Perspex protective screen affects visibility of the inscription.	V. Magar W. Meacham A. Thorn	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comments into account and improvement work, based on the consultant's recommendations, will be arranged.
8. The Perspex protective screen cannot provide sufficient protection to the inscription. It should be replaced with a glass window set in a stainless steel frame.	W. Meacham	
9. Introduction of a psychological barrier to ensure sufficient distance for visitors to stand and have a clear view of the inscription without causing physical disturbance to the site.	V. Magar	
10. The Perspex protective screen creates a micro-climate in front of the inscription and should be removed. A better-designed protective shelter with visitor interpretation facilities should be constructed.	R.A. Engelhardt	Noted. The consultant commissioned by AMO to design new protection and visitor facilities will take the comment into account and improvement work, based on the consultant's recommendations, will be arranged. Furthermore, repeated climatic studies have been carried out by the Central Conservation Section of LCSD within the shelter and no notable deviation from the patterns of the ambient condition has been found.

Conservation Measures

Recommendations / Comments	Consultants	Follow up actions/ Responses
11. The surrounding environment favors the growth of micro-organisms.	R.A. Engelhardt A. Thorn	Agreed. The Central Conservation Section of LCSD has been monitoring the site closely and applying ethanol

Recommendations / Comments	Consultants	Follow up actions/ Responses
12. Application of an appropriate biocide if contamination with micro-organism is identified and its effect should be closely monitored.	R.A. Engelhardt	periodically on the rock surface to control the bio-growth.
13. Ethanol is suggested as an alternative element to control the bio-growth.	A. Thorn	
14. Stopping treatment of the inscription by chemical. It is preferable to clean the inscription by gentle mechanical means.	W. Meacham	The Central Conservation Section of LCSD will continue to monitor the effect of the treatment closely.
15. If the current cleaning treatment is effective, it should be reused periodically to control the biological growth on the inscription. The cleansing should also be extended to the entire boulder surface.	V. Magar	Noted. The Conservation Section of LCSD has been monitoring the site closely.
16. Improvement of the housekeeping and maintenance of the site	R.A. Engelhardt	Agreed. AMO has increased the frequency of site inspection and housekeeping work.

Baseline Studies

Recommendations / Comments	Consultants	Follow up actions/ Responses
17. Monitoring of the site by 3D laser scanning	R.A. Engelhardt	Agreed. AMO will keep track of the change of the rock inscription by photographic record and will commission a contractor to collect data by 3D laser scanning to construct digital, three dimensional models for monitoring the monument.
18. Monitoring of the inscription	V. Magar	

Annex F

Photos of Improvement Works carried out
in connection with Rock Carvings and Inscription

Rock Carving at Big Wave Bay

Photo 1: Water diversion dam above the Rock Carving

Photo 2: After removal of the water diversion dam

Rock Carving at Shek Pik

Photo 3: Refuse collection point at the footpath leading to the Rock Carving site

Photo 4: After cleaning up of the refuse collection point

Annex F

Rock Carving on Kau Sai Chau

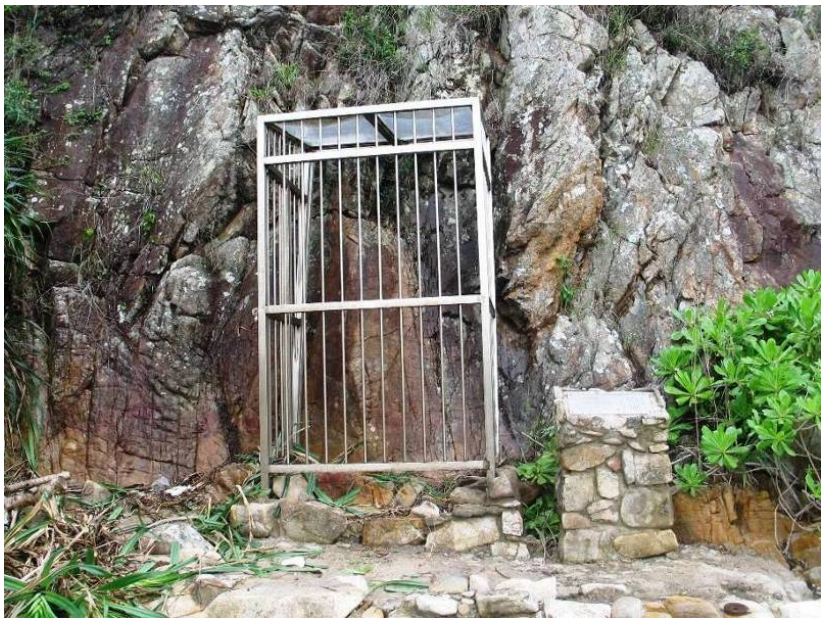


Photo 5: Shelter of the Rock Carving

Photo 6: Rock Carving after removal of the shelter

Rock Carvings on Cheung Chau

Photo 7: Planter above the Rock Carvings

Photo 8: Planter after removal of some plants

Photo 9: Re-seal of the glass roof to stop the water leakage

Rock Carvings on Cheung Chau

Photo 10: Cement capping at the base of the Rock Carvings

Photo 11: Rock Carvings after removal of the cement capping

Rock Carving at Lung Ha Wan

Photo 12: Protection screen of the Rock Carving

Photo 13: Rock Carving after removal of the protection screen

Annex F

Rock Inscription at Joss House Bay

Photo 14: Water diversion dam above the Rock Inscription

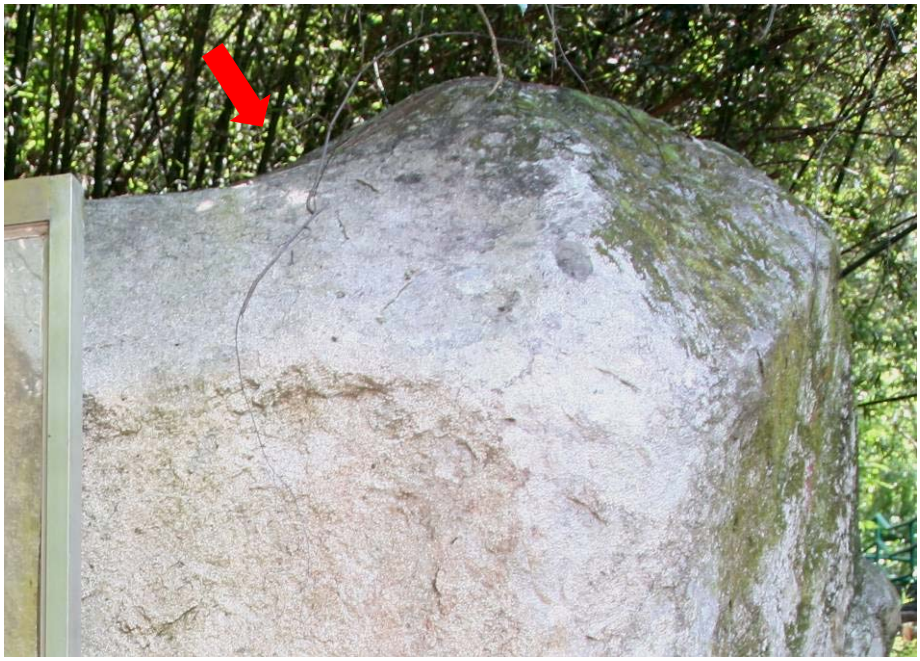


Photo 15: After removal of the water diversion dam