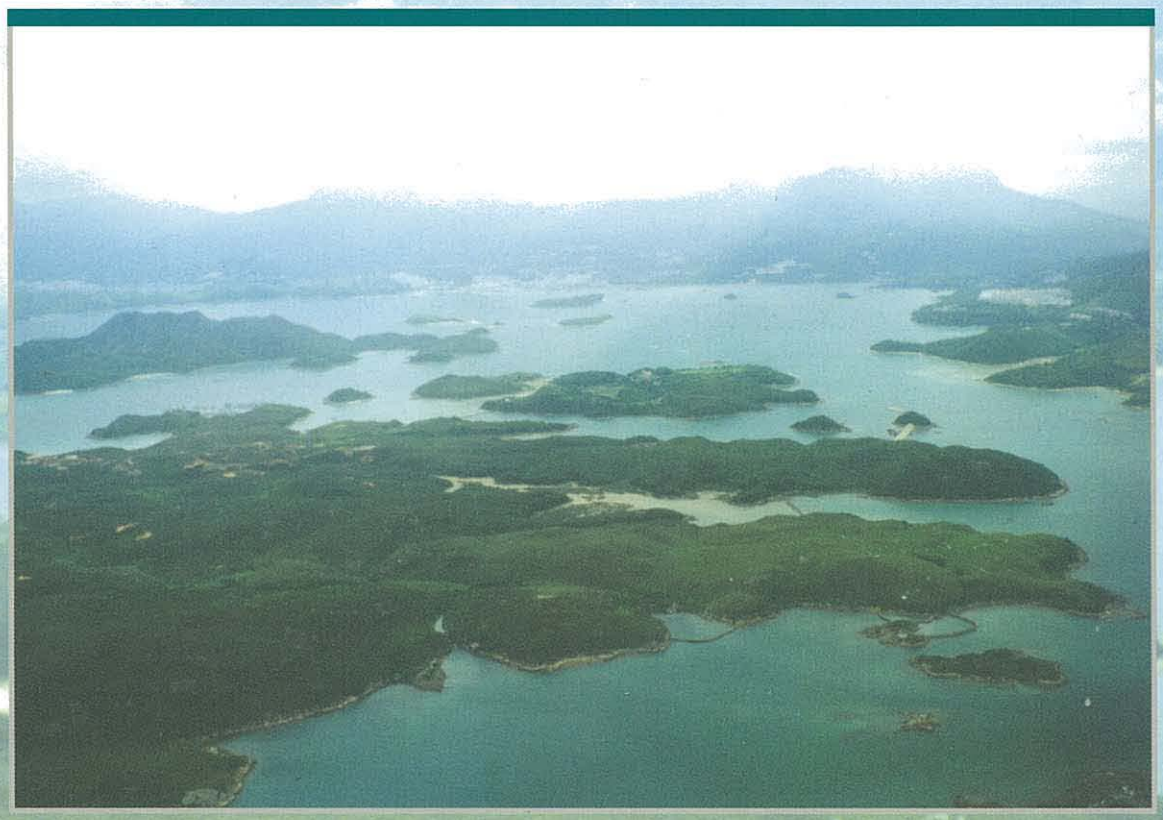
The Royal Hong Kong Jockey Club
英皇御准香港賽馬會

THE HONG KONG GOLF CENTRE

KAU SAI CHAU



Environmental Impact Assessment

Executive Summary

April 1994

AXIS Environmental

AXIS Environmental Consultants Ltd.

Contents

E1 INTRODUCTION

E1.1 Background

The Hong Kong Government proposes to develop the northern part of Kau Sai Chau for a public golf course. The golf course development comprises a 36 hole golfing facility with club house, driving range and practice facilities including a golf instruction academy. The location of the development is shown in Figure 1. The course will be developed and managed by the Royal Hong Kong Jockey Club (RHKJC).

The key issues identified during the consultation process were:

1. Treatment and/or re-use of sewage effluent generated by the project;
2. Assessment of impacts from the transport and traffic systems;
3. Potential loss of mangrove habitat due to construction of an irrigation reservoir;
4. Archaeological artifacts in proposed disturbance areas;
5. Potential construction and operation impacts to nearby mariculture sites;
6. Turfgrass management and application of chemicals.

This Executive Summary encapsulates all the major issues dealt with in the environmental impact assessment for the Kau Sai Chau project, including those dealt with in response to Government comments.

E1.2 Environmental Design and Assessment

Whereas the overall concept of the development and its feasibility were established at an early stage in the study process, the detailed designs for many of the engineering aspects were not finalised at this time. Therefore it was possible to feed back the results of the EIA process into the design process as part of an iterative design/assessment/redesign process.

This pro-active approach to the assessment has been adopted so that environmental design criteria, established at the outset of the Project, are incorporated to ensure an environmentally led form of development. This ensured that environmental problems were designed out of the Project through the master plan and not simply regarded as residual impacts to be mitigated by additional measures following completion of the plan. Most of the holes will be accommodated naturally into the terrain and will utilise the shapes of the surrounding land as a template for the course.

E1.3 Existing Environment

Kau Sai Chau is the fifth largest island in Hong Kong and the largest island off the eastern coast of the New Territories. The island is located in the centre of Port Shelter and forms a central feature with its mountain peaks rising to over 200m. The island has two distinct areas. The northern sector is comparatively low with a series of ridges and valleys forming two drainage systems flowing north and east to the coast. In contrast, the southern portion rises steeply from the coast line to three distinctive peaks.

The rugged coastline reflects the deep gullies which cross the island. Some gullies culminate in small waterfalls at the coast. The gullies gather rainfall in small streams which pass through corridors of diverse but poorly developed scrub/woodland. Elsewhere Kau Sai Chau has no substantial vegetation other than grass and low scrub. The vegetation has been limited by two agents; hill fires and explosives.

Numerous grave sites on the northeast headland of the island have probably been the source of frequent wild fires which have precluded establishment of shrubs and trees. Massive erosion from the craters caused by artillery practice (from 1936-1975) has created a "moonscape" over a large area of the island where pioneer vegetation has not been able to get a foothold, and severe erosion has occurred. However much of the coastal vegetation has continued to function despite these influences. Significant areas of mangrove and diverse high scrub/low canopy woodland still occur in the inlets and along the coastal slopes.

The island's undeveloped character contributes significantly to the natural vistas of Port Shelter. Together with the Sai Kung Country Park and many small islands nearby, Kau Sai Chau forms a key component of the Port Shelter archipelago in its role as one of the foremost coastal recreational resources for Hong Kong.

Current and Former Land Use

Kau Sai Chau is undeveloped, and almost completely uninhabited, apart from the settlement at Kau Sai on the southern tip of the island. The permanent settlement at Kau Sai appears to be based on commercial fishing and fish-farming being near a fish culture zone, off the south shore of the island. There are also three other fish culture zones on the island. There are also several privately owned plots (abandoned farms) which are located in the east-central portion of the island. Overhead electric power lines cross the island from Yim Tin Tsai to Kau Sai.

The artillery practice range appears to have been located mainly on the west-central portion of the island, but extending across the island to the southeast shore as well. Because of the risk of unexploded ordnance there are signposts advising visitors of the danger and warning them to remain off the island. Access to Kau Sai Chau is limited, and recreation on and near the island is based on hiking, orienteering, and water sports. Kau Sai Chau is also a popular mooring site for pleasure boats on weekends.

Historic and Cultural Resources

There is evidence of Bronze Age settlement on the island indicating that Kau Sai Chau has been subjected to a number of land uses, possibly dating back to early human settlement some 3000 years ago. Archaeological evidence suggests settlements near the larger inlets and at the upper end of Kwat Tau Tam inlet. Historic rock carvings are

prominent at a site on the northwest side of the island. The main rock carving, which is a declared monument (Antiquities and Monuments Office), is marked on Hong Kong countryside series maps. There are also three other sites on the island which have yielded stone artifacts on past archaeological surveys.

E2 PROJECT DESCRIPTION

E2.1 Course Facilities

Golf Course

The development is planned for an area of about 158 ha, located towards the northern, low lying half of the island. The central feature will be two 18 hole public golf courses, served by compact but fully equipped supporting club facilities (Figure 2). In addition there will be a golf teaching and practice area. The golf courses will be constructed to a standard that will allow championship play, and it is anticipated that international tournaments will be held occasionally. The longer course is intended to be more challenging, and suited for experienced golfers. The shorter course will be more suited to inexperienced golfers.

The development has a capacity of up to 640 playing golfers/day. Additional golfers could also be accommodated in golfing schools or on the driving range. The total players, visitors, caddies and staff indicate a maximum daily population of about 1440. Powered golf carts will not be used on the courses, therefore there will be no requirement for hard-surfaced cart paths.

A key design criterion was to balance the areas of slopes to be cut with those to be filled (cut and fill), in order to minimise earthworks and the need to import filling materials. The course has been designed to fit into the existing landscape and to utilise natural features as far as possible. Areas outside the immediate playing areas will be left untouched except where there is erosion due to bomb damage or wild fire. These eroded areas will be revegetated with local species for stability, to reduce erosion and improve their scarred appearance. The external view of the golf courses will be obscured by the steeply rising slopes at the shoreline and the rolling terrain of the island.

Club House

The clubhouse comprises a single building which will house locker rooms, a pro shop, a restaurant and administrative offices. The design, layout, and construction materials of the clubhouse have been selected to be minimally intrusive within the landscape and visual context of Kau Sai Chau. The central location of the proposed club house and practice area, at an elevation of 40m, means it would be obscured from close external sea level views by its inland location.

The building will have two levels and is envisaged to have a modern design with all modern conveniences but traditional Oriental character. It is proposed that rock walls and natural tone walls and roof would be used extensively to be sympathetic with the Kau Sai Chau land form. Landscaped planting of shrubs and other vegetation around the club house will moderate the scale of the development and reduce the visual impact of the building. Indigenous species would be used as far as possible for landscaping.

Other Main Buildings

A maintenance workshop and course superintendents administration office will be constructed to include garage facilities for vehicles and equipment, stores, water treatment plant, irrigation control system and sewage treatment plant. Accommodation will be provided for a small number of resident staff, such as the golf course manager and superintendent as well as the maintenance supervisor and several maintenance staff. Separate dormitory accommodation (male and female) would also be provided for about 30 roster staff. A staff canteen would also be provided.

Access Road and Footpaths

A paved roadway of approximately 0.8km in length will be constructed from the jetty location to the clubhouse. Because there will be no internal traffic on the island except golf course maintenance equipment and shuttle buses, there will be no hard surfaced roads other than the access road. The route from the jetty to the clubhouse will be served by several shuttle buses which will be equipped to carry passengers and their golf equipment.

The interconnecting footpaths between the fairways and around the development would be kept as natural as possible. Gravel paths of 1.0 metre width would be used on the busiest paths, or areas that begin to show heavy wear. Where footbridges are required, these would be built of stone, timber or steel framework with suitable timber finish. Rubber matting would be used over timber or steel decking, to accommodate golf shoe spikes.

E2.2 Access to Kau Sai Chau

Ferry Access

Access to the island will need to be improved and the preferred method of transport is by ferry. Four potential pier sites were identified. Three were within the Sam Nga Hau typhoon shelter and one on the western coastline Kau Sai Chau. As an alternative the feasibility of constructing a vehicular bridge was also considered, but subsequently rejected on a number of environmental grounds. A scheduled ferry service is proposed for public access to Kau Sai Chau from Sai Kung. The ferry would operate at about 15 minute intervals from Sai Kung to the north-west coast of Kau Sai Chau.

Jetty

A jetty is proposed on the northwestern shoreline of Kau Sai Chau. The jetty will be some 80m in length, 3m wide and with a 20m long by 6m wide pier head facilitating berthing on both sides. The site is readily accessible without dredging and is close to the clubhouse and facilities. The jetty has been designed to accommodate foot passengers as well as small vehicles for the landing of plant and stores.

Parking at Sai Kung

The adequacy of parking facilities at Sai Kung has been investigated. Golf course traffic and parking demand is typically relatively low due to the even spacing of traffic throughout the day. However, it is anticipated that additional parking facilities will be needed at Sai Kung. Discussions are taking place between the RHKJC and Government on car parking requirements and potential sites in Sai Kung. Two principal options have been identified, one to the north-east of the Sai Kung pier, and another at Tui Min Hoi.

E2.3 Infrastructure

Water Supply

Water would be supplied by use of a dam across Kwat Tau Tam inlet to provide the water storage for the golf course irrigation and potable uses. The detail of the dam and discussion of the other options is described in Section E3.1.

Sewage Treatment

It is proposed that a package treatment plant would be used, and the treated effluent from the plant would be used for watering and fertilising certain of the holes. The detail of the sewage treatment plant and discussion of the other treatment and disposal options is described in Section E3.2.

Power Supply

Kau Sai Chau is supplied with electric power by a China Light & Power submarine cable. This supply system will be evaluated with reference to projected power requirements of the development, and additional submarine cable(s) will be installed if needed.

E2.4 Waste and Emissions Management

The waste generated by the operation of the golf course, restaurant and staff quarters would be of a household/commercial nature. These wastes would be disposed of to a Government landfill. Sewage sludge arising from the sewage treatment plant would be disposed of to Sai Kung Sewage Treatment Works. Small quantities of waste arising from vehicle and equipment maintenance areas would be classified as chemical wastes. A philosophy of reduction, re-use and recycling will be adopted in the operation of the golf course.

Owing to the remoteness of the site, noise is not considered to be an issue. Similarly air pollution nuisance from construction activities is unlikely, however in dry and windy weather fugitive dust emissions could be significant. Dust can be reduced to acceptable levels by the frequent application of water to access roads and exposed areas during the dry season.

E2.5 Construction Aspects

Construction Activities and Programme

The key engineering works can be divided into civil and building works. The main construction activities will span approximately two years. The longest duration construction project will be the golf courses, which will require 15 months. Clubhouse and other building construction will require 13 months. The construction programme is projected to begin in May 1994 with temporary site formation works, and all facilities are planned to be completed prior to December 1995. Construction projects involving substantial earth moving are scheduled to take place during the remaining autumn-winter dry seasons in 1993-1994 and in 1994-1995. This will reduce erosion and potential sedimentation during the construction period and allow fairway grass seeding before the heavy rains of the typhoon season.

Minimising Site Disturbance

The following constraints were applied to the design of the golf course:

- Avoidance of the shoreline/woodland habitats to reduce ecological as well as visual impacts. This ensures preservation of naturally vegetated buffer zones to hold back sedimentation of marine waters during construction and to absorb any nutrients which could potentially be carried from the golf course during storm events.
- Avoiding development of the northern headlands of the island to minimize visual impact and avoid disturbance of grave sites in that area.
- Minimization of excessive earthworks by confining the golf course to the northern half of the island. Massive cuts of steep ground would be required to "bench" fairways into hillsides on the southern side of the island.
- Avoiding the two southern areas where cultural artifacts have been recorded, and avoiding the western headland where the stone carving is located.

Within the remaining area the overall objective of course layout was to preserve as much as possible of the gently rolling, grassy or low shrub landscape because it was seen to be a significant resource in terms of natural beauty.

Landscaping

The landscaping would be confined mainly to the area around the clubhouse, and would be sympathetic with the natural low cover on the island. Species would be chosen that occur naturally on the island. It is proposed extensively to use "no-go" areas during consturction, so that areas other

Figure 1 Location **The Hong Kong Golf Centre – *Kau Sai Chau***

LEGEND Maximum Extent of Golf Course

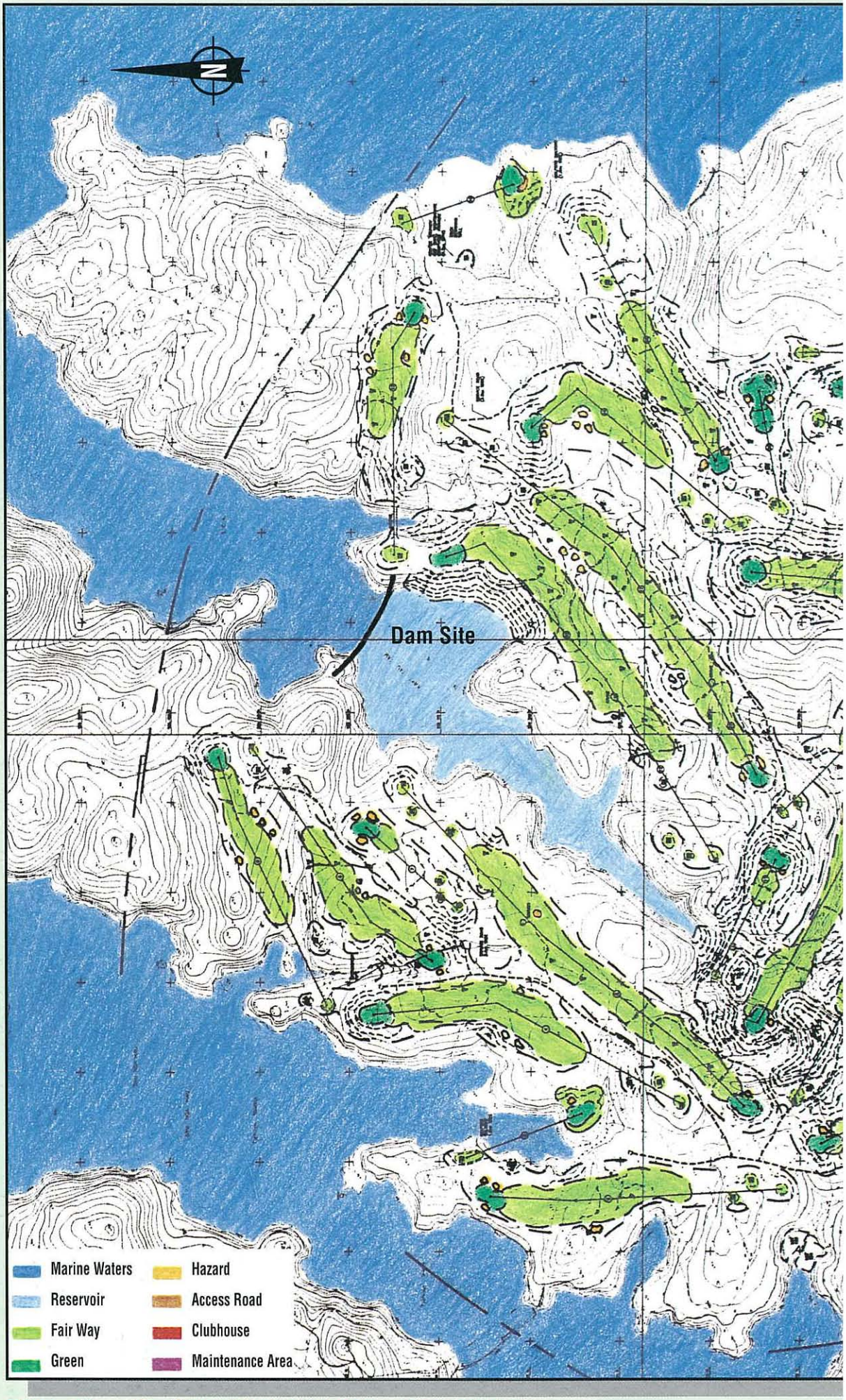
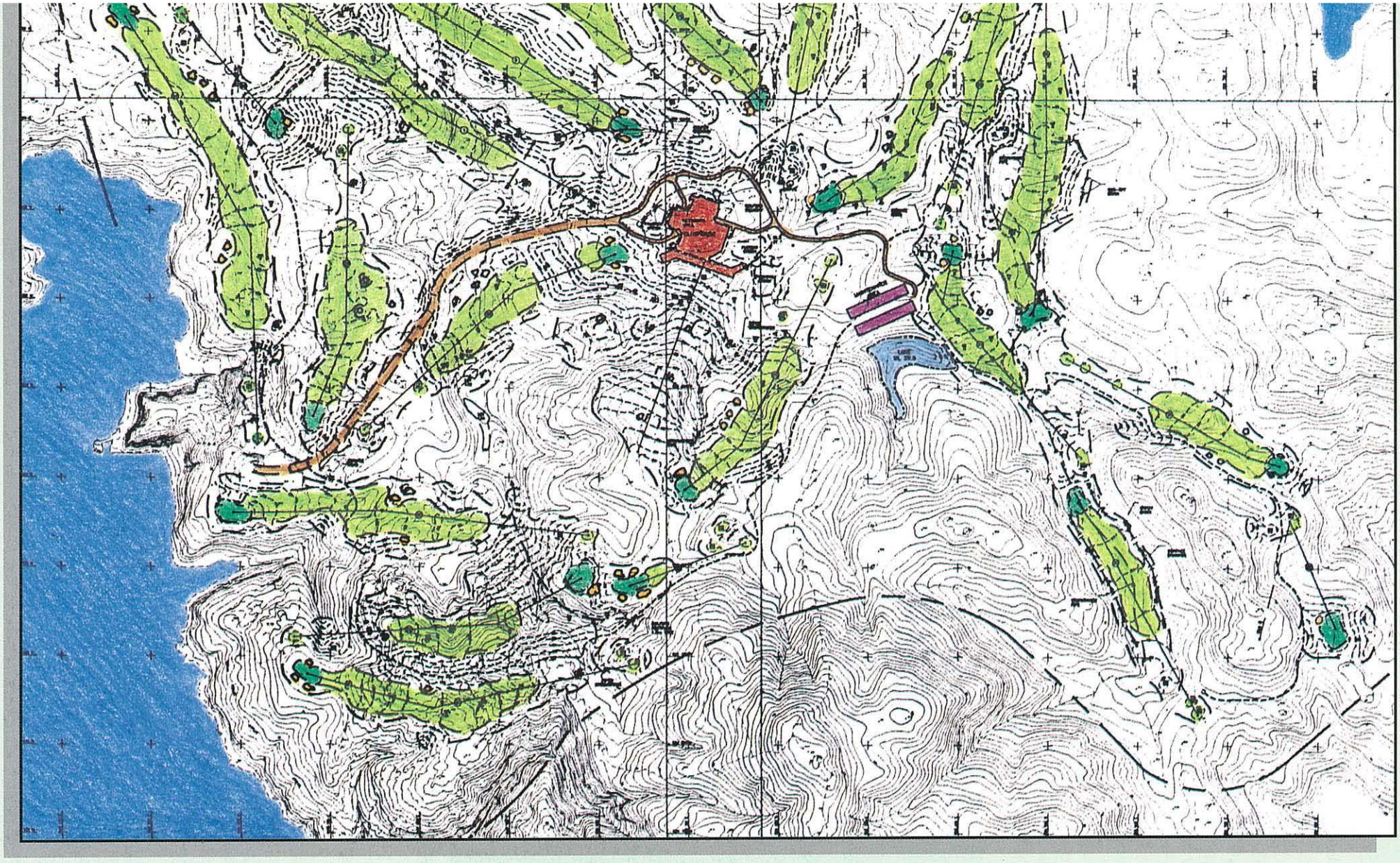


Figure 2 The Hong Kong Golf Centre – *Kau Sai Chau*
Master Layout Plan April 1994



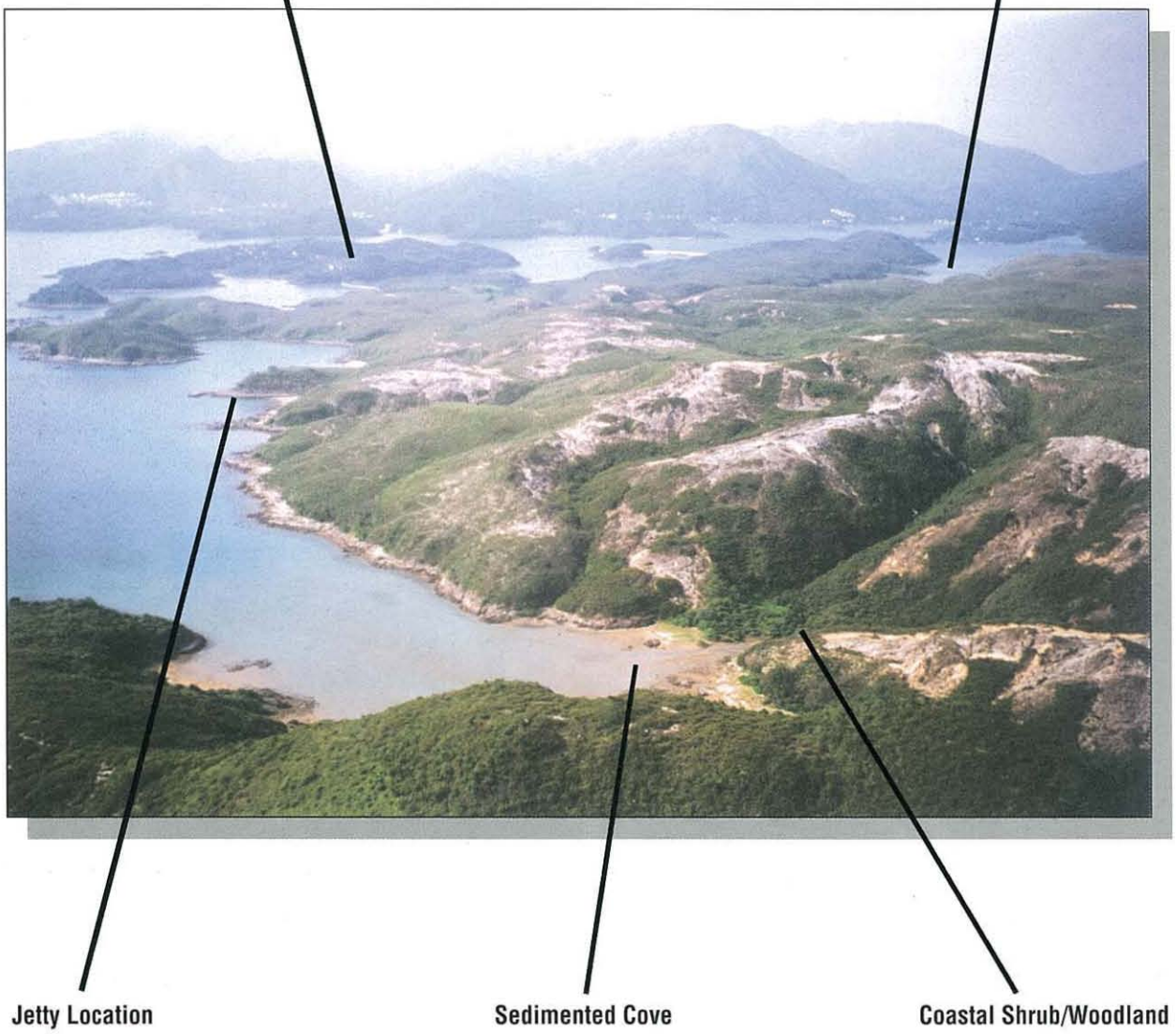


Figure 3 Aerial photo of west-central Kau Sai Chau

than the fairways and interconnecting paths are left natural and as undisturbed as possible. With this approach any areas subject to minor disturbance should recover naturally.

The golf couse would be developed to a landscape masterplan which provides for:

- the needs of the golfer for a varied and interesting game
- replacement planting to compensate for vegetation lost by filling the gullies
- planting for visual interest from within and outside the site
- cover and potential habitat for wildlife estalishment on a hitherto degraded landscape.

E2.6 Ordnance Clearance Activities

The RHKP Explosive Ordnance Disposal (EOD) Team have been approached to make a clearance sweep of the island to remove as much unexploded ordnance (UXO) as possible prior to the commencement of construction work. Should the EOD Team be unable to undertake this work, a private contractor will be engaged. However, because UXO is likely to be buried and may be missed during the clearance sweep, safety precautions and procedures have been issued by the Project Manager for use during the construction phase.

E2.7 Course Safety

The two principal aspects of concern in relation to course safety are risks of injury from stray golf shots, and the possible location of any more UXO. It is proposed that notices would be placed in Chinese and English at the pier advising of the hazards from stray-hit golf balls. The principal concern in relation to stray-hit golf balls is likely to be during the Ching Ming and Chong Yeung festivals, when there may be an influx of visitors to grave sites. On these days special arrangements may be necessary, such as the use of temporary signs and additional security staff to direct visitors to safe paths to gain access to grave sites.

In regard to UXO, the clearance sweep and construction activities would ensure effective removal of UXO. However, should there be any residual concerns, notices could be placed in Chinese and English at the pier advising the public to not disturb any unusual objects, and to report such objects to the Golf Course Management. Any such objects would be reported to the EOD Team for retrieval and disposal.

E3 WATER MANAGEMENT

E3.1 Water Supply System and Irrigation

Water Supply System

The various options for water supply to Kau Sai Chau were considered in detail. These options included mains water supply, desalination and various reservoir possibilities. Mains water supply was rejected because it is Water Supply Department policy that mains water should not be used for large-scale irrigation purposes. Desalination is impracticable. Thus a reservoir supply is required.

After careful consideration the selected site for the reservoir is Kwat Tau Tam, a steep sided narrow estuary. The refilling capability of this direct catchment was demonstrated to be insufficient to replenish the water demands of the development for the design period of the reservoir. Consequently, the stream draining to the east of the direct reservoir catchment area will be developed as an indirect catchment, to be diverted to the reservoir by use of an aqueduct.

The reservoir dam will be located upstream of the existing ruined dam structure. Conceptual designs for the dam and reservoir have been developed, and include earthfill and rockfill embankments. The crest elevation of the dam would be 14mPD, and the maximum water level would be 12mPD. The dam will be about 140m long. A package treatment plant, designed to meet Water Supply Department standards for potable water in Hong Kong, would be used for potable water treatment.

Potable Water and Irrigation Demand

A major component of the proposed development is the damming of the Kwat Tau Tam inlet to provide the water storage for the golf course irrigation and potable uses. The reservoir would provide a freshwater storage capacity of 420,000m^3 active storage and 150,000m^3 dead storage. Potable water is required to serve the clubhouse, residential accommodation and other facilities. It is estimated that about 4,600m^3/month (55,200m^3/year) is required to meet predicted demand. Existing potable water supplies on the island are minor, and will either be reprovisioned from the golf course supply or will be unaffected.

The irrigation demand for the golf course is estimated to be of between 3.5mm per day (105mm/month) for fairways and general areas, and 7mm per day (210mm/month) for greens and tees. The total irrigation water demand is estimated to be 305,000m^3/year. The total potable water and irrigation demand is thus estimated to be approximately 360,000m^3/year of the total demand, of which some 15% is for potable water supply.

E3.2 Sewage Treatment and Disposal

Several options are available for sewage treatment and disposal, including a soakaway, treatment and disposal from an outfall at the jetty, and effluent treatment and re-use. These options were compared at some length. A soakaway is impractical because of the low permeability of the soils on Kau Sai Chau. Treatment and disposal by an outfall is practicable, and was demonstrated to have a negligible impact on Port Shelter.

However, effluent re-use is in keeping with the concept for the project of self-containment and minimal environmental impact, and this is the chosen option. It is proposed that a package treatment plant would be used, and the treated effluent from the plant would be used for watering and fertilising certain of the holes. These holes drain away from

the reservoir, thus avoiding the possibility of contamination of the water supply.

E3.3 Site Drainage

The existing catchment areas (direct and indirect) are currently drained by natural stream courses, discharging ultimately into the waters of Port Shelter. Due to previous use of the site as a practice range for bombing and shelling, some areas of the island are badly eroded. The resulting silt load into Port Shelter is visible following storms on the island, and during the summer rainy season in general.

The primary reservoir catchment covers approximately 74 ha in the central and western parts of the island and currently drains to the proposed reservoir area and then to the sea. There are several tributary streams which drain the main catchment area and feed the Kwat Tau Tam inlet. The secondary catchment of 52 ha drains the eastern portion of the project area, and drains directly to the sea along the eastern shore of the island.

Existing stream courses will be maintained where possible, and will serve to direct surface flow to the reservoir. The site will require some regrading to replace the existing steep-sided gullies with a gently undulating surface in the area of golf fairways. In some areas regrading of the steep gullies will reduce erosion, and facilitate revegetation of burnt, bomb damaged and eroded sites. Surface drainage from the club-house area and other built-up surfaces will be integrated into the main golf irrigation system.

E3.4 Evaluation of Impacts

In order to mitigate the possible effects of eutrophication in the reservoir it is proposed to remove as much of the nitrogen from the drainage as possible. By introducing a weir or series of weirs at the head of the reservoir it is proposed that the dry weather flow to this area could be intercepted. Water in this pond would be recirculated for irrigation purposes and monitored to determine nitrogen levels and the need for supplementary fertilisation. Emergent macrophyte vegetation would be planted in the margins of the pond, and algae would become established in the ponds, which would utilise surplus nitrogen so reducing the load on the reservoir. Herbivorous fish species would be introduced to the ponds to crop off the algae. Excessive vegetative growth at the margins could be cropped off at intervals to keep the system free flowing. Certain of the ponds could also provide habitat for waterfowl.

If the predicted quantities of nitrate migrate into the water supply, the potable water criterion (10mg/l) would not be exceeded and nitrate levels would be at least an order of magnitude below the criterion. For the current drainage regime half of the holes would eventually drain towards the sea creating at least potentially a diffuse low level source of nitrogen. However, this would most likely be absorbed by the roughs and adjacent natural vegetation. The ambient levels of inorganic nitrogen in the surrounding waters are below the criteria for eutrophication and given the massive diluting effects it is unlikely that any impact would be detectable in the marine habitats.

During the construction of the golf course storm events could create significant erosion from the exposed areas with consequent effects on water quality in the area. Because of this potential problem the main construction activities are planned for the dry season. It also should be possible to restrict the amount of exposed area during the wet season, and the storm water could be intercepted and directed through silt traps/sedimentation ponds which would allow much of the loading to be retained on-site.

Overall the Project would have a minor impact on the Port Shelter Water Control Zone (WCZ). The fish culture zones are not expected to experience any impact from the project. It may be expected that there would be some deterioration in water quality in the immediate vicinity of the jetty from propeller wash from ferries and other boats. However any such deterioration would be expected to be very localised, with very little impact overall on the quality of the WCZ. The closest gazetted beaches are 2.5 to 3 km from the jetty. At this distance it is most unlikely that the project would have any effect on these beaches.

E4 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

The newly created reservoir, the pier, the golf courses and associated buildings and facilities will alter the uninhabited and undeveloped character of Kau Sai Chau. Views to and from Kau Sai Chau will inevitably be affected. However, the course layouts do not encroach significantly upon the steeply sloping and well vegetated coastal zone, although the jetty and access road will result in limited landscape impacts to the western coastline.

The primary visual envelope for the Kau Sai Chau development extends westward to the crest of the Kiu Tsui Chau island ridge, north to the Sai Kung Country Park and eastwards to Tai Tau Chau and High Islands. A secondary distant visual boundary relates to the Tseung Kwan O peninsula and the skyline mountain ridges of the Ma On Shan and Sai Kung Country Parks. The visual impacts will initially be moderate and will gradually decrease to low as the course matures. By the tenth year the impact will be low.

The principal landscape impacts likely to arise from the proposed development relate to the filling of natural gullies with material removed from within the course area (i.e. balancing cut and fill). This major disturbance of natural landform will involve the loss of some areas of woodland and scrubland within the gullies and in particular the filling of the scenic upper reaches of the Kwat Tau Tam Valley. The loss of this self-contained valley ecosystem would represent a locally significant landscape and ecological impact. These losses will compensated for by planting elsewhere on the site.

The parallel orientation of several holes across the natural grain of the landscape at the upper end of the Kwat Tau Tam valley may involve the total loss of this feature. In addition, the damming of the Kwat Tau Tam inlet to a depth of 12m will result in a significant landscape impact on the boulder, shrub and mangrove covered coastline. The golf course has been designed with the express aim of minimising site disturbance as much as possible, and areas of the golf course that have been previously degraded by erosion and fire would be progressively rehabilitated.

E5 ECOLOGY

The principal ecological concern is in relation to mangroves. The significance of mangroves has been widely documented in the scientific literature and Hong Kong's pre-eminent nature conservation site, Mai Po Marshes, was established to protect one of the largest mangrove ecosystems on the South China coast. Because Hong Kong is located on the northern limit of the range of mangrove species, local mangrove trees are typically dwarf. The Hong Kong government is committed to protection of remaining mangroves in Hong Kong.

There are many areas on and near Kau Sai Chau where mangroves occur. As a result of concern about the loss of mangrove, the originally proposed dam site was relocated upstream of the original proposed location. This will require an increased water level from 9mPD to 12mPD to maintain an acceptable storage capacity, and consequently some additional scrubland habitat will be lost. The relative scarcity of mangroves in Hong Kong, the recent reduction in the total area of mangrove and the comparative abundance of upland shrub/woodland habitats in Hong Kong all support the decision to re-site the dam.

The decision to relocate the dam was taken to preserve as much of the mangroves as possible and reduce overall impacts of the project. The relocation of the dam will save an area of about 0.5 ha of mangrove. The issue of loss of mangroves is addressed by transplanting trees from the reservoir area to the area downstream of the dam site where suitable muds and substrates can provide a useful extension of the mangrove habitats. The proposed extension of mangrove habitat area will make up for the loss of existing mangrove.

E6 TURFGRASS MANAGEMENT

A Turfgrass Management Plan (TMP) has been prepared, which is designed to provide management direction for the planned golf couse at Kau Sai Chau. The aim of the TMP will be to provide a managed turfgrass playing surface and to control non-point chemical contamination of surface, groundwater and marine waters and protect non-target organisms from contamination. The risk of chemical contamination arises from golf course operation, which will require application of fertilisers and limited use of pesticides to maintain quality of the turf-grass on fairways, tees, and greens.

There is however increasing awareness among golf course managers of the environmental and economic benefits of minimising chemical applications. Technology has developed rapidly to enable course managers to eliminate or render insignificant the potential risks of turf-grass chemicals to the environment. The guiding principle has been to minimise the use of chemicals by strategies such as mechanical removal of weeds (to reduce herbicides) and soil management practices to reduce diseases (to reduce fungicides). The principle is avoidance of the use of chemicals except where absolutely necessary. Fertiliser applications will be minimised by the reuse of irrigation water.

Assessments of the potential risks of chemical losses from the course have indicated that it is most unlikely that there will be any detectable effects on water quality immediately adjacent to Kau Sai Chau, at the nearby mariculture sites or in the marine habitats and beaches in the vicinity. As an extra measure the course has been designed to provide wide buffer areas between the courses and the sea.

The function of the TMP is to provide control through environmental monitoring, audit and review so as to allow effective protection of the surrounding environment. The golf course management practices and the course design will enable close monitoring of any chemicals which have to be applied. Recirculation of drainage water back on to the course provide yet another level of protection for the environment.

E7 RECREATION AND CULTURE

Kau Sai Chau is currently used for hiking, orienteering, and recreational boating. Most of the visitor use observed during this study was for day-trips only. No overnight use was observed on Kau Sai Chau. Due to the presence of unexploded ordnance remaining from the period when the island was used as an artillery shelling range, there are numerous signposts on the island advising of the danger and warning away prospective visitors. There are no scheduled ferry services to the island, and no permanent facilities for recreation on Kau Sai Chau.

By comparison of available facilities in Hong Kong versus those in other regions of the world, Hong Kong is poorly provided with golf courses. Hong Kong currently has the equivalent of one 18-hole course per some 860,000 residents, which is less than one twentieth of the recreation provision accepted as a standard in other countries. The Kau Sai Chau Project would assist in redressing this lack of facilities, and also provide opportunity to the youth of Hong Kong who have not yet had the possibility to be introduced to the game. Greens fees would be modest in comparison to those for non-members at private clubs.

Kau Sai Chau is known to be a site of archaeological and historic interest. There are three points of interest on the island, two relating to archaeology and one to religious history. On the north-west coast of Kau Sai Chau a rock carving has been located and preserved as a declared monument. At the southern tip of Kau Sai Chau the Hung Shing Temple is located. Both these sites are ouside the proposed disturbance area, and would be unaffected.

Three archaeological sites on Kau Sai Chau have yielded late Neolithic stone implements. One of the three lies within the disturbance boundary of the proposed golf course. To avoid loss of important archaeological artifacts from this area a three-stage study has been commissioned. All aspects of the survey, assessment, and any required salvage operation will be coordinated by the Antiquities and Monuments Office.

All grave sites on the island have been identified and mapped to avoid potential disturbance. All grave sites will be maintained as part of the original landscape, and foot access to them will be provided. The grave site survey has indicated only two grave sites that might be affected by the development, and which may need to be relocated prior to dam construction.

E8 TRANSPORT AND ASSOCIATED INFRASTRUCTURE

A separate transportation study has been carried out for the project. The study noted that during weekdays the generated traffic demand along Hiram's Highway towards Sai Kung will be heaviest in the non-peak direction. The figures indicate the project would have minimal impact on the peak traffic flows on weekdays. On weekends the project would cause a minor increase in traffic along Hiram's Highway during the golfer peak use periods. However, these flow levels would be below the peak levels observed on weekdays. The Project will therefore only marginally affect traffic onditions, and will be within existing capacity limits.

An assessment of car parking was undertaken as part of the transportation study, and concluded that the car parking demand is about 254 spaces where car usage is a maximum. Discussions are taking place between RHKJC and Government on the possible integration of this car parking requirements and potential sites in Sai Kung. Two principal options have been identified, one to the northeast of the Sai Kung Pier, and another at Tin Min Hoi. Details on the car park are thus not available at this time.

The options for ferry services were the establishment of a new dedicated ferry fleet; utilization of existing kaito services; and other combination options. Overall a dedicated service is preferred, and is the proposed option. In particular the dedicated ferry option would provide a regular, reliable, safe, efficient and comfortable standard of service. The distance from the Sai Kung pier to the proposed jetty on Kau Sai Chau is about 4.5 km. For vessels capable of carrying 75 passengers and 15 knots (28 km/hr), three vessels would be required, operating on a service frequency of 10 to 15 minutes.

E9 ENVIRONMENTAL MONITORING AND AUDIT

Environmental monitoring schedules and audit procedures are essential in order to:

- Ensure that any environmental impacts resulting from the construction and operation of the golf course are minimised or kept to acceptable levels;
- Establish procedures for checking that mitigation measures have been applied and are effective, and that the appropriate corrective action is undertaken if and when required;
- Provide a means of checking compliance with environmental objectives, recording anomalies and documenting corrective action.

Environmental monitoring schedules were developed for the project in consultation with EPD. These detail the monitoring requirements in relation to water quality; air, noise, and waste management; ecology; landscape restoration; and archaeology and grave sites. The schedules also detail action plans which set out the action to be taken if certain pollution levels are reached.

An audit system was also recommended, for both the construction and operational phases. Schedules of implementation were also included summarising the recommended environmental mitigation measures that evolved as part of the environmental assessment.

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