Project Profile

Proposed Temporary Golf Facility at Kai Tak Runway

Reference : **R0962-3.03**

Client : **OGC Golf City**

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Prepared by : **CH2M-IDC Hong Kong Limited**

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1 BASIC INFORMATION

1.1 Project Title

1.1.1 Proposed temporary Golf Facility at Kai Tak Runway (the "Project").

1.2 Purpose and Nature of the Project

1.2.1 The purpose of this project is to transform and temporarily operate an existing driving range into an environmentally friendly designed mini golf facility at the Kai Tak Runway as an interim use of the subject site. The subject site is leased from Government with Short-term tenancy agreement which is renewed every 3 months currently.

1.2.2 This temporary golf facility is proposed to operate from 0700 to 2400 every day and designed to have a peak capacity of 28 golfers per hour and on average, it can accommodate 160 golfers a day.

1.3 Name of Project Proponent

1.3.1 OGC Golf City

1.4 Location and Scale of Project and History of Site

Location and Scale of Project

1.4.1 The location of the Project is at the old Kai Tak Airport Runway, as shown in Figure 1.1, at where is already zoned for "Other Specified Uses (Tourism related Uses to include Commercial, Hotel and Museum) under Kai Tak (South) Outline Zoning Plan (OZP number S/K21/3, dated July 2002). Around the subject site, there are no sensitive uses, such as residential developments, found. The project site is currently used as a temporary golf driving range.

1.4.2 The proposed site is fully contained within the old airport runway which is totally concrete paved to prevent any possible seepage happened in the subject site.

1.4.3 The existing use of the project site is a driving range at where most of the area has been cultivated with grass (*Zoysia*) and has some landscape features, such as lakes. This specie of the grass has been cultivated in the driving range since its operation from end of year 1999. For transforming the driving range into a mini golf facility, some areas of the driving range will be redeveloped into green and tee areas with new species of the grass planted on these areas only by laying new soil and turfgrass on top of old layer. There is no disturbance on the concrete platform underneath the existing soil layers. Tip Eagle and seashore phaspalum will be planted at the greens and tees area respectively.

1.4.4 This Project is small scale and divided into two parts, northern and southern area, with a total area of about 6.87 ha. Upon completion of the Project, the subject site will be an executive temporary mini golf facility, with 9 holes. The southern area contains 7 holes (Hole 1 to Hole 7) with about 5.32 ha; and within the site, there are 4 existing artificial lakes with totally approximate 3850m^2 surface area. Northern area contains 2 holes (Hole 8 and 9), with approximately 1.55ha. There are no lakes within the northern area. However, a 1m high flood-controlled earth berm is provided along the catchment boundaries, and is intended to provide zero discharge to the outside areas under normal circumstance. The preliminary layout of the Project is shown in Figure 1.2. There is no extensive structure proposed to be constructed. It must be noted that the carpark as well as the one-storey buildings are existing infrastructure.

1.4.5 Irrigation water is pumped from these lakes and sprayed onto the turf grass every morning. The water will then flow back to the artificial lake through landscape profile and subsurface drainage underneath the green and tee areas (Figure 1.3). Since the subsurface layers underneath the turf grass are soil, sand and rocks, a good filtration ability of this soil mixture layers are expected. It must be noted that whole subject site is concrete paved that there will be no significant seepage from the Project outside the marine area.

1.4.6 In addition, an environmentally friendly turfgrass management strategy, including use of fertilizers, integrated pest management and irrigation practice, will be implemented during planning and operation of the Project to avoid and/or minimise the use of chemicals which might potentially escape from the soil to the artificial lakes within the Project site. Organic fertilizers or green fertilizer with equivalent nutrient value will be used instead of chemical fertilizers, so as to avoid and/or minimise leaching of nutrients, if any. Also, there will be no application of fertilizers if heavy storm is predicted to be happened within a few days.

1.4.7 For integrated pest management, no chemical pesticides will be used. Microbial insecticide and fungicide (biological pesticide), as well as biological control method will be applied to control and remove the pest. No herbicide will be applied within the proposed golf facility. It must be noted that all the microbial insecticides and fungicides proposed are natural substances and their microbial active ingredients occurs ubiquitously in the environment. They will be effective only to target organisms and not toxic to non-target organisms. All biological pesticides and the biological control method are registered pesticides in the AFCD.

1.4.8 Under normal condition, there will be no surface runoff escaping from the subject site. This design will tend to create a self-contained system for environmental protection purpose, so as to avoid any possible uncontrolled outflow of surface run-off and to safeguard the surrounding local water quality. A 1m high flooding control earth berm is proposed along the boundaries of the turfgrass area. The artificial lakes as well as the turfgrass area within the proposed golf facility would be flooded during heavy rainstorm and retain the runoff within the area. After the rainstorm, the water retained within the site will be slowly outflowed from the subject site. Proactive measures as described above would be applied to avoid / minimise the potential water quality pollution to the nearby environment, if any.

1.4.9 In general, the whole project is designed to avoid and minimise the potential water pollution to the surrounding water bodies. Details of the environmentally friendly infrastructure design and turfgrass management strategy are described in section 4.

1.4.10 Since the proposed Project will be operated at the night-time, floodlights will be installed and will be facing towards ground. Currently there are already some floodlight and florescence lights installed at the end of the Kai Tak Runway. After the operation of the proposed Project, some of the existing floodlights will not be used. In addition, there is some shrub planted on top of the earth berm along eastern side of the southern area of the proposed Project to further reduce the potential brightness nuisance to the nearest fixed visual sensitive receiver (about 950m) southeast to the subject site and the existing driving range.

Number and Type of Designated Project to be covered by the Project Profile

1.4.11 The proposed golf facility has been suggested as a Designated Project (O.1) under the "Tourist and Recreational Developments" category of Part 1, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). There is only one designated project covered by this project profile.

1.4.12 The contents and checklist provided in the Technical Memorandum of the EIAO chapter 2 and Annex 1 – Project Profile for Designated Project have been used as guidance in the preparation of this project profile.

1.5 Name and Telephone Number of Contact Persons

Company	OGC Golf City (Project Proponent)
Contact person	Ms. Jessica Sit
Address	The Kai Tak Runway, Kai Fuk Road, Kowloon Bay
Telephone	2540 4887
Facsimile	2587 8865

2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Development of the Golf Facility

2.1.1 The proposed Project is only an interim arrangement for the subject site before the implementation of the development for the old Kai Tak Airport under the current planning study for South-east Kowloon Development (SEKD). It must be noted that the South-East Kowloon Development has yet to be confirmed[1]. According to the Planning Department's in-house study "Hong Kong 2030: Planning Vision and Strategy" information, a preliminary sustainability development (SA) for whole Hong Kong involving SEKD has been conducted and receiving public comments. A detailed SA would be carried out at a later stage when a preferred development option has been considered. There is no solid programme for the SEKD development.

2.1.2 The existing use of the subject site is driving range with some landscape features and the subject site including the existing driving range has been leased from the Government through short-term tendency (STT) since 1999. Table 2-1 shows the tentative construction time-table of the proposed Project. It is assumed that the proposed Project would operate for about 4 years but this is subjected to the STT agreement and the future development of the South-East Kowloon Development.

Table 2-1 Tentative Construction Time-table for the Proposed Temporary Golf Facility

Construction Activities	Weeks			
	1	2	3	4
Finalizing of design	■			
Commence of minor construction	■	■		
Commissioning and Operation			■	■

3 POSSIBLE IMPACT ON THE ENVIRONMENT – CONSTRUCTION PHASE

3.1 General Summary on the Key Issues

3.1.1 The main construction activities to be carried out in the Project are minor landscape reformation for the green and tee area by laying new soil on top of the existing ground, laying of drainage system and the establishment of turfgrass at the green and tee areas only. It must be noted that there will be no disturbance on the concrete slab underneath of the existing turfgrass area expected.

3.1.2 Possible impacts on water quality are construction runoff to the marine environment; however, impacts are expected to be limited given the small scale of this Project and the limited use of organic fertilizers and /or green fertilizers. It must be noted that green and tee areas are required for establishment and landscape reformation by laying soil on top of existing area. No disturbance on the concrete paving is expected. Majority area, fairway and rough, are covered by the original turfgrass. No establishment as well as site formation would be required. Other environmental impacts, such as construction noise and construction dust, will be minor because of the limited scale and absence of sensitive uses surrounding the subject site. Details of the potential construction impacts on the environment are described in the following sections.

3.2 Construction Site Water Discharges and Runoff

3.2.1 Construction runoff impact could arise during the earthworks for landscape formation if run-off from works areas is not controlled. However, with the proper scheduling the construction work at dry season, it is expected that there will be no or very minor runoff generated. It must be noted that the landscape formation works only involve levelling the existing soil layers on the subject site to form the required topography features (e.g. green and tee areas). There will be no disturbance on the concrete slab underneath of the existing turfgrass area.

[1] *Further Urban Design Study for Planning and Development of South East Kowloon* has been suspended since 17 December 2003, Planning Department Internet information (http://www.info.gov.hk/planning/p_study/prog_s/sek/01/index.htm)

3.3 Construction Site Noisy Operations

3.3.1 Since there are no sensitive uses located within 300m from the subject site, it is expected that there will be no construction noise nuisance.

3.4 Gaseous Emissions from Construction Phase

3.4.1 Construction dust impact could arise during site formation earthworks. Laying of topsoil and sand for the establishment of turfgrass is a major construction activity and possible fugitive dust emissions can be expected. However, there are no air sensitive receivers within 500m from the subject site and therefore gaseous emissions are only a minor concern for this project, providing that the Contractor strictly follows the mitigation measures stipulated in the *Air Pollution Control (Construction Dust) Regulation of Air Pollution Control Ordinance* (APCO).

3.5 Generation of Construction Waste

3.5.1 Since there is no demolition work involved during the construction site and the major construction works are laying topsoil, sand and rock, it is expected that there will be minor amount of construction and demolishment material generated. The general practices by contractor and waste collector for the collection and management of waste within a construction site and the transportation and disposal of waste to landfill/public fill will be followed in accordance with the Waste Disposal Ordinance.

3.6 Ecological Impact from Construction Activities

3.6.1 The existing landuse of the Project site is landscape area with old concrete paving underneath. The ecological value of the existing site in terms of terrestrial ecology is low. Victoria harbour and the Kai Tak Nullah are located south and north of the subject site respectively. Both marine water areas are heavily polluted[2]. Construction of the Project will not cause additional adverse impact to the terrestrial and marine ecology nor will it result in the loss of flora and fauna at the subject site.

3.7 Visual Impact

3.7.1 The Project site is located at the southeastern end of the Kai Tak Runway. There is no sensitive receivers located within 500m in the vicinity of the subject site. The nearest visual sensitive receiver is Laguna City where is about 950m east to the subject site. In addition, there are no major construction activities including site formation expected. Therefore, it is expected that there would be unlikely have significant visual and landscape nuisance caused by subject site during the construction period.

4 POSSIBLE IMPACT ON THE ENVIRONMENT – OPERATIONAL PHASE

4.1 General Summary of the Key Issues

4.1.1 The major potential environmental impact from the operation of this Project is the discharge of surface runoff, as it may potentially contain fertilizers and pesticides used in the regular maintenance of the turfgrass. Other environmental impacts, including air quality, noise impact and ecological issue, generated from the operation of the Project are considered to be minor.

4.2 Operational Phase Water Discharges and Runoff

Background

4.2.1 The marine area adjacent to the subject site is in the Victoria Harbour. Two EPD operated marine water quality monitoring stations, namely Victoria Harbour(East), VM1 and VM2 are located south of the Kai Tak Runway. A typhoon shelters water quality monitoring station, named Kwun Tong VT4, is located east of the Kai Tak Runway. Locations of these monitoring stations are shown in Figure 4-1. The water quality of these two stations are likely influenced by the existing and future discharges

[2] Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development, EIA report, July 2001 (EIA-059/2001)

from the Kowloon and Hong Kong Island area. A summary of the water quality data recorded at the monitoring stations from 2000 to 2002 is presented at Table 4.1 below.

Table 4-1 Compliance with WQOs at EPD's Marine Water Quality Stations adjacent to the Proposed Temporary Golf Facility

Water Quality Parameters	2002			2001			2000		
	VM1	VM2	VT4	VM1	VM2	VT4	VM1	VM2	VT4
Dissolved Oxygen Surface (mg/l)	5.8 ✓	6.0 ✓	1.7 ×	4.7 ✓	4.5 ✓	1.5 ×	5.3 ✓	4.9 ✓	1.9 ×
Dissolved Oxygen Bottom (mg/l)	5.5 ✓	5.6 ✓	2.3 ×	4.7 ✓	4.0 ✓	1.6 ×	5.2 ✓	4.8 ✓	1.8 ×
pH	8.0 ✓	8.0 ✓	7.7 ✓	8.1 ✓	8.1 ✓	7.5 ✓	7.9 ✓	7.9 ✓	7.5 ✓
Ammonia Nitrogen (mg/l)	0.1 ×	0.13 ×	1.01 ×	0.2 ×	0.25 ×	0.32 ×	0.19 ×	0.25 ×	1.35 ×
Total Inorganic Nitrogen (mg/l)	0.18 ✓	0.23 ✓	1.23 ×	0.32 ✓	0.39 ✓	0.44 ×	0.29 ✓	0.36 ✓	1.42 ×
5-day Chemical Oxygen Demand (BOD_5) (mg/l)	0.8 ✓	1.1 ✓	1.4 ✓	1.2 ✓	1.4 ✓	1.9 ✓	1.2 ✓	1.4 ✓	2.7 ✓

Note:
✓: compliance with WQO
× : Non-compliance with WQO

4.2.2 According to the EIA report for Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (EIA-Ref: EIA-059/2001, July 2001), Kai Tai Nullah collects storm water from San Po Kong, Diamond Hill, Tsz Wan Shan, Wong Tai Sin, Wang Tau Hom, Lok Fu and Kowloon City. In addition to storm water, treated effluent from the Sha Tin Sewage Treatment Works (STW) has been pumped into the upstream location of Kai Tak Nullah since 1995 after the completion of the Tolo Harbour Effluent Export Scheme (THEES) Stage I works. After the completion of the Stage II works of the scheme, effluent from the Tai Po STW was also exported to the nullah. For the Tsing Ping Nullah, it collects storm water along Tsui Ping Road and King Yip Road.

4.2.3 Environmentally friendly infrastructure design and the implementation of long-term turfgrass management plan are common local and worldwide practice for operation of a golf facility. The following sections discuss the designs and plans for different components of the interim golf facility are the associated environmental impacts.

Environmentally-friendly Turfgrass Management

4.2.4 Application of chemicals is required at most operating golf courses for turfgrass management purposes. Commonly used chemicals include fertilizers, pesticides and herbicides. These chemicals are potential causes of marine pollution if they are released uncontrolled from the golf facility to the marine environment through surface runoff or seepage. However, since the ground of the subject site is already concrete paved, there will be no significant seepage of surface water from the subject site. On the other hand, this Project incorporate an environmentally–friendly turfgrass management and a flood control landscape design to avoid and/or minimise any potential water pollution impact. This management involves: use of fertilizers and integrated pest control.

Use of Fertilizers

4.2.5 In this Project, no chemical fertilizers will be used. Organic fertilizers and/or green fertilizers with equivalent nutrient value will be applied. Usually, organic fertilizer may contain about 7% nitrogen, 1.25% phosphorous, 3.5% potassium, and some other micronutrient (1.5% magnesium and calcium). Table 4-2 presents the nutrients required for healthy growth of turfgrass.

Table 4-2 Nutrients required for healthy growth of turfgrass

Nutrient	Application
Nitrogen	The Nitrogen (N) source used should be in slow release or organic form. With the correct Management Practices and the use of slow release and organic fertilizers, losses of nitrogenous fertilizer will be minimal. Only mini pill form of fertilizers will be used as this will also minimize runoff as the fertilizer granules become fixed within the turf canopy.
Phosphorous	Turf Grass does not require large amounts of Phosphorous (P) after establishment. As Phosphorous will only be applied in small quantities during regular maintenance, the chance of any significant runoff following application is small. Runoff can be controlled by irrigation practices and understanding rain patterns.
Potassium	Potassium (K) is the third most important element for turfgrass. Potassium is important in resistance to disease, drought, heat stress, cold and wear. Losses of Potassium into the water system occur under similar conditions to that of Nitrogen. Potassium will be applied in conjunction with nitrogen (N:K) at a 1:2 ratio and that is already provided by the 100% organic fertilizers.
Micro Nutrients	Micro nutrient requirements for elements such as Magnesium (Mg), Boron (B), and Calcium (Ca) are determined by soil tests. Iron will be applied according to a plan involving six applications per year on tees, greens and fairways. Today Turf Managers consider sulfur to be the most important micro element as it generates strong and hardy plants cells as well as providing fungal control. Calcium and Magnesium levels will need to be monitored through soil testing because the sands in Hong Kong easily become deficient of these two elements.

4.2.6 Table 4-3 shows an example of application rate and frequency for this organic fertilizer at the green, tee and fairway area. It must be noted that the application rate and frequency for fertilizers may be varied depending on the health of the turfgrass, and the type of the fertilizers may be varied. All details of the fertilizers application will be included in a turfgrass management plan (TMP), and EPD will be informed in advance when there is a change in the fertilizer application.

4.2.7 However, since healthy growth rates will be achieved only when the turfgrass is not over fertilized or over watered. Therefore, the residual amount of fertilizer in the water of the artificial lake will be monitored as part of the turfgrass management plan to adjust for any fluctuations in fertilizer demand. Details of the water quality monitoring are described in section 8.

Table 4-3 Example of Application rate and frequency of Organic Fertilizer at Various area of the Proposed Golf Facility

Area	Application Rate	Application Frequency
Green and Tee	50 g/m²	Every 10 days
Fairway	100 g/m²	Every 3 months
Rough	No application	No application

4.2.8 The use of organic fertilizers has the following advantages.

- No nitrate pollution;
- Unobjectionable with regards to hygiene;
- Activates the soil organisms;
- Regenerates the soil with a lasting effect;
- From humus and improves root penetration;
- Improves the formation of mycorrhiza;
- Improves soil water and nutrient holding capacity; and
- Create an environment that encourages beneficial soil organisms such as earthworms.

4.2.9 An important advantage is that organic materials take longer to breakdown and release nutrients, while nutrients in chemical fertilizers are readily available for the plant to absorb, but will be leached away easily. For organic fertilizers, microbes in the soil will break down the organic materials gradually into inorganic and water-soluble forms that can be absorbed by grass's tiny root hairs. This creates a slow-releasing situation that provides nutrients over a longer period of time and can also help in reducing the potential loss of nutrients to leaching, if any. Once the limited amounts of soluble nutrients from the organic fertilizer are released, the roots of the turfgrass as well as mycorrhiza formed between roots will immediate uptake them. It is expected that there will be no or minimal residual nutrients left in the soil, because of the quick uptake rate of the grass.

4.2.10 In addition, no fertilizers will be applied to the turfgrass when heavy rainstorm is forecasted within a few days, minimising the potential leaching of the nutrients to the artificial lakes. It must be noted that, with the provision of the flooding control berm, there will be zero discharge of the surface runoff from the subject site under normal circumstance.

Potential Nutrients Pollution

4.2.11 In the unlikely and extreme event that once after the fertilizers applied (50 g/m² at green and tee areas, and 100g/m² at fairway) and a 1 in 50 years heavy rainstorm happened, all fertilizers are be dissolved into the rainwater captured. The areas of the green, tee and fairway within the proposed temporary golf facility are 3840m², 3190m² and 23270m² respectively. The concentration of nitrogen within the rainwater captured (about 28770 m³) is estimated to be 6.52 mg/L, assuming that the fertilizers contain 7 % nitrogen. Even if the captured water were out-flowed into the marine water, it would be subjected to very large dilution and would not have any impacts on the marine water. Therefore, it is expected that the surrounding marine area is unlikely to be adversely affected due to the operation of the proposed temporary golf facility.

4.2.12 As described in section 4.2.2, the Kai Tak Approach Channel collects water from Kai Tak Nullah which is receiving treated effluent from the Sha Tin Sewage Treatment Work (STW) and Tai Po Sewage Treatment Work. Table 4-4 and Table 4-5 summarise the effluent standards for the existing and upgraded Sha Tin STW and Tai Po STW. The effluent standards provided information to estimate the contribution of flows and loads by the two STWs to the Kai Tak Nullah, and subsequently the downstream Kai Tak approach channel and Kwun Tong Typhoon Shelter.

4.2.13 Table 4-4 shows the combined flow and loading for the Sha Tin STW and Tai Po STW treated effluent.

Table 4-4 Existing Effluent Discharge Standards for Sha Tin and Tai Po STWs

STW	Flow (m^3/day)	Total Nitrogen Concentration listed in the licence	Load (Kg/day)
Shatin	350,000	25 mg/L (95%ile), 50 (maximum)	8,750,000
Tai Po	130,000	25 (95%ile), 50 (maximum)	3,250,000

Notes: 1. The flows presented in the table are the average daily flows for the Sha Tin and Tai Po STWs; and
2. There is no disinfection of the discharged effluent.

4.2.14 It is clear that the pollutant loading from the unlikely outflow from the proposed golf facilities is insignificant compared with the existing Sha Tin and Tai Po STWs treated effluent discharged into the Kai Tak Nullah.

4.2.15 It is found that pollution loading from the rainwater retained in the subject site even in a rare and unlikely event that all fertilisers dissolved would be much less than that of the daily treated effluent discharged from the STWs. Also, the estimated nutrient level described in the section 4.2.12 is much less than the corresponding standard for effluents discharged into the Inshore Waters of Victoria Harbour Water Control Zone[3]. Table 4-5 shows the standards for effluents discharged into the Inshore Waters of Victoria Harbour Water Control Zone.

Table 4-5 Standards for effluents discharged into the Inshore Waters of Victoria Harbour Water Control Zone

Flow rate (m^3/day) Determinant	< 10	> 10 and < 200	> 200 and < 400	> 400 and < 600	> 600 and < 800	> 800 and < 1000	> 1000 and < 1500	> 1500 and < 2000	> 2000 and < 3000	> 3000 and < 4000
pH	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9
Temperature (°C)	40	40	40	40	40	40	40	40	40	40
Colour (lovibond units) (25mm cell length)	1	1	1	1	1	1	1	1	1	1
Suspended Solids	50	30	30	30	30	30	30	30	30	30
BOD	50	20	20	20	20	20	20	20	20	20
COD	100	80	80	80	80	80	80	80	80	80
Oil & Grease	30	20	20	20	20	20	20	20	20	20
Iron	15	10	10	7	5	4	2.7	2	1.3	1
Boron	5	4	3	2.7	2	1.6	1.1	0.8	0.5	0.4
Barium	5	4	3	2.7	2	1.6	1.1	0.8	0.5	0.4
Mercury	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	1	1	0.8	0.7	0.5	0.4	0.25	0.2	0.15	0.1
Total toxic metals	2	2	1.6	1.4	1	0.8	0.5	0.4	0.3	0.2
Cyanide	0.2	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.03	0.02
Phenols	0.5	0.5	0.5	0.3	0.25	0.2	0.13	0.1	0.1	0.1
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1
Total residual chlorine	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	100	100	100	100	80	80	50	50
Total phosphorous	10	10	10	10	10	10	8	8	5	5
Surfactants (total)	20	15	15	15	15	15	10	10	10	10
E. coli (count/100 mL)	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

Notes: 1. All units in mg/L unless otherwise stated; and
2. All figures are upper limits unless otherwise is indicated

[3] Table 9a stipulated in the *Technical Memorandum of Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*, EPD

Summary of Nutrient Impact

4.2.16 Since the whole subject site is already concrete paved and the landscape reformation works proposed is to lay additional soil on top of the existing soil layers for the green and tee area as well as some landscape area, it is expected that the existing concrete platform will not be disturbed. Most of the areas in the subject site are not disturbed. Even if there is any creak in the concrete platform underneath the soil layer that is expected to be a rare and unlikely event, the soil layers on top of it are expected to have a good filtration ability to filter the nutrients. In addition, organic fertilizers or green fertilisers with similar nutrient levels will be used in this proposed Project. As described in section 4.2.10, these fertilizers, unlike the chemical fertilisers, can be leach away easily. Once the soluble form of the nutrients formed, all these nutrients will be absorbed by the turfgrass. There will also no fertilisers applied if heavy storm is predicted to be happened within a few days. In addition, as described in sections 4.2.15 above, the pollution loading from the rainwater within the subject site is much lower than that of the treated effluent daily discharged from Sha Tin STW and Tai Po STW into the Kai Tai Nullah and subsequently to the Kwun Tong Typhoon Shelter next to the subject site. Therefore, it is expected that there is no significant or unacceptable adverse impact due to leakage as well as outflow of surface run, which is considered to be an unlikely and rare event.

Integrated Pest Management

4.2.17 In general, non-chemical methods for control of pests and turfgrass diseases will be employed to cure the infected turfgrass. Integrated Pest Management (IPM) is a pest control or management system, which is using biological method to control pest. IPM is a highly effective approach that minimizes the use of pesticides, maximizes the use of natural processes and improve environment habitat[4]. For example, one of the biopesticide used in the golf courses at China are applying nematodes (e.g. Stememema spp. and Hetterarhabditis spp.) and its symbiotic bacteria within its body to kill the pest[5].

4.2.18 In the proposed Golf Facility, one of the methods to be adopted is the use of is parasitic natural enemy, e.g. *Trichogramme spp.*, to control pest[6]. *Trichogramma* are stout-bodied, minute wasps, which can hardly be seen without a hand lens or microscope and they can be found in South-East Asia area. Since they are egg parasitoids, their larvae will develop within the pest's egg and thus finally kill the pest. In general, operator will import egg of the *Trichogramma*. Once the pest is found, the *Trichogramma* egg will be hatched manually and adult *Trichogramma* will be released to the proposed golf facility. They will attack pest's egg and their young will develop within pest's egg. Ultimately, pest's egg will die and there will be no pest found in the golf facility. It must be noted that the quantity imported will be controlled by AFCD each time.

4.2.19 Another method is applying microbial insecticides, for examples: bacterium-type insecticide (e.g. *Bacillus thuringienssis*), Fungi-type insecticide (e.g. *Beauveria bassiana*), viruses-type insecticide (e.g. *Nuclear Ployhedrosis virus, NPV*), and plant extract, (e.g. Neem oil and *Azadirachta indica*)[4,7]. Neem oil and its substrate product, *Azadirachta indica,* can also be used as fungicide. All these biological pesticide have been applied in the Mainland China[6] and Hong Kong[4]. It must be noted that all these microbial insecticide or fungicide are found in natural environment and have been well studied in other countries, e.g. USA (USEPA Biopesticide home page

[4] Organic Hong Kong 2000 Seminar organised by Agriculture & Fisheries Technology Promotion Association, Kadoorie Agricultural Research Centre-University of Hong Kong, The Federation of Vegetable Marketing Co-operative Societies Ltd., Hong Kong Organic Farming Association, Kadoorie Farm & Botanic Garden and Highwise Yuen Long Service Center

[5] Turf Maintenance edited by Dr. Hong, China Golf Management Vol. 12 – 14.

[6] Application Principle and Methods of Insect Natural Enemies, complied by You Lanshao & Bal Lianyang Wei meicao, published by Hunan Press of Science & Technology.

[7] Biological Control in China, complied by Bao Jianzhong & Gu De-Xiang, Institute of Biological Control, The Chinese Academy of Agricultural Sciences and State Key Laboratory for Biological Control, Zhongshan University, published by Shanxi Science and Technology Publishing House.

http://www.epa.gov/pesticides/biopesticides) and Main China[6,8]. Table 4-6 shows the recommended insecticide and fungicide and their associated characteristics.

4.2.20 All insecticides and fungicides proposed and listed in Table 4-6 are registered pesticides under AFCD and fully comply with the requirements of registration with the Agriculture, Fisheries and Conservation Department (AFCD) under the Pesticides Ordinance Cap 133. Import and storage of these registered pesticides are controlled by license.

Table 4-6 Characteristic of the Recommended Insecticide and Fungicide

Name of Microbial Insecticide/ fungicide	Characteristic	Target Pest
Nuclear Ployhedrosis virus (NPVs) (Reg-No 2P242(WP)) (Viruses type insecticide)	• *Nuclear Ployhedrosis virus* (NPVs) are insect viruses; • These viruses kill various larval pests that feed on food crops and certain other plants; • Some species of NPV are relatively specific regarding their target insect host; • It must be noted that NPVs become active only after susceptible larvae ingest the occlusion bodies; • In the larval gut, the protein overcoat quickly disintegrates, and the viral particles proceed to infect digestive cells. A few days after ingesting the viral occlusion bodies, the larvae stop eating, weaken, and die; and • US EPA has conducted toxicity test on NPVs and the test results show that the NPVs do not harm other organisms, including plants, beneficial insects, other wildlife, or the environment. • These viruses occur naturally in their insect hosts.	1.Orthoptoroidea; - *Gryllotalpidae* - *Gryllidae* 2.Isoptera; - *Termitidae* 3.Coleoptera; - *Scarabaeoidae* 4.Lepidoptera; and etc.
Beauveria bassiana (AFCD Reg-No 2P239) (Fungus type insecticide)	• Many strains of *Beauveria bassiana* are found worldwide in the soil; • They control insects by growing on them, secreting enzymes that weaken the insects' outer coat, and then getting inside the insect and continuing to grow, eventually killing the infected pest; and • US EPA has conducted toxicity tests of this fungus and the results show that it is non-toxic on mammals, birds or plants.	1.Orthoptoroidea; - *Gryllotalpidae* - *Gryllidae* 2.Isoptera; - *Termitidae* 3.Coleoptera; - *Scarabaeoidae* 4.Lepidoptera; and etc.
Bacillus thuringiensis (Bt) (AFCD Reg-No 2P12(GR)) (Bacteria type insecticide)	• It is a protein produced by *Pseudomonas fluorescens* (a common bacteria); • The Bt protein or called toxin kills the larvae of certain species of insects after ingested by the larvae. This Bt toxin causes death by attaching to specific receptors in the larval gut, eventually rupturing the gut and killing the larvae in a few days; • According to US EPA information, Bt toxin kills only the target pests because only the target pests contain the necessary binding receptors. When organisms without the specific receptor ingest the same toxin, the toxin does no harm; and • US EPA has evaluated the active ingredients for potential hazardous effects on the environment, including effects on	1.Orthoptoroidea; - *Gryllotalpidae* - *Gryllidae* 2.Isoptera; - *Termitidae* 3.Coleoptera; - *Scarabaeoidae* 4.Lepidoptera; and etc.

[8] Insect Pathology, complied by Pu Zhelong, published by Guangdong Science & Technology Press.

Name of Microbial Insecticide/ fungicide	Characteristic	Target Pest
	such non-target organisms as mammals, birds, fish, beneficial insects, marine animals and endangered species. US EPA found that these active ingredients do not pose a risk to the environment nor non-target organisms. Organisms other than target insects appear to lack the gut receptors that make the toxins hazardous.	
Neem oil (AFCD Reg-No 2P262) and its substrate product, *Azadirachta indica* (AFCD Reg-No 2P261) (Plant extraction type insecticide)	• Can be used as insecticide and fungicide; • This microbial insecticide will deters certain insects from feeding and it interferes with the normal life cycle of insects, including feeding, molting, mating and egg laying; and • According to US EPA information, Neem oil and *Azadirachta indica* are not expected to harm non-target organisms, when used as directed on product labels. The substances are found in the environment, where they degrade naturally	1.Orthoptoroidea; - *Gryllotalpidae* - *Gryllidae* 2.Isoptera; - *Termitidae* 3.Coleoptera; - *Scarabaeoidae* 4.Lepidoptera; and etc.

4.2.21 In summary, advantages of microbial insecticides are[9]:

- The organisms used in microbial insecticides are essentially non-toxic and non-pathogenic to wildlife, humans, and other organism not closely related to the target pest. The safety offered by microbial insecticides is their greatest strength. Conventional pesticide, by contrast, are generally synthetic materials that directly kill or inactivate the pest;
- The toxic action of microbial insecticides is often specific to a single group or species of insects, and this specificity means that most microbial insecticides do not directly affect beneficial insects (including predators or parasites of pests) in treated areas. Conventional pesticide that may affect organisms as different as birds, insects and mammals; and
- Their residues present no hazards to humans or other animals.

4.2.22 In order to effectively implement IPM, it would be better to have understanding on the pest and its associated ecosystem. Therefore, it would be advised that during operation of the Project, a specialist / consultant will be employed to advise the operation of the IPM. It must be noted that currently a pesticide specialist is employed by the Driving Range operator to advise the use of pesticides.

4.2.23 In this Project, there will be no herbicide use to remove weed. It must be noted that tee, green and fairway within the site will be mowed once a day, once per every two days and once per every month respectively. Mowing with such frequency will remove any weeds. For the rough area, mowing will be conducted once per every three months.

4.2.24 As described above, either parasitic natural enemy or biological pesticide will be applied only when pest are found and they will be applied in spot only. Also, all these biological pesticide will be used following label instructions and under proper use. It is expected that these biological pesticide should not cause adverse impact to the environment. In normal condition, pest control with proper turfgrass management such as irrigation will be applied.

Potential Chemicals Pollution

4.2.25 As described in above section, there are no use of chemical insecticide or fungicide. All the insecticide and fungicide used are microbial or plant extract and are non-toxic to non-target organism. In addition, all these chemicals are ubiquitously in the environment. Some of them, such as neem oil and its substrate product are likely to be degraded after a few days, according to USEPA information. Most importantly, there is zero discharge of surface runoff from the subject site during

[9] USEPA Biopesticide home page http://www.epa.gov/pesticides/biopesticides

normal circumstance. Therefore, there will be no potential chemical hazard due to the operation of the Project.

Irrigation Practice

4.2.26 Irrigation is important for the turfgrass management. Too much water or insufficient water will both adversely affect the health of the turfgrass. The application of the organic fertilizers will help improve soil texture and provide a good environment for the root of turfgrass development. In this project, it is proposed to irrigate the turfgrass once a day with an irrigation rate of about 1200 gallon for whole site, i.e. about 0.08L/m^3.

4.2.27 The source of the irrigation water will be mainly from the recycled water within the artificial lakes. When it is necessary, fresh water from off-site will be imported.

4.2.28 Irrigation will be conducted in early morning due to the relatively polluted fog in Hong Kong. The morning fog trapped with the air pollutants will potentially deteriorating the health of the turfgrass. Sufficient irrigation in the morning will help to wash away the deposition on the turfgrass surface, and so the turfgrass will grow healthily. It must be noted that all irrigation water will be diverted back to the artificial lake by landscape and sub-surface drains, as mentioned in section 1.4. Therefore, in normal condition, there will be no water discharged outside the subject site.

Drainage Impact Assessment

Site Design Characteristics

4.2.29 The temporary Golf Facility is located at the old Kai Tak Airport. The whole temporary golf Facility site is situated on the concrete paved area.

4.2.30 As shown in Figure 4-2, the site consists of two open catchment areas (Area A, 5.32 ha and Area B, 1.55ha), which contribute flows to themselves. The areas are rather small and localized. It is note that there are no drainage system connecting beyond the site area. Flood-controlled landscape feature with 1 metre high earth beam will be constructed along the catchments boundaries. Thus, the overall landscape design is intended to provide zero discharge to the outside areas.

Assessment Methodology

4.2.31 The design storm used in assessing the flood level is based on the Extreme Rainfall Intensity-Duration-Frequency (IDF) Relationship stated in the Stormwater Drainage Manual of Drainage Services Department (DSD), HKSAR. The design flood level is assessed using 1 in 50 year return period. The storm duration is assumed to be 4 hours.

4.2.32 In the analysis, worst case scenario is considered. As mentioned previously the Golf facility is built on concrete paved area of the old runway, therefore it is assumed no initial loss and no continuous losses by infiltration will occur. Since heavy rainstorm is normally happened during the rain season, it is also reasonable to assume that when the 1 in 50 year design rainstorm occurs, the site is fully saturated and the lake has reached its maximum capacity. Thus, the water is accumulating directly over the golf course area. In this case, runoff coefficient will assumed to be 1.0.

Design Calculation

4.2.33 Appendix 2A summarises the land characteristic of the runoff areas that being described above. Appendix 2B shows the IDF Relationship described in the Stormwater Drainage Manual of DSD. The analysis for the flood volume of both Area A and B are shown in Appendix 2C. The total volumes of runoff estimated are 22,279 m^2 in Area A and 6,491 m^2 in Area B. In which, the estimated capacities of the proposed golf facility are well enough to cater for the design rainstorm.

4.3 Operational Noise and Air Quality

4.3.1 Since there is no noise and dust generated source identified within the Project and no sensitive uses located within 300m from the subject site, there will be no operational noise and air quality nuisance arising during operational phase of the Project.

4.4 Ecological impact of the Operation

4.4.1 The subject site itself has low to no ecological value. Since the whole Project is designed to be a self-contained system, it is expected that operation of the Project will not have any ecological impact.

4.4.2 In addition, with the implementation of the environmentally-friendly turfgrass management plan plus integrated pest management, no chemical fertilizers nor chemical pesticide will be used. Therefore, the potential contamination on the surface runoff is expected to be minimal. Most importantly, all surface runoff will be captured and stored in the artificial lakes for irrigation. There will be zero discharge of the surface runoff. The limited nutrient leached into the water of artificial lakes, if any, will be reused during irrigation, and further uptaken by the turfgrass. Therefore the limited fertilizers being washed away, if any, by surface runoff during operation phase will be minimal. Moreover, even during raining or heavy rainstorm, there will tend to be zero discharge of rainwater from the subject site by provision of flood control structure. Therefore, it is expected that the surrounding habitat will not be subjected to any potential nutrient pollution nor pesticide pollution.

4.5 Generation and Disposal of Waste During Operation

4.5.1 The volume of waste to be generated by the Project will be minimal and is expected not to cause any impact on the existing refuse transfer system for the Kwun Tong area.

4.5.2 The generation rate of vegetation and landscape waste, including grass clippings and plant waste from the operation of the golf facility will depend on the growth rate of the turfgrass and the frequency of mowing. However, these vegetable wastes would be used to compost and could be used as fertilizers.

4.6 Visual and Landscape

4.6.1 As described in section 1.4, the existing use of the subject site is driving range where is already cultivated with turfgrass. The proposed Project will not change the landscape feature significant for the subject site. Also, there will be no extensive building taller than the existing one-storey high administration house to be constructed. Most importantly, most of the fixed sensitive receivers are located over 950m away from the subject site. With this large buffer distance, it is expected that there will be no significant adverse visual and landscape impact due to the operation of the proposed Project.

Night-time operations Impacts

4.6.2 Floodlighting of the proposed Project will likely be required at night-time operation. It must be noted that currently, there are about 109 floodlgihts and 441 florescence lights installed at the end of the Kai Tak Runway. Out of these floodlights, there are 58 floodlight located about 4m above ground on top of a canopy and the florescence lights are installed underneath it. Other floodlights (6m tall) are located at the vicinity of the carparks, administration house and internal roads.

4.6.3 In the proposed Project, it is proposed to reduce the number of the existing floodlight at the vicinity of the carparks, administration house and internal roads from 51 to 41. A total of 53 new floodlights (35 floodlights at southern area and 18 floodlights at northern area) are proposed to scatter around the subject site at a height of around 6m above ground. Therefore, there will be 152 floodlights and 441 florescence lights at the end of the Kai Tak Runway after the operation of the proposed Project. All existing and proposed floodlights will be at the same power output, i.e. about 1000W. It is expected that there will be no significant additional brightness induced after the operation of the Project.

4.6.4 Most importantly, in comparing the proposed floodlight with the existing ones, all proposed floodlight will be installed facing towards ground, different to the floodlights at the existing driving range. In addition, there is an earth berm (about 1 – 1.5m tall) with shrub on top located at the eastern side of the southern area of the subject site. This earth berm will further reduce the potential nuisance to the sensitive use located at the east of the subject site, if any. Figure 4-3 shows the locations of the existing floodlights and the proposed floodlights in the vicinity of the subject site.

Existing Fixed Visual Sensitive Receivers (VSRs)

4.6.5 Figure 4-4 shows the location of the visual sensitive receivers at Victoria Harbour East, Kowloon Bay and near Kwun Tung Typhoon Shelters. It is found that the nearest existing fixed visual sensitive receiver (VSR) is the Laguna City, about 950m due east of the subject site. This existing VSR is currently viewing the bright driving range, which is located a little closer towards the VSR. It must be noted that all proposed floodlights under this Project would face towards ground, which is different to the existing floodlight. This arrangement will minimise the potential brightness nuisance

due to the night-time operation of the proposed Project. In addition, there is an earth berm with shrubs along the eastern side of the southern area of the proposed Project, at where most of the new floodlights are installed. This infrastructure will further reduce the potential brightness nuisance by blocking some line of the sight from the Laguna City towards the subject site. Therefore, it is expected that additional brightness impact on the Laguna City will be considered as insignificant after the operation of the proposed Project, in comparing existing condition.

4.6.6 Other nearest existing fixed VSRs to the west and south of the subject site are residential developments along coastal area of North Point at Hong Kong Island side and that along the coastal area of Kowloon Bay (including Hung Hom) with a minimum buffer distance of about 1550m and 1900m respectively. All of them can see the existing bright driving range. With the large buffer distance, next to an existing bright source and the future floodlight installed at the subject site facing towards ground, it is expected that these VSRS will not have additional brightness nuisance after the operation of the proposed Project, if any.

Existing Mobile VSRs

4.6.7 Kwun Tong Bypass is running parallel to the northeastern side of the subject site and the existing bright driving range with a minimum buffer distance of 420m. For the driver and passengers travelling along this viaduct, they can see the subject site and the adjacent existing bright driving range at their side. However, this highway is not travelling towards the subject site and, most importantly, all the proposed floodlight will be facing towards ground and be scattered around the subject site, which are different to the existing bright driving range. The viaduct structure will also undoubtedly block some view of the subject site. Also, the vehicle is travelling in a relative high speed on the Bypass. The driver and passengers will see the subject site in a very short period of time. Therefore, it is considered that there will be insignificant or acceptable additional brightness impact for these mobile VSRs after the operation of the proposed Project.

4.6.8 For the ship travelling within the Kwun Tong Typhoon Shelter, it is expected that these mobile VSRs will have a relatively more brightness impact than those travelling along Kwun Tong Bypass because of the closer distance. However, unlike the adjacent existing driving range, all the floodlights will be facing towards ground and are scattered around the subject site. The earth berm with plantation on top will further reduce the potential impact. Also, the adjacent bright driving range is located at the entrance of the Typhoon Shelter. It is expected that the ship entering the Typhoon Shelter will have adopted the brightness due to the floodlight of the driving range. Therefore, it is expected that the potential brightness impact due to the operation of the proposed Project on these mobile VSRs will be insignificant or not unacceptable.

4.6.9 Since the existing bright driving range is located in front of the proposed Project and all proposed floodlight within the subject site will be facing towards ground, there is a bright light source lies between the subject site and ferry travelling along Victoria Harbour. These mobile VSRs have already adopted the brightness environment at the end of Kai Tak Runway. Also, the light source of the subject site lies behind the existing bright driving range, it is expected that there will be insignificant or unacceptable impact on these mobile VSRs due to the operation of the proposed Project.

Future Fixed VSRs

4.6.10 The closest future fixed VSR is the residential zoning (about 500m northeast) at the Kai Tak runway according to the SEKD development. However, as described in section 2.1.1, the programme of the SEKD has yet to be confirmed. Currently, the area is used for storage of fill material. Most importantly, the operation period of the proposed Project is controlled by Short Term Tendency, which is likely also subject to the future development scheme of the SEKD. Since there is an relative large buffer distance from the future zoning and all the floodlight will be facing towards ground, it is expected that the future VSRs would not be significantly affected by the proposed Project, which may not be present in future due to the overall development of the SEKD.

5 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

5.1 Identification of Surrounding Sensitive Receivers

5.1.1 The subject site is located at the end of Kai Tak Runway at where is already zoned for "Other Specified Uses (Tourism related Uses to include Commercial, Hotel and Museum) under Kai Tak (South) Outline Zoning Plan (OZP number S/K21/3, dated July 2002). An existing driving range is located immediate south-east of the subject site.

5.1.2 Along the runway, there are no sensitive receivers found. In addition, about 500m north of the subject site is Kwun Tong Industrial Area. There are also no sensitive receivers located in this area. The nearest sensitive use is the Laguna City where is about 950m due east from the subject site. To the west and south of the subject site, the closest sensitive use is the residential developments along coastal area of Kowloon Bay and that along costal area of Hong Kong Island, North Point district, and they are about at least 1900m and 1550m away from the subject site.

5.1.3 To the immediate north of the subject site is the Kwun Tong Typhoon Shelter; while Victoria Harbour is located immediate south of the subject site. These two water bodies is the only identified water sensitive receivers. To the north of the Kwun Tong Typhoon Shelter is the Kai Tak Nullah which collects storm water from San Po Kong, Diamond Hill, Tsz Wan Shan, Wong Tai Sin, Wang Tau Hom, Lok Fu and Kowloon City[10]. In addition to the storm water, treated effluent from the Sha Tin Sewage Treatment Works has been pumped into the upstream location of Kai Tak Nullah since 1995 after the completion of the Tolo Harbour Effluent Export Scheme (THEES) Stage I works. After the completion of the Stage II works of the scheme, effluent from the Tai Po Sewage Treatment Works was also exported to the nullah.

[10] Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development, EIA report, July 2001 (EIA-059/2001)

6 ENVIRONMENTAL PROTECTION MEASURES – CONSTRUCTION PHASE

6.1 General Summary of the Issues

6.1.1 A key to protecting the environment from being adversely affected by the construction works would be runoff management since the nearest sensitive receiver is the marine water body east to the Project.

6.1.2 Other impacts are considered minor issues in this project in view of the large buffer distances from the sensitive receivers and the short construction time.

6.2 Construction Phase Water Protection Measures

Construction Wastewater

6.2.1 The Contractor shall observe and comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulations by implementing environmental protection measures (such as the use of silt traps) and preventing any either point or non-point source pollution.

6.2.2 The Contractor shall carry out the works in such a manner as to minimise adverse impacts on the water quality during execution of the works. In particular he shall arrange his method of working to minimise the effects on water quality within and outside the site, on the transport routes and at the loading and dumping areas.

6.2.3 The Contractor shall follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures as specified in the Professional Persons Environmental Consultative Committee Practice Note (ProPECC PN) 1/94 - Construction Site Drainage issued by the Director of Environmental Protection. The design of the approved mitigation measures shall be submitted to the Director of Environmental Department by the Contractor or the Engineer's representatives for comments.

Runoff Management Procedures

6.2.4 The Contractor shall contain within the site all surface runoff generated from construction works, concreting works, dust control and vehicle washing, etc, if any.

6.2.5 The Contractor shall cover excavated materials or stockpiles with tarpaulin or similar fabric during rainstorms, if any. In addition, the Contractor shall arrange for other measures, such as the provision of sand bags or temporary diversion system surrounding the manhole to prevent washing away of soil, silt or debris into any nearby drainage system. Any runoff shall be diverted into appropriate sediment traps before discharging to the nearby drainage system.

6.2.6 During the turfgrass establishment period, runoff will be captured in the artificial seawater lake. The irrigation water will be reused for irrigation, therefore no runoff will be discharged into the nearby marine environment.

6.3 Aerial Emissions Protection and Control Measures

6.3.1 The requirements of the Air Pollution (Construction Dust) Regulation shall be included in the construction contract as a standard clause for environmental protection. To comply with Air Pollution Control Ordinance (APCO), the Contractor should at all times prevent dust nuisance as a result of his activities. The Contractors are required to follow all the requirements for dust control stipulated in the *Air Pollution Control (Construction Dust) Regulation.* In a proactive approach, preventive measures for dust suppression, such as regular watering of exposed areas and haulage pavement, should be installed as part of good construction practice, and incorporated in the Contract Specification.

6.4 Ecological issues

6.4.1 With the implementation of the proposed mitigation measures for water quality described in Section 6.2, the water quality of the nearby marine environment is expected not to be adversely affected. Therefore, no adverse impacts on the ecology of the aquatic ecosystem nearby are expected.

6.5 Waste Management and Minimisation Measures

6.5.1 The Contractor shall observe and comply with the Waste Disposal Ordinance (WDO) [Cap 354] and its subsidiary regulations, especially the Waste Disposal (Chemical Waste) (General) Regulation. The Contractor shall apply for registration as a chemical waste producer under the *Waste Disposal (Chemical Waste) (General) Regulation* if chemical waste is to be produced. All chemical waste shall be properly stored, labelled, packaged and collected in accordance with the Regulation.

6.5.2 The Contractor shall minimise the generation of waste from his work. Avoidance and minimisation of waste generation can be achieved through changing or improving design and practices, careful planning and good site management.

6.5.3 The reuse and recycling of waste shall be practised as far as possible. The recycled materials shall include paper/cardboard, timber, metal, etc.

6.5.4 The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The public fill which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt shall be reused in earth filling, reclamation or site formation works. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled where possible and, as the last resort, disposal of at landfills.

6.5.5 The Contractor shall record the amount of waste generated, recycled and disposed of (including the disposal sites). The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill.

6.5.6 In order to avoid dust or odour impacts, any vehicles leaving a works area carrying construction waste or public fill should have their load covered.

6.5.7 To avoid the excessive use of wood, reusable steel shutters should be used as a preferred alternative to formwork and falsework where possible.

6.6 Visual and Landscape Aspects

6.6.1 Since the major construction works involved is minimal landscape reformation and the buffer distance from the existing sensitive use are more than 500m, it is expected that there is no mitigation measures required. However, it is still advise the Contractor to keep the works area tidy and ensure that construction wastes are properly stored and disposed of as a proactive measure.

7 OPERATION PHASE ENVIRONMENTAL PROTECTION MEASURES

7.1 General Summary of the Key issues

7.1.1 Due south and north of the site are the Victoria Harbour and Kwun Tong Typhoon Shelter respectively. There are no air quality nor noise sensitive receivers found immediately in the study area or in the vicinity of the Project site. Since the proposed golf facility has been designed and operated in an environmentally-friendly manner, and intends to be a fully self-contained as much as possible, therefore, it is unlikely that this Project will require mitigation measures but environmental protection measures will be required.

7.2 Water Protection and Design Features

7.2.1 To protect the environment and keep potential water quality impacts to a minimum, a proactive approach has been applied to the proposed golf facility through the design of its infrastructure and major components including the irrigation system and sub-surface drainage system. In this Project, a contained system approach will be adopted so that all the surface run-off will be diverted to the proposed artificial lake by means of topographical features. The project area will also be installed with sub-surface drains for stormwater collection and discharge to the artificial lake.

7.2.2 Implementation of environmentally friendly turfgrass management plan plus integrated pest control described at section 4 will avoid and/or minimize use of chemicals as well as fertilizers, and avoid/minimize any potential water pollution.

7.2.3 Under normal circumstance, there will be no surface runoff to be outflowed from the subject site. During a heavy storm scenario, the rainwater will be firstly retained within the subject site. After the storm stops, the rainwater retained will be allowed to be overflowed from the subject site. This will help to minimise the cumulative first-flush impact of the urban run-off from surrounding area where industrial uses located.

7.3 Operation Phase Noise and Air Quality Issue

7.3.1 No mitigation measures during the operational phase of the Project.

7.4 Ecology Protection Measures

7.4.1 Adequate water protection measures have been proposed for the Project with respect to potential surface runoff and wastewater discharges and are included in the turfgrass management plan.

7.4.2 With the implementation of the proposed water protection measures and the environmental management plan described in previous sections on the design of the golf facility, no adverse impacts on the ecology of the aquatic ecosystem nearby are expected. The water quality of the nearby marine environment is not expected to be adversely affected because no discharge of surface runoff to the vicinity marine areas is expected. No additional mitigation measures other than the proposed water protection measures will be needed.

7.4.3 Regular water quality monitoring and audit exercise should be carried out in the vicinity of the Project site as a management tool to support environmentally friendly turfgrass management and the effectively use of fertilizers. Deterioration of the surrounding water quality is not anticipated and so the aquatic ecosystem will not be adversely affected.

7.5 Waste Management and Minimisation Measure

7.5.1 The vegetation and landscape wastes will be composted on-site and reused as organic fertilizer in an environmental friendly and economic approach wherever possible.

7.6 Visual and Landscape Issue

7.6.1 No mitigation measures are required as the proposed Project will enhance the visual quality of the Project site.

7.7 Night-time operations

7.7.1 The floodlights have been proposed to be installed facing towards ground to reduce the glare impact and nuisance to the nearby receivers, even the receivers have a large buffer distance, if any. Also, there is already an earth berm with plantation on top located at the eastern side of the southern area of the subject site to further reduce the potential brightness impact. It is expected that there will be no additional protection measures required for the proposed Project.

8 ENVIRONMENTAL MONITORING AND AUDIT

8.1 Introduction

8.1.1 As discussed in sections 3 and 4, the major potential environmental impact arising from the Project will be on water quality. Other environmental issues discussed in these two sections are expected to be minor or have no impact. As such, environmental monitoring and audit (EM&A) will only be required as a management tool and to safeguard water quality.

8.1.2 However, providing the Contractor strictly implements the proposed protection measures as mentioned in section 6, it is expected that there will be no significant impact on the water quality of the nearby water body during the construction phase of the Project. As such, no EM&A is proposed during construction phase.

8.1.3 However, turfgrass management during the golf facility operation phase will be supported by regular monitoring of residual nutrients present in the soil, as well as those potentially present in the artificial lakes nearby. Monitoring results will provide information to feed back into the turfgrass management system, so as to ensure turfgrass grows under healthy and cost-effective conditions. The

dosage of the fertilizers will be adjusted depending on the measured presence of the residual chemicals of concern.

8.2 Water Quality Monitoring and Audit Program

8.2.1 A regular Water Quality Monitoring & Audit (WQM&A) program is suggested for periodic monitoring of water quality in the artificial lake to support the turfgrass management effort. This WQM&A will also confirm that chemicals and other pollutants, if any, are properly managed to maintain good health of the turfgrass and to ensure that the corresponding WQOs in local waters are safeguarded.

8.2.2 In general, for both the suggested water quality monitoring programs (turfgrass establishment and operational phases), the key monitoring parameters could include, but not be limited to those recommended in Table 8-1. The frequency and parameters of the water quality monitoring as well as the location of the monitoring will be subject to the detailed design of the turfgrass management plan. The details of the water quality monitoring programme could be outlined in an WQM&A manual or incorporated into the turfgrass management plan.

8.2.3 Before the commencement of the Project, the water quality monitoring programmes will be reviewed as necessary in consultation with relevant Government departments, such as EPD and AFCD. In addition, the baseline water quality monitoring records for the water within the artificial lake should be compiled to provide information on determining appropriate standards and guidelines for the regular monitoring and audit exercise.

Table 8-1 Recommended Key Water Quality Monitoring and Audit Parameters

Recommended Key Water Quality Monitoring Parameters	Description
Nitrate, Nitrite and Total Kjeldahl Nitrogen (Total Nitrogen)	Excessive nitrate, nitrite or total Kjeldahl nitrogen concentrations may indicate the presence of fertilizer runoff. If high nitrate levels are detected in the artificial lake/water tanks, or underground culvert, this information will be fed back into the turfgrass management plan to adjust fertilizer application accordingly.
Total Phosphate	High phosphate levels in surface water may indicate fertilizer runoff. Phosphate is typically the limiting nutrient for algal growth. Similar to nitrate, this monitoring information will be fed back into the turfgrass management plan to adjust fertilizer application accordingly.
Conductivity	This is a measure of the ability of water to conduct an electric current. Conductivity is expressed as micro siemens per centimetre (μ S/cm). It is related to the concentration of total dissolved solids and major ions for a given water body, thus giving an indication of chemical pollution.
Dissolved Oxygen (DO)	Dissolved oxygen measurements provide an indication of the level of organic contamination or suspended solids. Algal blooms eventually cause a depletion of DO concentration due to the accelerated decay of organic matter.
pH	The result of pH measurement will alert the project of seasonal changes and potential water quality problems, such as sodicity.
Chlorophyll a	The green pigment chlorophyll is present in photosynthetic organisms and provides an indirect measure of algal biomass and an indication of the trophic status of a water body. The growth of planktonic algae in a given water body is related to nutrient levels, oxygen, temperature and light. Therefore, concentrations of chlorophyll fluctuate seasonally and even daily, and also with water depth. The measurement result of chlorophyll a will provide information on the processes occurring within the artificial lake/water tank, and provide more data on a variety of the artificial lake condition, for example, total phosphorous and nitrate-nitrogen concentration.

8.3 Turfgrass Management Plan

8.3.1 A long-term Turfgrass Management plan (TMP), suggested in section 4, is to be implemented during the operation of the project. Since the details of a Turfgrass management plan are subject to the final design and operating conditions of the golf facility, a site-specific turfgrass management plan should be prepared during the finalised design stage and thereafter reviewed from time to time, in order to incorporate the best possible environmental management strategy for the operation of the project. It is anticipated that the TMP will be reviewed as necessary in consultation with relevant Government departments.

8.3.2 Considerations for preparing a TMP are listed below for reference only, and should not be limited to these. The TMP will regularly be evaluated depending on the operational conditions of the proposed golf facility. In general, the site-specific TMP should clearly address all aspects of chemical management on the Project and clearly spell out how chemical application will be monitored and minimized. The details of the suggested irrigation rate and the chemicals suggested to be used in the Project are listed in section 4.

- **Selection of Turfgrass species and cultivars** – describe the characteristics of the turfgrass cultivated on various areas of the golf facility, such as greens, fairways, tees, bunkers and other areas.
- **Soil Management Practices** – specify any requirements for managing the soil at various areas within the golf facility. Soil sample may be required to identify any residual chemicals and the nutrient content of soil, depending on the health of the grass. This soil sampling could be conducted quarterly.
- **Irrigation Management** – specify any requirements and arrangement for irrigation practices.
- **Fertilizer Requirements** – identify any application requirements and estimated amounts of each type of fertilizers which will be used under different weather and soil conditions. A record sheet for recording details of fertilizers application each time should be filled and keep in site.
- **Weed Control and Herbicide Requirements** – specify the methods of removing turfgrass weeds.
- **Disease Control and Fungicides** – identify the types of diseases that may affect the selected turfgrass and the corresponding remediation method. Should microbial chemicals be used, the type of application and the quantity applied should be listed in the TMP. A record sheet for recording details of microbial chemicals application each time should be filled and keep in site.
- **Insect Control and insecticide applications** – the details required are similar to those for disease control and fungicides.
- **Chemical Application Management Plan** – outline the procedure of chemicals' (pesticide and fertilizers) preparation and applications. Any safety, training and spillage remediation and emergency response actions should also be outlined in the TMP. A record sheet for recording details of microbial chemicals application each time should be filled and keep in site.
- **Regular Water Quality Management** – identify water quality sensitive receivers nearby. The key water quality monitoring and audit parameters and associated standards and guidelines should be included in the TMP. An example of the key water quality monitoring and audit parameters is shown in Table 8-1 above. Monitoring methodology, for example, the sampling strategy, monitoring locations and monitoring frequency, should also be included. In the event that the guideline levels are exceeded, an Event Contingency Action Plan should also be included.

8.3.3 The event contingency action plan described in section 8.3.2 above propose actions taken in the event the guideline levels proposed in the TMP are exceeded. Table 8.2 suggested a guideline levels for the WQM&A programme. This guideline is based on the standards for effluent discharged into the Inshore Waters of Victoria harbour Water Control Zone stipulated in the *Technical Memorandum of Standard for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*. The proposed contingency action will be as follows:

- Inform the Golf Facility Supervisor immediately and stop chemical application, if any;
- Notify Environmental Protection Department (EPD) and Agricultural, Fisheries and Conservation Department (AFCD);
- Review of application and re-evaluate suitability and availability of alternatives to chemical control, if any;
- Agree remedial measures with Golf Facility Supervisor and inform EPD/AFCD;
- Implement immediately the agreed remedial measures; and
- Increase monitoring frequency and or locations to demonstrate the efficiency of remedial measures.

Table 8-2 Recommended Guideline for the Water Quality Monitoring and Audit Parameters

Recommended Key Water Quality Monitoring Parameters	**Suggested Guideline**
Total Nitrogen (mg/L)[1]	50
Total Phosphate (mg/L)[1]	5
Conductivity (μS/cm)[2]	<1000
Dissolved Oxygen (DO) (mg/L)[1,2]	>4
pH[1]	6.0-9.0
Chlorophyll a (μg/L)[2]	<5

Note:
1: standards are based on Table 9a stipulated in the *Technical Memorandum of Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*, EPD
2: standards based on Turf Grass Management Guidelines (version December 2001) for the Jockey Club Kau Sai Chai Public Golf Course Limited

9 USE OF PREVIOUSLY APPROVED EIA REPORTS

9.1 Past Environmental Impact Assessment Reports

9.1.1 There is no approved EIA regarding to golf facility under the EIAO. However, for the Kai Tak Runway area, Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development, EIA report, July 2001 (EIA-059/2001) is the approved EIA for the reference.