Environmental Impact Assessment
Proposed Low-rise and Low-density Residential Development At Various Lots and their Adjoining Government Land in D.D. 104, East of Kam Pok Road, Mai Po, Yuen Long, N.T.

(**Volume I – Main Text**)
Final Report

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Glory Queen Limited

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CKM Asia Limited
Ecosystems Ltd.
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1. INTRODUCTION

1.1 Background of the Project

The Project Site comprises various lots in D.D. 104, East of Kam Pok Road, Yuen Long. It covers an area of about 3.8ha. The site is located between Kam Pok Road, Ha Chuk Yuen Road and Fung Chuk Road, and bounded by a number of existing and planned residential developments adjacent to Castle Peak Road and Fairview Park Boulevard. **Figure 1-1** presents the location of the Project Site.

The Project Site falls within an area zoned "Residential (Group D)" ["R(D)"] on the Approved Mai Po and Fairview Park Outline Zoning Plan No. S/YL-MP/6 (the OZP). It is located outside the Wetland Buffer Area and Wetland Conservation Area under the Town Planning Board Guidelines (TPB PG-No. 12C). Thus, requirements such as the "no-net-loss in wetland" principle and wetland enhancement and management scheme do not apply to this Project. According to the Notes of the Subject OZP, the planning intention of the "R(D)" zone is intended primarily for improvement and upgrading of existing temporary structures within the rural area through redevelopment of existing temporary structures into permanent buildings. It is also intended for low-rise, low-density residential developments subject to planning permission from the Town Planning Board (TPB).

The current proposed development is in compliance with the statutory planning intention of the Project Site. A planning application for the residential development at the Project Site was previously obtained from the TPB.

Ramboll Environ Hong Kong Limited (Ramboll Environ), formerly known as ENVIRON Hong Kong Limited, was commissioned by the Project Proponent of the development site, Glory Queen Limited., to undertake an Environmental Impact Assessment (EIA) for the project. A project profile was submitted to EPD on 24 August 2009 for the proposed development. Pursuant to section 5(7)(a) of the Environmental Impact Assessment Ordinance (EIAO), EPD issued an EIA study brief (Ref. No. ESB-210/2009) in September 2009 for "Proposed Low-rise and Low-density Residential Development at Various Lots and their Adjoining Government Land in D.D. 104, East of Kam Pok Road, Mai Po, Yuen Long, N.T."

Ramboll Environ conducted this EIA (the Study) in association with consultants from various fields:

- Planning – Vision Planning Consultants Ltd.
- Architectural – MCAAL
- Ecology and Fisheries – Ecosystems Limited
- Engineering – AECOM
- Landscape and Visual – ADI Limited
- Traffic – CKM Asia Limited
- Road traffic noise and fixed noise sources - Westwood Hong and Associates Ltd.
- Cultural Heritage - China Point Consultants Ltd.

1.2 EIAO and Designated Projects

According to Item P of Part 1, Schedule 2 of the EIAO, the Project is a Designated Project since it is a residential development other than New Territories exempted house within the Deep Bay Buffer Zone 2.

1.3 Objectives of the EIA Study

The objectives of the EIA study are:

- to describe the Project and associated works together with the requirements for carrying out the Project;
- to identify and describe elements of community and environment likely to be affected by the Project and/or likely to cause adverse impacts to the Project, including both the natural and man-made environment;
- to identify and quantify all environmental sensitive receivers, emission sources and determine the significance of impacts on sensitive receivers and potential affected uses;
- to identify and systematically evaluate any potential losses or damage to flora, fauna and wildlife habitats;
- to identify any negative impacts on sites of cultural heritage and to propose measures to mitigate these impacts;
- to identify and systematically evaluate any potential landscape and visual impacts and to propose measures to mitigate these impacts;
- to propose the provision of infrastructure or mitigation measures so as to minimise pollution, environmental disturbance and nuisance during construction and operation of the Project;
- to identify, predict and evaluate the residual (i.e. after practicable mitigation) environmental impacts and the cumulative effects expected to arise during the construction and operation phases of the Project in relation to the sensitive receivers and potential affected uses;
- to identify, assess and specify methods, measures and standards, to be included in the detailed design, construction and operation of the Project which are necessary to mitigate these environmental impacts and reducing them to acceptable levels;
- to investigate the extent of secondary environmental impacts that may arise from the proposed mitigation measures and to identify constraints associated with the mitigation measures recommended in the EIA study, as well as the provision of any necessary modification;
- to identity, within the study area, any individual project(s) that fall under Schedule 2 and/or Schedule 3 of the EIA Ordinance; to ascertain whether the findings of this EIA study have adequately addressed the environmental impacts of those projects; and where necessary, to identify the outstanding issues that need to be addressed in any further detailed EIA study; and
- to design and specify the environmental monitoring and audit requirements, if required, to ensure the implementation and the effectiveness of the environmental protection and pollution control measures adopted.

1.4 The Approach

Pursuant to the requirement of the Environmental Impact Assessment Ordinance (EIAO), this EIA Study has been undertaken according to the Project EIA Study Brief requirements as well as the Technical Memorandum (TM) on the Environmental Impact Assessment Process of the EIAO (EIAO-TM). It provides a detailed assessment of the nature and extent of potential environmental impacts associated with the construction and operation of the Project, and recommendations for complying with environmental legislations and standards.

The scope of the EIA study covers the Project and its potential environmental impacts. The EIA addresses key issues as described below:

- Noise impacts arising from construction and operation of the Project;
- Dust impact arising from construction of the Project to nearby air sensitive receivers (ASRs); vehicular emission impacts on ASRs; industrial emissions impact on ASRs; and odour impact from the planned sewage treatment plants to the development and nearby ASRs;
- The potential water quality impacts caused by site formation, pond draining and filling, and any other works activities during construction; the potential water quality impacts caused by the operation of the Project;
- Sewerage impacts of the Project;
- Potential impacts and management of waste during both construction and operational phases;
- Direct and indirect terrestrial and aquatic ecological impacts due to the construction and operation of the Project;
- Fisheries impacts during construction and operation of the Project;
- Potential impacts on sites of archaeological interest, historic buildings/architectures and monuments; and
- Landscape and visual impacts during construction and operation of the Project.

1.5 Continuous Public Involvement

Continuous public involvement (CPI) is one of the initiatives incorporated into the EIA process for engaging the public. CPI involves identification of main concerns of the general public and special interest groups in parallel with the EIA preparation process in soliciting their views and opinions on the Project.

Public comments on the proposed development of Project were received throughout the Town Planning Application during the previous application of this project (e.g. A/YL-MP/170, A/YL-MP/202, and A/YL-MP/242), which form the basis for the current proposed development scheme.

The current proposed development scheme has reflected comments that were received during the planning application, and is in compliance with the statutory planning intention of the Project Site. That is to remove existing temporary structures and for low-rise and low-density residential development. It has obtained approval from TPB to proceed from land use planning perspective.

Apart from the public consultation during application for EIA study brief, the proposed development has also gone through the public inspection and comment process during the course of Section 16 Town Planning Application.

1.6 Description of the Project

1.6.1 Project Location

Figure 1-1 presents the location of the Project Site. The Site has an area of about 3.8 ha. The site is located between Kam Pok Road, Ha Chuk Yuen Road and Fung Chuk Road, and bounded by a number of existing and planned residential developments adjacent to Castle Peak Road and Fairview Park Boulevard. Under the Approved Mai Po and Fairview Park Outline Zoning Plan (OZP) No. S/YL-MP/6, the Project Area is zoned “R(D)”. In addition, the

Project Area is located outside the Wetland Buffer Area and Wetland Conservation Area under the Town Planning Board Guidelines (TPB PG-No.12C) (**Figure 1-1** refers). The planning intention of the zone is to allow comprehensive low-density residential development within the zone. In brief, the Project Area is designated by the Government for residential use purpose in line with the existing and planned uses on the adjacent sites.

1.6.2 Nature and Scope of Project

The Project includes the development of components described in the following paragraphs (**Figure 2-1** refers).

The Project Area covers various lots in DD 104 near Kam Pok Road, Yuen Long, with a total area of about 3.8 ha. The proposed development consists of low-rise and low density residential development, including residential clubhouse, swimming pool, site drainage system and ancillary facilities to support the development in accordance with the planned land use in the approved OZP. 32 houses of two storeys high set in spacious surroundings with private gardens and carports and a maximum building height of 2 storeys of 6.6m high, are proposed. General speaking, the existing ground level at the northern portion of the Project Site where proposed houses are located, is about +6.5mPD in average. There are general slopes surrounding the Project site boundary where the ground level gradually decreases to about the road level. The existing mPD level for the southern portion is about +4.8mPD in average. The developable area of the proposed houses will be raised to an average level of about +5.45mPD and 6.5mPD for the southern portion and the northern portion, respectively.

The proposed development layout is shown in **Figure 2-1**, while the proposed elements of this Project are also depicted in **Figure 11-11-1**.

Description of scenarios with and without the Project; different development options; different construction methods and sequence; and reasons for selecting the proposed development that have been considered during the EIA Study, are detailed in Chapter 2.

1.6.3 Project Programme

Appendix 1-1 presents the implementation programme. According to the programme, the construction works are scheduled to commence in year 2017 and for completion by year 2018. After site formation works to raise the existing ground level, subsequent construction of building, road and underground services will then commence within the Project Site area.

1.7 Description of the Environment

The Project Site is located about 100m north of Fairview Park Boulevard and about 300m northwest of San Tin Highway Interchange (**Figure 2-2**). It is bounded by Ha San Wai Road to its south; Kam Pok Road to its west; Fung Chuk Road to its north; and Ha Chuk Yuen Road and an open storage site to its east (**Figure 2-2**).

Further west across Kam Pok Road is Ngau Tam Mei Channel. To the northwest of the Project Site is the Chuk Yuen Floodwater Pumping Station. Further east across Ha Chuk Yuen Road are mainly abandoned agricultural land and temporary warehousing structures. An open storage and a garage are located immediate southeast of the Project Site. Low-rise residential housing developments, namely Helene Terrace and Villa Camellia, are located across Ha San Wai Road south of the Project Site (**Figure 2-2**).

According to the "*Town Planning Board Guidelines for Application for Developments within Deep Bay Area under Section 16 of the Town Planning Ordinance*" (TPB PG No. 12C), since the Project Site is located outside the Wetland Conservation Area and Wetland Buffer Area, TPB Guidelines (TPB PG No. 12C)does not apply for the proposed residential development at the Project Site.

Land uses on the Project site and zoning on surrounding areas are also illustrated in **Figure 11-1**.

Baseline environmental conditions of the Project Site and its surrounding areas which may be affected have been identified, which are also further described in the respective chapters of this EIA report. Existing technical data sources; local and regional plans; and relevant departments and authorities holding the baseline information have been approached. Baseline surveys were also carried out as part of this EIA Study.

1.8 Major Concurrent Projects

A number of development projects are known to be implemented near the Project Site. They include the followings:

- Yuen Long and Kam Tin Sewerage and Sewage Disposal under PWP Item 4235DS (EIA Register No.: AEIAR-078/2004);
- Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River (EIA Register No.: AEIAR-133/2009);
- Proposed Residential Development within “Residential (Group D)” zone at various lots in DD104, Yuen Long, N.T. (Study Brief No. ESB - 204/2009) (hereinafter referred to as the “RD Site”);
- Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long, N.T. (EIA Register No.: AEIAR-182/2014) (hereinafter referred to as the “REC Site”) (note: a rezoning application for that development site was agreed by TPB under the planning application no. Y/YL-MP/3. The exact new zoning of that site is still subject to Government’s further review. However, it is noted that the submitted development scheme is the same as that approved under the EIAO); and
- Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long (EIA Register No.: AEIAR-189/2015) (hereinafter referred to as the “Yau Mei Site”).

The locations of the above-mentioned development projects (including the alignment of section of proposed public sewerage and the proposed cycle track alignment near the Project Site) are also shown in **Figure 1-2**.

Yuen Long and Kam Tin Sewerage and Sewage Disposal Project

With regards to the above, this Government’s public sewerage project has already obtained approval on their EIA reports under the EIAO process, although the Environmental Permit has not yet been obtained for its construction and operation. The public sewerage project near Ngau Tam Mei Channel concerns the construction of a section of gravity trunk sewer underneath Kam Pok Road and Yau Pok Road as well as construction of proposed San Tin No.1 Sewage Pumping Station (ST1SPS) near the road junction between Kam Pok Road and Castle Peak Road. According to the approved EIA report of this project, the construction would commence in mid-2005 for completion by end of 2007. However, there is currently no fixed construction programme for this public sewerage project.

Proposed Cycle Track Project

For the cycle track project, this Government project has already obtained approval on their EIA reports under the EIAO process and Environmental Permit has been obtained for its

construction and operation. A section of the cycle track will be constructed between Yau Pok Road and the Project Site. According to the approved EIA report, the construction of the cycle track would commence in mid-2009 for completion by early 2012. Currently, there is no fixed construction programme for this cycle track project.

Proposed "RD Site" Project

This private residential development project will need to obtain approval under the EIAO for its construction and operation. Development programme in the respective project profile of these planned projects is outdated. Based on the latest project information obtained from the project proponent of that project, its construction works would likely commence in year 2020 and for completion by 2023. It is also noted that the "RD Site" will still need to carry out its EIA study required under the EIAO.

Proposed "REC Site" Project

The EIA report for the "REC Site" Project has already been approved (EIA Register No.: AEIAR-182/2014). An Environmental Permit has been issued under the EIAO in 2014 for the construction and operation of this private residential development project. Based on the current best available information, the construction of the planned "REC Site" would commence in year 2017 for completion in year 2020.

Proposed "Yau Mei Site" Project

The EIA report for the "Yau Mei Site" Project has already been approved. An Environmental Permit has been issued under the EIAO in 2015 for the construction and operation of this private residential development project. According to its approved EIA report, the project will commence in year 2015 and it is planned for completion by year 2018 which may be constructed concurrently with this Project.

Potential Concurrent Works

As the above two Government projects have already obtained EIA approval, overlapping of their works programme with this proposed development project cannot be precluded at this stage, and hence they are considered in this EIA study.

For the last three private residential development projects, since works of this Project may potentially overlap in terms of time with the said private residential projects, and that concurrent works with the approved Government projects cannot be precluded at this moment, cumulative impact assessment is further considered in the subsequent chapters.

1.9 Structure of the EIA Report

The EIA presents the findings of the Study and contains the following sections which demonstrate that the criteria in relevant sections of the Technical Memorandum (TM) on the Environmental Impact Assessment Process of the EIAO (EIAO-TM) are complied:

- Section 1 (this section) provides an introduction of the Study.
- Section 2 presents the background and the need for this Study. It also describes the consideration of possible development options, construction methods and sequence of works for the Project.
- Section 3 provides information of the air quality impact assessment.
- Section 4 describes the potential noise impact during construction and operation of the Project and recommends mitigation measures.

- Section 5 presents the water quality impact assessment.
- Section 6 presents the sewerage and sewage treatment implications.
- Section 7 presents the waste management implications.
- Section 8 presents the ecological impact assessment. It contains the findings of the baseline survey and the identification of appropriate mitigation measures to avoid, minimize and compensate for ecological impacts.
- Section 9 presents the fisheries impact assessment.
- Section 10 presents considerations of cultural heritage.
- Section 11 presents the landscape and visual impact assessment.
- Section 12 is the summary of environmental outcomes.
- Section 13 presents the environmental monitoring and audit requirements
- Section 14 summarises project implementation schedule of mitigation measures.
- Section 15 presents the conclusions of the EIA Study.

2. CONSIDERATION OF ALTERNATIVES

2.1 Introduction

This Chapter outlines the general land-use planning background of the Project Site; a brief description of the existing site conditions and the key development parameters of the Project; an evaluation of the potential implications of adopting the "With Development" and "Without Development" scenarios of the Project Site; a comparison between different development options and the preferred development scheme; and reasons for selecting the current proposed development. Alternative construction methods and sequence are also evaluated.

2.2 General Land-use Planning Background

2.2.1 The Project Site

The Project Site falls within an area zoned "Residential (Group D)" ["R(D)"] on the Approved Mai Po and Fairview Park Outline Zoning Plan No. S/YL-MP/6 (the "OZP") (**Figure 11-1** refers).

The Project Site is within Deep Bay Buffer Zone 2 under the EIAO, but is outside the Wetland Buffer Area as well as the Wetland Conservation Area under the TPB Guidelines (TPB PG-No. 12C) (**Figure 1-1** refers). Thus, requirements such as the "no-net-loss in wetland" principle and wetland enhancement and management scheme do not apply to this Project. It is intended for low-rise and low-density residential development according to the approved OZP.

According to the Notes of the OZP, the planning intention of "R(D)" zone is: " *…primarily for improvement and upgrading of existing temporary structures within the rural areas through redevelopment of existing temporary structures into permanent buildings. It is also intended for low-rise, low-density residential developments subject to planning permission from the Town Planning Board*".

Paragraph (b) in the Remarks of the Notes states: "*No development including redevelopment for 'Flat' and 'House' (except 'New Territories Exempted House') uses, ……shall result in a development and/or redevelopment in excess of a maximum plot ratio of 0.2 and a maximum building height of 2 storeys (6m)*".

Paragraph (c) in the same Remarks states: "*Based on the individual merits of a development or redevelopment proposal, minor relaxation of the plot ratio and building height restrictions stated in paragraph (b) above may be considered by the Town Planning Board on application under section 16 of the Town Planning Ordinance*".

Paragraph (e) in the same Remarks also states: "*Any filling of land/pond or excavation of land necessary to effect a change of use to any of those specified in Columns 1 and 2 above ……should not be undertaken or continued on……without the permission from the Town Planning Board under section 16 of the Town Planning Ordinance.*"

In fact, there were previous approved planning applications for house development at the Project Site (Section 2.4 refers). Pond filling at the Project Site is authorized in the previous approved planning application no. A/YL-MP/170 in year 2010.

2.3 Existing Site Context

The Project Site covers a total land area of approximately 37,645m^2. At present, the Project Site is partially vacant, with remaining area to be existing car parking operation. There is also an existing abandoned pond in its southern part (which is in deteriorating conditions). . Temporary uses, such as open storage activities are identified in the vicinity of the Project Site (**Figure 2-2**).

It is bounded by Ha San Wai Road to its south; Kam Pok Road to its west; Fung Chuk Road to its north; and Ha Chuk Yuen Road and an open storage site to its east (**Figure 2-2**).

Further west across Kam Pok Road is Ngau Tam Mei Channel. About 70m to the northwest of the Project Site is the Chuk Yuen Floodwater Pumping Station.

Further east across Ha Chuk Yuen Road are mainly abandoned agricultural land and temporary warehousing structures. An open storage and a godown are located to the southeast of the Project Site. Low-rise residential housing developments, namely Helene Terrace and Villa Camellia, are located across Ha San Wai Road south of the Project Site (**Figure 2-2**).

2.4 Planning Application Record Related to the Project Site

Since 1999, there were a few planning applications for house development and applications for temporary uses within the Project Site submitted to TPB under S16 of the Town Planning Ordinance. Details of these planning applications are summarized in **Table 2-1** and **Figure 2-3**.

According to the recent planning application, TPB has approved with conditions for houses development at the Project Site with a minor relaxation of building height restriction (i.e. from 2 storeys and 6m to 2 storeys 6.6m), and a proposed filling of pond/ land and excavation of land. The site area is about 37,645m^2. The proposed development comprises a total of thirty-two 2-storey houses with a total plot ratio of 0.2. Detailed development parameters are outlined in paragraphs below.

Table 2-1 Previous Planning Applications Related to Project Site

Application No.	Site Address (in D.D. 104)	Site Area (m^2)	Proposed Uses	Decision (Date) *[Status*]*
A/YL-MP/55	Lots 3224(Part), 3225SA (Part), 3226SA(Part), 3228 and 3229	11,584	26 2-storey Houses with Clubhouse and Recreational Facilities	A/C (13.8.1999) *[Lapsed]*
A/YL-MP/90	Lots 3221RP(Part), 3224RP (Part), 3225SA RP(Part) and 3226SA RP(Part)	7,900	Temporary Fun Kart Playground and Barbecue Site for 2 Years	Rejected (4.5.2001)
A/YL-MP/104	Lots 3122RP, 3123, 3124, 3147RP, 3150RP, 3192RP, 3209RP, 3220RP(Part), 3224RP, 3225SA RP(Part), 3226SA RP(Part), 3228, 3229, 3230RP(Part) & GL	37,604	74 2-storey Houses with Relaxation of Plot Ratio	Rejected (1.3.2002)
A/YL-MP/110	Lots 3122RP, 3123, 3124, 3147RP, 3150RP, 3192RP, 3209RP, 3220RP (Part), 3224RP, 3225SA RP(Part), 3226SA RP(Part), 3228, 3229, 3230RP(Part) & GL	37,604	74 2-storey Houses	A/C (17.1.2003) *[Lapsed]*

Application No.	**Site Address (in D.D. 104)**	**Site Area** (m^2)	**Proposed Uses**	**Decision (Date)** ***[Status*]***
A/YL-MP/136	Lots 3224RP(Part), 3225SA(Part), 3226SA(Part), 3228 & 3229	110,938	26 2-storey Houses with Clubhouse and Recreational Facilities	A/C (14.1.2005) *[Lapsed]*
A/YL-MP/144	Lot 4658(Part)	110,730	8 2-storey Houses and Filling of Ponds	Withdrawn (2.11.2005)
A/YL-MP/148	Lots 3224RP, 3225SA RP and 3226SARP(Part)	99,420	Temporary Open Air Private Car Park for Exhibition of Used Cars for 3 Years	A/C for 2 Years up to 23.12.2007 (23.12.2005) *[Revoked on 23.6.2007]*
A/YL-MP/156	Lots 3224RP, 3225SARP, 3226SA, 3228, 3229 & GL	12,798	26 2-storey Houses with Clubhouse and Recreational Facilities	A/C (3.11.2006) *[EoT of PP Approved on 21.10.2010 and Extended for 48 Months until 3.11.2014]*
A/YL-MP/170	Lots No. 3207RP, 3209RP, 3220RP, 3221RP, 3224RP, 3225SA RP, 3225RP, 3225SC RP, 3226SA RP, 3226RP, 3228, 3229, 3230RP, 3250SB ss33 SB, 3250SB ss21RP, 3250SB RP(Part), 4658(Part) & GL	37,930	42 2-storey Houses with Clubhouse and Recreational Facilities, Relaxation of BH Restriction and Filling of Ponds	A/C (7.5.2010) *[Planning Approval Valid until 7.5.2014]*
A/YL-MP/176	Lots 3225 SC RP (Part), 3250 SB ss21RP, 3250 SB ss33SB, 3250 SB ss40 (Part)	11,860	Temporary Shop and Services (Sale of Household Plants, Aquarium and Clothes) Use for a Period of 3 Years	A/C for 3 Years up to 19.6.2012 (19.6.2009) *[Revoked on 19.12.2009]*
A/YL-MP/202 & A/YL-MP/242	Lots No. 3207RP, 3209RP, 3220RP, 3221RP, 3224RP, 3225SA RP, 3225RP, 3225SC RP, 3226SA RP, 3226RP, 3228, 3229, 3230RP, 3250SB ss21 SB, 3250SB ss33RP, 3250 SB ss40SA (Part), 3250SB ss40 RP (Part), 4658(Part) & GL	37,645	32 2-storey Houses with Clubhouse and Recreational Facilities, Relaxation of BH Restriction and Filling of Pond/Land, Excavation of Land	A/C (7.2.2014) *[Planning Approval Valid until 7.2.2018]* *A/C (27.2.2015) [Planning Approval Valid until 27.2.2019]*

* Status for the Approved Applications Only; EoT – Extension of Time; PP – Planning Permission; A/C – Approved with Conditions; BH – Building Height; GL – Government Land.

2.5 Evaluation of Different Development Layout Options

2.5.1 Purposes and Objectives for the Project

As described in Chapter 1, this Project is for low-rise and low-density residential development within an existing planned “R(D)” zone.

The Project is to implement the statutory land use planning under the OZP within “R(D)” zone. The Project area is designated by the Government for residential use purpose in line with the existing and planned uses on the adjacent sites.

The EIA Study Brief requires the consideration of alternative layout options with justifications and evaluations for these alternatives. Development layout that has been formulated for evaluation for this Project, and the evolution of different layout options are described in the following paragraphs. Scenarios both with and without the Project have been evaluated in paragraphs below.

The objectives are through different factors considered in the option selection and comparison of environmental benefits and disbenefits of different layout options with a view to recommending the preferred option to avoid and minimize adverse environmental effects to the maximum extent and to enhance the landscape and visual quality in the area. Measures that can enhance the landscape and visual qualities have been proposed.

2.5.2 Scenario 1: Without the Project

According to the TPB record, temporary approval for 'Shop and Services (Sale of Household Plants, Aquarium and Clothes and Agency for Car Repairing Service)' use for a period of 3 years at part of the project site [i.e. Lots 3225 S.C RP(Part), 3250 S.B ss.21 RP (Part), 3250 S.B ss.33 S.B and 3250 S.B ss.40 (Part) in D.D. 104] were previously granted by Town Planning Board on 19.6.2009 (Application No. A/YL-MP/176). However, as the applicant of this application failed to comply with the approval conditions, the application was revoked on 19.12.2009.

If the Project Site remains as its existing situation (i.e. without development scenario), similar temporary planning approvals (such as temporary car-parking area or other temporary industrial uses) may be granted in the future which will result in deteriorating the environment; and the planning intention of the “R(D)” zone under the approved OZP (i.e. the improvement and upgrading of existing temporary structures within the rural areas through redevelopment of existing temporary structures into permanent building) cannot be implemented. Under this scenario:

i. No sustainable residential development will be permanently undertaken within the Project Site.

ii. All existing land-use features, such as the deteriorating pond, temporary car-parking activities and vacant portion at the north, will remain unchanged.

iii. The conditions of the existing pond will deteriorate further. This will result in creating adverse environmental and hygiene problems on the local area.

iv. The temporary parking activities will continue and extend to the northern part of the Project Site.

v. The Project Site is sandwiched within a designated residential “R(D)” zone on the town plan. It will impose adverse effect on the residential developments on its two sides.

vi. It completely deviates from the original planning intention of the "R(D)" zone which aims to improve the general living environment of the area through redevelopment of the Project Site and other sites within the same "R(D)" zone.

vii. It represents a waste of land resources and eventually, it will become a blight to the local community.

viii. No catalyst effect will be generated to stimulate land owners in the vicinity to phase out the open storage operations and to upgrade the local living environment with proper redevelopment schemes.

ix. More and more local complaints to various Government departments are anticipated.

x. Visually unpleasant features including open carpark and weedy trees remain on site.

Conclusion:

In the light of the above, it can be concluded that the "Without" development option is not appropriate for the Project Site.

With the proposed development it would replace existing uncontrolled site conditions; prevent further deterioration/ nuisance of the Project Site; enable the implementation of planning intension the "R(D)" zone under the OZP; and improve the environment by a properly managed and controlled use.

2.5.3 Scenario 2: With the Project (Consideration of Alternative Layout Options)

Alternative layout options have been considered to represent different development options. Details of each alternative layout option are presented in the following paragraphs and these options are evaluate against identified Project objectives in Section 2.5.3.4.

2.5.3.1 Initial Layout Option of Just Meeting the Planning Intention (Figure 2-4 refers)

During the early stage of preparation of development layout, an initial layout was firstly established with a view of just meeting the planning intention of the Project Site. Under this layout, the entire development is designed as a typical sub-urban development. In which, residential houses are served by a big loop road system with house lots on its two sides. A clubhouse is proposed to be located along Kam Pok Road with vehicular access branches off directly from the main entrance road. Please refer to **Figure 2-4**.

In this layout option, residential houses are located in close vicinity to the nearby road with little or no landscape buffer in between, thus it may lead to adverse landscape and visual impacts as well as adverse road traffic noise and air quality impacts. Thus, this layout option is not preferred and not considered further.

2.5.3.2 Option A: Previous Approved Layout Under Planning Application No. A/YL-MP/170 (Figure 2-5 refers)

Having considered the above drawbacks, enhancement measures have been incorporated in the later design during the previous planning application under A/YL-MP/170. The layout proposed under A/YL-MP/170 comprises a total of 42 nos. of 2-storey houses with a building height of 6.6m. Based on a site area of about 37,930m^2 and a maximum plot ratio of 0.2, a total GFA of 7,586m^2 can be achieved. The average house size in this scheme is 180.62m^2.

In this scheme, a strip of landscaping area is provided along Kam Pok Road as well as along Ha Chuk Yuen Road with a view to enhance the landscape and visual quality of the Project

Site. The clubhouse and the entrance point of the Project Site breaks this landscaping area into two sections. The existing group of landscaping area in the northern tip will be retained. Additional set back from Kam Pok Road are also provided for the proposed houses so that the potential road traffic noise and air quality impacts can be significantly reduced.

Under this layout option, a layer of residential houses will be located along the eastern site boundary and may be affected by an open storage site to the east. As such, there will be a 7.5m tall and 0.5m cantilevered noise barrier wall along a portion of the eastern site boundary in order to shield the development site from the open storage site. Therefore, its visual impact will need to be mitigated. A strip of 1.5m wide planting area will be provided along this noise barrier wall.

Please refer to **Figure 2-5** for this layout option. This layout option is compared with other alternative options in **Table 2-2**.

2.5.3.3 Option B: Alternative Development Layout (Figure 2-6 refers)

Asides from Option A, another alternative development layout option was established (see **Figure 2-6**). Basically, the key development parameters (i.e. site area, plot ratio, number of storeys and total GFA) in this scheme are the same as those in Option A. The main differences between these two are number of houses (32 in this scheme instead of 42 under the approved A/YL-MP/170) and the overall development layout. **Table 2-3** compares the key development parameters of these two layout options.

Due to the reduction in the number of houses (from original 42 to 32 in the present scheme), the average house size will be increased to 237.06m^2.

In terms of development layout, this scheme adopts a two-cluster development concept instead of the one-cluster. The merits of this arrangement are: simpler and more effective internal road layout; more peripheral planting areas to further enhance the visual amenity of the development; a continuous landscaping area alongside Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road; central location of the clubhouse and the ancillary recreational facilities; more internal communal landscaping areas; more privacy in each house; no noise barrier wall along Kam Pok Road; and shorter noise barrier wall along Ha Chuk Yuen Road with less visual impact.

This scheme was developed with less no. of houses and more landscape buffer area has been provided along Kam Pok Road along the western site boundary to increase the landscape area, while residential buildings can be further set backed from Kam Pok Road in order to minimize traffic noise and air quality impacts. A wider landscape buffer area is also provided along the eastern Site boundary (i.e. minimum 5m wide instead of 1.5m in Option A), which offers much better screening effect on the wall; making use of the existing ingress/egress point; and fewer houses, hence generating less vehicular traffic on the local road system.

The disposition of residential houses under this layout option has also been revised with a view to minimize potential noise impacts. Noise tolerant uses such as sporting facilities, sewage treatment plant (STP), and club house are now relocated to the eastern site boundary so that it allows a further set back of residential buildings from the eastern site boundary and the noise source at the open storage site. With this arrangement, the concerned no. of residential houses along the eastern site boundary which may be affected by the operation of open storage site, is also minimized.

Having considered the above, Option B is considered a preferred layout option and is proposed further under the planning application no. A/YL-MP/202. A detailed comparison of pros and cons of different development options is provided in **Table 2-2**.

2.5.3.4 Option B: Recommended Development Layout (under the Approved Planning Application No. A/YL-MP/202, hereinafter referred to as "Recommended Layout") (Figure 2-7 refers)

Although Option B (as described in Section 2.5.3.3 above) is considered feasible, in response to departmental comments received during the planning application under A/YL-MP/202, some adjustments were incorporated into the design.

Innovative measure has been proposed to make use of the noise tolerant STP building structure in between the residential houses and the concerned open storage site to the east. The shape of the STP building has been designed in such a way that it can be used to provide noise shielding to the open storage site to the east. This would replace a section of the noise barriers originally proposed along the eastern Site boundary, thus minimizing the extent and length of noise barrier required. With this arrangement, residential houses in adjacent to the STP can be further set back from the eastern site boundary (i.e. the noise source) and visual impact is improved further.

In addition, a total land area of about 285m^2 at the southwest corner of the Project Site (i.e. at the intersection between Ha San Wai Road and Kam Pok Road) are removed in order to make way for a right-of-way (ROW) to adjoining lots in response to comments received during the planning process.

The Recommended Layout is shown in **Figure 2-7**, which was approved under the planning application A/YL-MP/202. A detailed comparison of pros and cons of different development options is provided in **Table 2-2**.

2.5.4 Comparison and Evaluation of Alternative Options

The abovementioned alternative layout options and evolution, together with the "Without the Project" Scenario are compared and evaluated in **Table 2-2** below. The evaluation compares the relative strengths and weakness (also benefits and disbenefits) of each option in ecological, planning, visual and landscape, environmental and engineering respects in the context of specific project objectives. Measures to enhance the landscape and visual qualities have been proposed.

2.6 Key Development Parameters of the Alternative Schemes

The key development parameters of alternative schemes are also outlined in **Table 2-3** below. Master Layout Plan of these schemes is provided in **Figure 2-5** to **2-7**.

Table 2-2 Evaluation of Development Options

Objectives		Scenario 1: Without the Project	Scenario 2: With the Project		
			Option A (Figure 2-5 refers)	**Alternative Option B** (Figure 2-6 refers)	**Option B: Recommended Layout** (Figure 2-7 refers)
Planning	Complying with the planning intention of "Residential (Group D)" ["R(D)"] zone.	Deviated from the planning intention of the "R(D)" zone; never realize the town plan; site conditions will be further degraded and will impose adverse impact to its surrounding developments.	Basically, in-lines with the planning intention; complies with the statutory requirements set out in the town plan; With certain enhanced measures such as landscape buffer and building set back; the overall development layout, allocation of clubhouse and the ancillary facilities, and provision of landscaping areas and planting zone for screening effect can be further improved.	Fully in-line with the planning intention and complies with the statutory requirements. Better development layout; more simple road system; more landscaping areas; wider planting; better disposition of clubhouse;	Fully in-line with the planning intention and complies with the statutory requirements. Better development layout; more simple road system; better arrangements on the landscaping areas and planting; making use of the landscape berm to enhance the visual amenity; better disposition of clubhouse, recreational and sewerage facilities.
	Planning control on Project Site, which is outside the Wetland Buffer Area	Temporary car-parking area or other temporary industrial uses (similar to those granted before) may be granted in future. No sustainable development within the Project Site which can adhere to its planning intention.	Statutory land use planning can be implemented through sustainable residential development to avoid further degraded site condition.	Statutory land use planning can be implemented through sustainable residential development to avoid further degraded site condition.	Statutory land use planning can be implemented through sustainable residential development to avoid further degraded site condition.
Ecological	Minimizing habitat fragmentation	The Project Site is located outside the Wetland Buffer Area and is surrounded by existing residential uses and activities.	The Project Site is urbanised and located outside the Wetland Buffer Area and is surrounded by existing residential uses and activities. No adverse impact	The Project Site is urbanised and located outside the Wetland Buffer Area and is surrounded by existing residential uses and activities. No adverse impact	The Project Site is urbanised and located outside the Wetland Buffer Area and is surrounded by existing residential uses and activities. No adverse impact.
	Maximizing the existing and potential wildlife usage of the Site	Wildlife usage of the Site remains the same. Site condition continues to deteriorate due to unattended management.	Enhanced by landscape planting will provide some habitats for birds and butterflies. Potential wildlife usage of the Site increased compared Scenario 1.	More landscape planting will provide more habitats for birds and butterflies Potential wildlife usage of the Site increased compared Option A.	More landscape planting will provide more habitats for birds and butterflies Potential wildlife usage of the Site increased compared Option A.

Objectives		Scenario 1: Without the Project	Scenario 2: With the Project		
			Option A (Figure 2-5 refers)	**Alternative Option B (Figure 2-6 refers)**	**Option B: Recommended Layout (Figure 2-7 refers)**
				Reduced extent and height of noise barrier compared with Option A, and hence the potential risk of bird collision	Reduced extent and height of noise barrier compared with Option A, and hence the potential risk of bird collision
	Minimization of potential impact to sites of recognized conservation importance	The Project Site is located outside the Wetland Buffer Area, 520m from WCA and is far away from all other sites of recognized conservation importance. No impact	The Project Site is located outside the Wetland Buffer Area, 520m from WCA and is far away from all other sites of recognized conservation importance. Direct impacts on recognized sites of conservation importance and other ecologically sensitive areas have been avoided.	The Project Site is located outside the Wetland Buffer Area, 520m from WCA and is far away from all other sites of recognized conservation importance. Direct impacts on recognized sites of conservation importance and other ecologically sensitive areas have been avoided.	The Project Site is located outside the Wetland Buffer Area, 520m from WCA and is far away from all other sites of recognized conservation importance. Direct impacts on recognized sites of conservation importance and other ecologically sensitive areas have been avoided.
Landscape and Visual	Minimise Tree Impact	No development / No Impact Weedy trees and existing trees with low amenity value remain on site	Tree retention along Kam Pok Road on the slope along Ha Chuk Yuen Road Moderate Tree Impact	More tree retention along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road. Less Tree Impact than Option A	More tree retention along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road when compared to Option A and Alternative Option B due to reduction of site area.
	Minimise Potential Landscape Impact	Impact on landscape resources : Roadside amenity and fishpond (abandoned): Site condition continues to deteriorate due to unattended management. Open yard: No Impact	Impact on landscape resources : Roadside amenity: approx. 1.06 ha loss (Medium impact on existing trees): Significant Adverse Impact Fishpond (abandoned) : approx. 0.33 ha.: Moderate Adverse Open yard: 2.5 ha : Moderate Adverse impact	Impact on landscape resources : Roadside amenity: approx. 0.9 ha loss (Less impact on existing trees) : Moderate Adverse Impact Fishpond (abandoned): approx. 0.33 ha Moderate Adverse Impact Open yard: 2.5 ha : Moderate Adverse Impact	Impact on landscape resources : Roadside amenity: approx. 0.6 ha (Less impact on existing trees) : Moderate Adverse Impact Fishpond (abandoned): approx. 0.33 ha Moderate Adverse Impact Open yard: 2.5 ha : Moderate Adverse Impact Least loss of roadside amenity due to reduction of site area when compared to Option A and Alternative B.

Objectives	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A (Figure 2-5 refers)	**Alternative Option B** (Figure 2-6 refers)	**Option B: Recommended Layout** (Figure 2-7 refers)
Minimise Potential Landscape Impact (Cont')	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape : No Impact Indirect impacts: No Impact The site is largely hard paved for open car park, existing unpleasant landscape character will remain unchanged. Greening area under existing condition is very low.	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape : Negligible upon implementation of residential landscape proposals Minimum landscape buffer (1.5m) along a portion of the periphery of the site. Noise barrier is required along Kam Pok Road. Indirect impacts: Other impacts largely negligible due to responsive low-rise development compatible with other house developments in the vicinity. Slightly beneficial to the low-residential landscape along Ngau Tam Mei Drainage Channel upon replacement of industrial to residential landscapes	Impact on landscape character areas: LCA5 Kam Pok Road Roadside Residential Landscape : Negligible upon implementation of residential landscape proposals Wider landscape buffer (5m) at the periphery of the site incorporated when compared to Option A. High noise barrier wall is still needed along a portion of eastern site boundary, but with better screening effect. Articulated design of noise mitigation instead of monotonous design when compared to Option A. Removal of noise barrier along Kam Pok Road Indirect impacts: Other impacts largely negligible due to responsive low-rise development compatible with other house developments in the vicinity. Slightly beneficial to the low-residential landscape along Ngau Tam Mei Drainage Channel upon replacement of industrial to residential landscapes.	Impact on landscape character areas: LCA5 Kam Pok Road Roadside Residential Landscape : Negligible upon implementation of residential landscape proposals Design of noise mitigation with built structures of STP which is integrated with greening area instead of monotonous panel design when compared to Option A and Alternative Option B. Lowest overall height of noise barrier when compared to the previous options. Wider landscape buffer (5-8m) at the periphery of the site than Option A. Better screening effect on high noise barrier wall. Indirect impacts: Other impacts largely negligible due to responsive low-rise development compatible with other house developments in the vicinity. Slightly beneficial to the low-residential landscape along Ngau Tam Mei Drainage Channel upon replacement of industrial to residential landscapes.

Objectives		Scenario 1: Without the Project	Scenario 2: With the Project		
			Option A (Figure 2-5 refers)	**Alternative Option B** (Figure 2-6 refers)	**Option B: Recommended Layout** (Figure 2-7 refers)
Landscape and Visual	Avoid Potential Visual Impact	No impact. Visually unpleasant open car park occupied by heavy duty trucks and coaches and weedy trees remain on site, the visual quality is poor	Relatively higher density of houses (42 houses) with 6.6m building height. The longest extent of noise barrier along the site boundary. Medium overall height of noise barrier when compared to the other option Higher visual impact due to noise barriers than other options. Proposed development is integrated into existing topographical site condition with minimum site formation works. For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience significant visual impact due to loss of roadside amenity and the introduction of noise barrier along all three sides of the site. Visual quality enhanced upon replacement of existing unpleasant use with residential landscape.	Less density of houses (32 houses). Higher building height of 7m. Noise barrier required only along Ha Chuk Yuen Road. Option with the highest overall height of noise barrier. Design with articulated edges and stepped height profile. Reduced visual impact due to noise barriers when compared with Option A. Proposed development is integrated into existing topographical site condition with minimum site formation works. For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience moderate to significant visual impact due to loss of roadside amenity and the introduction of noise barrier. Less visual impact than Option A due to the reduction of the height and extent of noise barrier and number of proposed houses. Visual quality enhanced upon replacement of existing unpleasant use with residential landscape.	Less density of houses (32 houses) with 6.6m building height. Similar noise barrier extent as Option B. Integrated noise mitigation with built structures, STP, further reduced the extent of noise barrier panel. The lowest noise barrier when compared to Option A and B. Visual impact due to noise barrier is minimised. Proposed development is integrated into existing topographical site condition with minimum site formation works. For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience moderate to significant visual impact due to loss of roadside amenity and the introduction of noise barrier. Option with the least visual impact to the residential neighbourhoods due to further reduction of the height profile and extent of noise barrier. Visual quality enhanced upon replacement of existing unpleasant use with residential landscape.

Objectives		Scenario 1: Without the Project	Scenario 2: With the Project		
			Option A **(Figure 2-5 refers)**	**Alternative Option B** **(Figure 2-6 refers)**	**Option B: Recommended Layout** **(Figure 2-7 refers)**
Engineering	Practical and Feasible Hydrological System	No construction of drainage works are required. Uncontrolled surface runoff is directly discharged without treatment.	Construction of drainage works are required. Surface runoff and sewage will be properly collected and treated before discharge.	Construction of drainage works are required. Surface runoff and sewage will be properly collected and treated before discharge.	Construction of drainage works are required. Surface runoff and sewage will be properly collected and treated before discharge.
Environmental	Minimise Site Formation Works and Retaining Works Required and Associated Environmental Impacts	No site formation works are required.	Site formation works are required within the Project Site. Proposed development is integrated into existing topographical site condition with minimum site formation level, thus minimising the scale of site formation works.	Site formation works are required within the Project Site. Proposed development is integrated into existing topographical site condition with minimum site formation level, thus minimising the scale of site formation works.	Site formation works are required within the Project Site. Proposed development is integrated into existing topographical site condition with minimum site formation level, thus minimising the scale of site formation works.

Objectives		Scenario 1: Without the Project	Scenario 2: With the Project		
			Option A (Figure 2-5 refers)	**Alternative Option B** (Figure 2-6 refers)	**Option B: Recommended Layout** (Figure 2-7 refers)
Environmental	Noise and Air Quality Impacts	No impact. Potential nuisance due to current open car parking activities.	Relatively higher density of houses with minimum set back of buildings from Kam Pok Road and some landscape buffer along site boundary, noise and air quality impacts are reduced. Some residential buildings are in adjacent to the eastern site boundary and close to the fixed noise source – adverse noise impact. Requiring single-aspect design at some houses and higher boundary noise barrier with minimum landscape buffer along a portion of eastern site boundary to shield fixed noise source to the east of Project Site.	Reduced density of houses with further set back of buildings from Kam Pok Road and additional landscape buffer along site boundary to alleviate noise and air quality impacts. Some residential buildings along eastern site boundary are further set back from the fixed noise source – noise impact reduced. Some noise tolerant uses are placed along a portion of eastern site boundary. Additional landscape buffer area (set back from boundary) is provided. High boundary noise barrier will still be required along a portion of eastern site boundary to shield fixed noise source to the east of Project Site.	Reduced density of houses with further set back of buildings from Kam Pok Road and additional landscape buffer along site boundary to alleviate noise and air quality impacts. More residential buildings along eastern site boundary are further set back from the fixed noise source – noise impact is minimized. Noise tolerant STP building structure is in between the residential houses and the fixed noise source to the east in order to provide noise shielding. Additional landscape buffer area (set back from boundary) is provided. A section of the noise barriers originally proposed along the eastern Site boundary will no longer be required, thus minimizing the extent and length of noise barrier.
	Water Quality Impacts	Uncontrolled surface run-off carrying sediment laden due to lack of maintenance. Direct discharge without treatment.	More paved area of internal road, which may result in relatively increased surface runoff. Surface runoff to be properly collected and treated before discharge. During construction, surface run-off will be diverted to the constructed surface drains and treated before discharge.	More effective internal road layout with reduced paved road area and reduced surface runoff. Surface runoff to be properly collected and treated before discharge. During construction, surface run-off will be diverted to the constructed surface drains and treated before discharge.	More effective internal road layout with reduced paved road area and reduced surface runoff. Surface runoff to be properly collected and treated before discharge. During construction, surface run-off will be diverted to the constructed surface drains and treated before discharge.

Table 2-3 Key Development Information

Development Parameters	**Option A** **Previous Approved Scheme** **(Application No. A/YL-MP/170)**	**Option B**	**Option B: Recommended Layout** **(Approved under A/YL-MP/202)**
Site Area	**37,930m^2 (approx.)**	**37,930m^2 (approx.)**	**37,645m^2 (approx.)**
Plot Ratio	**0.2**	**0.2**	**0.2**
Total Domestic GFA	**about 7,586m^2**	**about 7,586m^2**	**about 7,529m^2**
Total Non-domestic GFA (Clubhouse) **(to be exempted from GFA calculation)**	**About 379m^2** (i.e. not more than 5% of the total domestic GFA)	**About 379m^2** (i.e. not more than 5% of the total domestic GFA)	**About 376m^2** (i.e. not more than 5% of the total domestic GFA)
Site Coverage	**not more than 20%**	**not more than 20%**	**not more than 20%**
Number of Houses	**42**	**32**	**32**
Building Height	**2 Storey (6.6m)**	**2 Storey (7m)**	**2 Storey (6.6m)**
No. of Car-Parking Spaces	**59**	**67**	**67**
No. of Motorcycle Parking Spaces	**6** [10% of total car parking provision with 1m (W) x 2.4m (L) each]	**7** [10% of total car parking provision with 1m (W) x 2.4m (L) each]	**7** [10% of total car parking provision with 1m (W) x 2.4m (L) each]
No. Loading/Unloading Bays	**2**	**2**	**2**
- for HGV	1 [3.5m (W) x 11m (L) x 4.7m (H)]	1 [3.5m (W) x 11m (L) x 4.7m (H)]	1 [3.5m (W) x 11m (L) x 4.7m (H)]
- for Refuse Collection Vehicles	1 [5m (W) x 12m (L) x 4.5m (H)]	1 [5m (W) x 12m (L) x 4.5m (H)]	1 [5m (W) x 12m (L) x 4.5m (H)]

2.7 Alternative Construction Methods and Sequences of Works

2.7.1 Construction Activities

As discussed in Section 1.6, the proposed development is for low-rise residential development. Top soil removal and excavation will be performed within the site, particularly at the southern portion of the Project Site. In order to minimize dust emission during site formation, it is expected that the site formation works of the Project Site will be carried out in stage. The extent of excavation works required has been minimized as far as possible.

Since the Project Site is in adjacent to existing village development as well as existing residential development sites such as Fairview Park, Helene Terrace, and there are also nearby planned residential development sites such as the planned RD Site, and planned REC Site (see **Figure 4-2A**), due consideration shall be given to the construction methods and sequence of works so as to minimise potential impacts on nearby developments during the construction period.

2.7.2 Alternative Construction Sequence of this Project

Similar to other general building project, the sequence of works of this Project will generally involve foundation (piling) works, site formation works, superstructure works, underground services and utilities, roadworks.

A preliminary construction programme was firstly established based on the shortest possible construction period (see **Appendix 1-2**). This programme has been developed merely based on construction sequence without considering potential cumulative impacts due to concurrent works during difference stage of construction activities. However, based on this construction programme there will be many overlapping of construction works between different stages of construction as depicted in the construction programme shown in **Appendix 1-2**. Thus, significant impacts on construction noise would arise due to the extensive construction area and concurrent works.

As such, an alternative construction programme has been considered and proposed (See **Appendix 1-1**). This programme has provided due consideration to the potential cumulative construction impacts, and concurrent works are avoided as much as possible. This arrangement would minimise potential impacts on construction noise due to concurrent site activities involving the use of powered mechanical equipment. In addition, the construction programme has been extended so that overlapping of construction activities is minimized as far as possible. Further extension of construction programme would significantly delay the Project programme, thus it is not proposed. With this arrangement, potential impacts due to construction activities can be significantly reduced to a minimum as both the number and type of construction equipment to be used during each construction phase is minimized (by avoiding concurrent works) when compared to the original construction programme.

Asides from avoiding concurrent works and extending the construction period with a view to avoid concurrent works, due consideration has also been given to the sequence of works when developing the construction programme. In order to avoid unnecessary excavation between different phases of construction, construction of underground services and utilities will be constructed before the roadworks so that excavation of road surface to install underground services and utilities can be avoided. This arrangement will also avoid generation of unnecessary construction waste as a result of excavation.

As discussed above, the current Project construction programme has been scheduled to avoid concurrent works as far as possible. Site hoarding will be erected outside wintering season of water birds (October to March) to screen disturbance to the nearby habitats during construction phase (**Section 8.13** refers). Furthermore, there will be no significant adverse

residual ecological impact anticipated during construction phase with the recommended best site practices and mitigation measures as recommended in **Sections 8.9** and **8.13**.

Given to the above, the construction programme and sequence of works presented in **Appendix 1-1** is more preferable than the original construction programme shown in **Appendix 1-2**.

2.7.3 Alternative Construction Method

As discussed earlier, the Project is for construction of low-rise residential development, thus the extent of building structures construction will be minimum. Subject to the site condition, piling works may be required for the proposed development. Piling works could be undertaken by traditional percussive piling method. However, this method will require a Construction Noise Permit to be issued by EPD in advance.

While non-percussive piling method (e.g. earth auger, mini-pile) is relatively quiet than the percussive piling method as no shocks or vibrations are induced when the system is performed. Given the considerations of reducing construction disturbance, non-percussive piling would be adopted.

The proposed development will require excavation and filling works (i.e. earthmoving activities), thus excavated /filling materials will need to be handled carefully in order to minimise waste generation. One way to handle excavated materials is by off-site disposal to public fill facility and/or landfill site subject to the quality of excavated materials. However, this would increase the amount of waste generated by this Project. Instead, due consideration has been given to reduce waste generation and disposal, and the excavated material will be utilized on site where possible. The Contractor will be required to reuse materials on site as far as practicable and to minimize waste from arising. This construction method would reduce the amount of waste to be generated which requires off-site disposal. As excavated materials will be re-used on-site, the amount of imported fill materials would be minimized as well.

3. AIR QUALITY

3.1 Summary

This air quality impact assessment is carried out in accordance with Section 3.9.1 of the EIA Study Brief to qualify and quantify the potential air quality impacts associated with the Project. This Chapter follows the criteria and guidelines for evaluating and assessing air quality impacts as stated in section 1 of Annex 4 and Annex 12 of the EIAO-TM.

This Chapter addresses the potential air quality impacts during construction phase and operational phase of the Project. The Assessment Area for air quality impact assessment is defined by a distance of 500 m from the boundary of the Project Site as per the Study Brief requirements.

3.2 Proposed Development

The proposed Project is for low-rise and low-density residential development and associated ancillary facilities. Details of the proposed development and the MLP are discussed in Section 1.6.

3.3 Legislation, Standards, Guidelines and Criteria

The principal legislation regulating air quality in Hong Kong is the Air Pollution Control Ordinance (APCO) (Cap. 311). Air Quality Objectives (AQOs) are set for the whole of Hong Kong, which specify the statutory limits for various criteria pollutants and the maximum number of exceedance allowed over a specified period of time. The prevailing AQOs specified under the Air Pollution Control (Amendment) Ordinance 2013, have been adopted in this air quality assessment.

The AQOs for Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2), Respirable Suspended Particulates (RSP), and Fine Suspended Particulates (FSP), which are relevant to this assessment, are summarized in **Table 3-1** below.

Table 3-1 Hong Kong Air Quality Objectives

Pollutants	Averaging Period *	Pollutants Concentration ($\mu g/m^3$) *	No. of Exceedances Allowed Per Calendar Year *
CO	1 hour	30,000	0
	8 hours	10,000	0
NO_2	1 hour	200	18
	Annual	40	N.A.
SO_2	10-min.	500	3
	Daily (24 hours)	125	3
RSP (PM_{10})	Daily (24-hours)	100	9
	Annual	50	N.A.
FSP ($PM_{2.5}$)	Daily (24-hours)	75	9
	Annual	35	N.A.

Remark: * Based on the Air Quality Objectives under the Air Pollution Control (Amendment) Ordinance 2013.

N.B. Concentrations of gaseous air pollutants are measured at 293 K and 101.325 kPa (one atmospheric pressure).

N.A. Not applicable.

FSP means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less.

RSP means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less.

In addition to the AQOs, an hourly Total Suspended Particulates (TSP) limit of 500 μg/m^3 measured at 298K(25^{o}C) and 101.325 kPa (one atmosphere) for construction dust impact assessment and 5 odour units based on an averaging time of 5 seconds for odour for the odour prediction assessment is required according to the criteria for evaluating air quality impact under Annex 4 in EIAO-TM.

Construction dust is controlled under the Air Pollution Control (Construction Dust) Regulation. Works such as site formation, construction of the foundation and superstructure of buildings, road construction works are classified as “notifiable work” under the Regulation. Any works which involve stockpiling of dusty materials, loading, unloading or transfer of dusty materials, transfer of dusty materials using a belt conveyor system, use of vehicles, debris handling, excavation or earth moving, site clearance, etc. are regarded as “regulatory work”.

A Schedule specifying the dust control requirements for a variety of construction activities is included in the Regulation. Contractors responsible for a construction site where a notifiable work and/ or regulatory work is involved have to ensure that the work is carried out in accordance with the Schedule with regards to dust control.

3.4 Baseline Conditions

The Project Site is generally low-lying in terrain and the geographical characteristic of the Project Site is relatively flat. There are existing and planned residential development projects surrounding the Project Site (Section 3.5 refers).

3.4.1 Existing Ambient Air Quality Levels

The Project Site is located in rural area. CLP Power Hong Kong Ltd. has a monitoring station at Lau Fau Shan, which is also located in rural area. Thus, the recorded air pollutants concentrations between year 2010 and 2014 at that station was used to provide an indication on ambient air pollutants level at the Project area. As CLP’s monitoring station only covers NO_2 and SO_2 levels, data recorded at EPD’s Yuen Long air quality monitoring station was used to provide an indication of ambient air pollutants concentrations for CO, TSP, RSP, and FSP.

The above calculated air pollutants concentrations are presented below, which are based on best available information. Based on the recorded air pollutants concentrations, the ambient air pollutants level at the project area was generally within the air quality criteria/ AQOs except some exceedances of RSP and FSP recorded in the past few years at EPD’s Yuen Long monitoring station. It is noted that EPD’s Yuen Long monitoring station is located at downtown area surrounded by existing road networks, which may not fully represent the ambient air quality level at rural area where the Project Site is located. It is selected since it is the best available information.

Table 3-1A Air Quality Levels Recorded between Year 2010 and Year 2014

				Pollutants Concentrations (μg/m^3)					
Pollutants	**Averaging Period ***	**Air Quality Criteria/ Standard (μg/m^3) ***	**No. of Exceedances Allowed Per Calendar Year ***	**2010**	**2011**	**2012**	**2013**	**2014**	**Remark**
Data from EPD Yuen Long Monitoring Station									
CO @	1-hr	30,000	0	2,730	3,210	2,200	2,690	2,560	
	8 hours	10,000	0	2,318	2,610	1,945	1,950	2,107	
RSP (PM_{10}) ## & ###	Daily (24-hours)	100	9	**115**	**111**	100	**142**	**124**	Based on 10th highest conc.
	Annual	50	N.A.	49	**54**	44	**56**	50	
FSP ($PM_{2.5}$) ## & ###	Daily (24-hours)	75	9	73	**76**	65	**106**	**86**	Based on 10th highest conc.
	Annual	35	N.A.	32	**36**	29	**37**	35	
TSP ** & ##	1-hr	500	N.A.	-	-	-	-	**-**	
	Annual	Nil	N.A.	78	86	68	73	N.A.***	
Data from CLP Lau Fau Shan Monitoring Station									
NO_2 # & ##	1-hr	200	18	164	171	136	155	147	Based on 19th highest conc.
	Annual	40	N.A.	29	36	30	30	32	
SO_2 #	10-min.	500	3	-	-	-	-	-	
	Daily (24 hours)	125	3	25	33	27	23	22	Based on 4th highest conc.

Note:

Bold numbers indicate exceedance of the relevant air quality criteria/ standard.

* Based on the prevailing Air Quality Objectives (please refer to Table 3-1 above).

** Parameter specified in the EIAO-TM only.

*** The TSP data for Year 2014 is not available in EPD's Air Quality Report.

- denotes data is not available.

Based on recorded levels at CLP's Lau Fau Shan Monitoring Station. (Available at: https://www.clpgroup.com/poweru/eng/air_quality/airQuality_monitoring_detail.aspx).

Based on annual average concentrations reported in EPD's Air Quality in Hong Kong Annual report (various years) for monitoring station at Yuen Long as well as CLP's Lau Fau Shan monitoring station.

Based on EPD's daily average monitoring data at Yuen Long Station available at: http://epic.epd.gov.hk/EPICDI/air/station/?lang=en

@ Based on the highest hourly CO and highest 8-hours CO reported in EPD's Air Quality in Hong Kong Annual report (various years) for monitoring station at Yuen Long.

3.4.2 Ambient Air Quality Levels During Operational Phase

The above ambient air pollutants levels provide air quality levels recorded in the past. The Environment Bureau released a report namely "A Clean Air Plan for Hong Kong" in 2013, which documents planned reduction in air pollution in Hong Kong. The Government also sets out strategies for tackling air pollution problem and to cut air pollutants emissions such as the incentive-cum-regulatory approach to phase out pre-Euro IV diesel commercial vehicles by end of 2019; requiring ocean going vessels to switch to fuel with sulphur content not exceeding 0.5% while berthing starting from July 2015; and reducing emissions from industrial sources and power plants by tightening of emission caps from 2019 onwards, etc. Thus, it is anticipated that the future background air quality levels would be improved.

For the purpose of evaluating the operational phase ambient air quality levels, background contributions based on EPD's PATH concentration output file are extracted and presented in **Appendix 3-1B**. The 500-m radius of Project study area falls within Grid (20,40) of the PATH system (**Appendix 3-1B** refers). PATH concentration output data in year 2015 and year 2020 are available from EPD, which are then presented. As the construction of Project works would be completed by end of year 2018, the above-mentioned PATH-predicted levels can represent the background air quality level at the time of population intake year of this Project.

Based on the above-mentioned PATH output data, it is found that the ambient air pollutants levels at the Project area during operational phase are in compliance with the prevailing AQOs.

3.4.3 Ambient Air Quality Levels for Evaluation of Construction Phase Air Quality Impacts

For the purpose of evaluating the construction phase air quality impacts, background contributions are based on EPD's PATH concentration output. According to "Guidelines on Assessing the 'TOTAL' Air Quality Impacts" published in EPD's website, hour-by-hour background contribution is estimated using output of PATH model.

Background contribution of FSP is not directly available from PATH model. According to "Guidelines on the Estimation of FSP for Air Quality Assessment in Hong Kong", background contribution of FSP is deduced based on the following conservative formula.

Daily($\mu g/m^3$): FSP = 0.75 x RSP

Annual($\mu g/m^3$): FSP = 0.71 x RSP

For TSP background contribution, the RSP contribution in PATH's concentration output is adopted instead.

Regarding the proposed development which falls within grid(20,40) in PATH system, the background contributions of RSP is based on concentration of each hour in PATH's concentration output for grid(20,40). For background contribution of FSP and TSP, these are calculated based on the RSP values as discussed above. To be conservative, PATH's concentration output for Year 2015 is adopted in the assessment.

3.5 Air Sensitive Receivers

3.5.1 Construction Phase

3.5.1.1 Existing ASRs

Representative existing ASRs within 500 m of the site boundary are identified according to the criteria listed in the EIAO-TM through site inspections and a review of land use plans. ASRs and their horizontal distance to the nearest emission source are summarized in **Table 3-**

2below. Their geographical locations are also shown in **Figure 3-1**. The representative ASRs selected for construction phase air quality impact assessment are shown in **Figure 3-2**.

Table 3-2 Locations of Representative Existing Air Sensitive Receivers

Description	Usage	No. of Storeys	Shortest Distance from Project Site Boundary (approx.), m **	Ground Level, mPD *
Fairview Park @	Residential	2-3	105	3.9 – 4.6
Bethel High School (A10, A10A)	School	3	151	4.4
Wong Chan Sook Ying Memorial School (A14)	School	4	208	4.4
Royal Palms (A25) ***	Residential	2	723	4.9
Palm Springs (A17, A34, A35) ***	Residential	2-3	713	5.7
Yau Mei San Tsuen village house (A07, A18, A23, A36) ***	Residential	2	553	3.1 – 3.6
Hang Fook Garden (A20)	Residential	3	200	4.2
Chuk Yuen Tsuen (A19, A08, A09)	Residential	2-3	239	2.3 – 3.5
Ha San Wai Tsuen (A21, A22)	Residential	3	174	3.5 – 4.2
Helene Terrace and Villa Camellia (A11, A12)	Residential	2	62	4.5 – 6.5
Restaurant nearby Helene Terrace (A32)	Commercial	2	49	4.5
Man Yuen Chuen (A15)	Residential	3	205	4.1
Hong Chi Morninglight School Yuen Long (A26) ***	School	3	739	4.4
Christian Ministry Institute (A24) ***	School	2	671	3.5
Existing building (near Ha San Wai Road) (A27)	Commercial	3	3	4.5
Royal Camellia/ Greenery Garden #	Residential	2-3	143 / 201	4.3

Remark: * Existing ground level of representative ASRs.

** Shortest horizontal distance between the ASRs and the nearest Project Site boundary.

*** ASRs outside 500 m radius selected for the cumulative impact assessment.

This ASR is covered by more representative ASR locations (e.g. A27, A11, A12) which are closer to the Project Site and are worst affected.

@ Representative ASRs at Fairview Park A01, A01A, A02, A02A, A03, A04, A05, A05A, A05B, A06, A06A, A13, A16, A16A, A28, A29, A30, A31, A33 as shown in Figure 3-2.

An assessment area of 500m envelope as well as individual representative ASRs locations selected for construction phase air quality assessment are shown in **Figure 3-2**. Since there are also planned development projects nearby (see Section 3.5.1.2), representative ASRs outside the 500m radius of this Project (which may be affected by the planned development projects), are also selected for cumulative impact assessment.

3.5.1.2 Planned ASRs

Identification of potential planned/ committed ASRs has been based on best available information such as relevant plans[1] , current Outline Zoning Plan (OZP No. S/YL-MP/6), and Town Planning Board (TPB) records, which have been reviewed. The registry of EIAO projects was also reviewed for identifying EIA projects. Based on information reviewed, there are a few planned residential development projects in the vicinity of the proposed development site. These planned residential developments are also classified as designated project under the EIAO; as such they have to go through the EIAO process. These potential future development cases are listed in **Table 3-3** below, and their geographical locations are also shown in **Figure 3-2**.

Table 3-3 Planned Air Sensitive Receivers

ASR ID	Planned Site	EIAO Application Number / Relevant Town Planning Board Ref. No.	Description	Appro-val from TPB	Appro-val of EIA Report	Ground mPD Level, (approx.) *	No. of Storey *	Distance (approx.) , m **
	Planned residential development proposals							
A3Pa	REC Site	ESB-207/2009, AEIAR-182/2014, EP-484/2014	Proposed Residential cum Passive Recreational Development within "Recreation" ("REC") Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long	Yes #	Yes	3	2	151
A4Pa						3	2	81
A1Pa, A2Pa	RD Site	ESB-204/2009. Different scales of development and site areas were also under A/YL-MP/132, A/YL-MP/146, and A/YL-MP/193 and A/YL-MP/205	Proposed Residential Development within R(D) Zone at Various Lots in DD 104.	Yes	No	3	2	42 – 371
A5Pa	Yau Mei Site	ESB-182/2008, AEIAR-189/2015	Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long	No	Yes	2	3	407

1 According to information available on Planning Department's website (available at: http://www.pland.gov.hk/pland_en/info_serv/tp_plan/index.html), the Project Site is not covered by existing Development Permission Area Plans. Instead, it is currently covered by the Outline Zoning Plan (OZP) No. S/YL-MP/6. Records of both the adopted and draft departmental plans in the area were obtained from Planning Department. According to the records obtained, relevant plans were reviewed such as the "L/YL-FP/1C Residential Layout - Fairview Park Access Road, Yuen Long" adopted in year 1982; as well as the draft departmental plan "DP/NWNT/1C North West New Territories - Development Plan" approved in year 1984. As all of these plans were prepared in 1980s', planned uses indicated in these plans are outdated and are superseded by the existing OZP. As advised by Planning Department, the existing OZP is the latest version regarding planned land uses in the area.

ASR ID	Planned Site	EIAO Application Number / Relevant Town Planning Board Ref. No.	Description	Appro-val from TPB	Appro-val of EIA Report	Ground mPD Level, (approx.) *	No. of Storey *	Distance (approx.) , m **
"V" zone/ "R(D)" zone in OZP	V01	A/YL-MP/172-3 and A/YL-MP/183-1	Proposed new territory exempted village house development	Yes	N/A	3	3	32
	V02, V03/ V04	Nil	Village zone /"R(D)" zone in OZP, respectively	-	-	2.4/ 4.8	3	6 - 430

Remark:

* Existing ground mPD level. According to the OZP, the allowed building height of the planned development sites is 6m high, it is therefore assumed the planned developments are 2 storeys buildings. For Yau Mei Site, the maximum allowed building is 3 storeys.
The proposed new territories exempted village houses are expected to be typical 3 storeys buildings.

** Shortest horizontal distance between the nearest Project site boundary and the ASR locations shown in Figure 3-2.

A rezoning application for the development site was agreed by TPB under the planning application no. Y/YL-MP/3. The exact new zoning of that site is still subject to Government's further review. However, it is noted that the submitted development scheme is the same as that approved under the EIAO.

N/A stands for not applicable.

None of the above residential development projects have obtained approval from both the Town Planning Board (TPB) and provisions under the EIAO, except the planned "REC Site" which has already obtained both approvals. Best available information regarding their construction programmes have been obtained from the published information including the approved/ submitted EIA reports of these projects as well as information obtained from the project proponents of these projects, which are considered in the cumulative construction phase air quality impact assessment. Details of the assessment and assumptions adopted have been provided in the following Sections in 3.6.1, 3.6.1.4, and 3.10.3.

In addition to the above planned development projects, there are also approved new territories exempted house development sites on the opposite side of Ngau Tam Mei Drainage Channel (e.g. case number A/YL-MP/172-3 and A/YL-MP/183-1) within the Village Development ("V") zone under the Outline Zoning Plan No. S/YL-MP/6 ("V01" in **Figure 3-2** refers). Asides from the above, the existing "V" zone and "R(D)" zone in the Outline Zoning Plan No. S/YL-MP/6 are also selected for assessment (V02, V03, and V04 in **Figure 3-2** refer). It is expected that development within these areas will be typical 3 storeys buildings. Although there is no committed development programme for these development sites, the concerned development sites are also taken into account in the air quality assessment.

3.5.2 Operational Phase

During the operational phase, the proposed development within the Project Site will be the representative sensitive receivers. **Figure 2-1** shows the layout of proposed houses.

3.6 Air Quality Impact Assessment

3.6.1 Construction Phase

3.6.1.1 Identification of Potential Impacts

The Project works comprise construction of 32 nos. of 2-storeys residential buildings, club house and other ancillary facilities, and landscaping works as discussed in Section 1.6. Since the proposed development intensity is not high, significant air quality impacts due to construction of foundation, building structures and the finishing works are not anticipated. As "ready-mixed" concrete will be used during the pile cap construction, significant air quality

impact is not expected. As such, major sources of air quality impact during the construction phase would be fugitive dust emissions during the site formation stage due to earth movement activities and transportation of excavated/ fill materials. As suspended particles will be the main air quality parameter concerned for construction works which involve handling of excavated/ fill materials, TSP, RSP and FSP have been identified as the parameters for further air quality impact assessment for dust emission impact.

Emissions of other air pollutants such as carbon monoxide and dioxide, nitrogen oxides and sulphur dioxide generated by powered mechanical equipment and vehicle exhausts on-site should not be significant since only limited amount of construction plants will be used on-site. Therefore, unacceptable impacts from the criteria pollutants (such as NOx, SO_2, and CO) are unlikely to occur as significant emissions of pollutants are not anticipated, and further assessment is not necessary.

Given the Project Site area is relatively flat, no rock crushing will be necessary. It is expected that no concrete batching plants will be used on-site. Concrete will be brought to the site in "ready-mixed" state or in pre-cast sections. Thus emissions due to operation of cement works or rock crushing activities are not anticipated.

Within the Project Site, there is a 0.33 ha abandoned pond located at the south-eastern corner of the Project Site (**Figure 5-1** refers). Sediments are usually rich in organic matters, and therefore may potentially give rise to odour nuisance to the surrounding area during construction. The concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. Thus, odour nuisance is not a concern.

There is one section of fixed temporary noise barriers (with a barrier height of 3m) proposed to be erected along the part of the western site boundary during the construction phase (see Section 4.9.4 and **Figure 4-3A**). Since the Project construction site is in an open area, the proposed vertical noise barriers along a portion of the Site boundary will not affect the dispersion of air pollutants from the construction site or the ASRs. Thus, no further assessment is necessary.

3.6.1.2 Evaluation of Impacts

According to the construction programme, the Project's construction period will tentatively commence in 2017 for completion by end of 2018. An indicative construction programme is shown in **Appendix 1-1**.

During site formation stage, earth movement activities and transportation of excavated/ fill materials will be involved, which would attribute to dust emissions. As discussed earlier, TSP, RSP, FSP have been identified as the parameter for air quality impact assessment during the site formation stage. Activities that would attribute to dust emissions are:

- Removal and unloading of soil materials by excavators;
- Earth loading/ unloading, and stockpiling;
- Bulldozing and surface compaction;
- Wind erosion on exposed ground; and
- Vehicle movements on haul roads;

During construction, the Contractor(s) will be required to transport only the adequate amount of fill materials to the Project Site in order to avoid cumulating filling materials on-site and the filled area shall be compacted as soon as possible (relevant requirement has been stated in Section 3.9.1). In addition, excavated materials will be reused as fill materials within the Project Site so as to minimize dust emission due to transportation of fill materials. In case

temporary stockpiling of small amount of materials is required, the stockpiling location will be covered by tarpaulin sheets and backfilled as soon as possible.

The potential air quality impact is however anticipated to be short-term. With appropriate dust control measures and good site practice stipulated in the *Air Pollution Control (Construction Dust) Regulation*, adverse dust impact is not anticipated. Notwithstanding the above, an EM&A programme will be implemented during the construction phase to verify the effectiveness of the mitigation measures and modification of work methods will be proposed when necessary to reduce the dust emission to acceptable levels. The recommended control measures are summarized in Section 3.9.1. With the continual monitoring and review of dust impact in the area, air quality impact is not anticipated.

An assessment on impact of TSP, RSP and FSP emissions have also been undertaken for the Project works, and the results are depicted in the following sections.

As mentioned above, there is an existing abandoned pond within the Project Site. Sediments are usually rich in organic matters, and therefore may potentially give rise to odour nuisance to the surrounding area when a large amount of such materials are exposed. The pond sediment is intended to be left in place and not to be disturbed as far as possible, and the pond will be filled up by imported fill materials. However, should any pond sediment be encountered during construction, precautionary measures are proposed. During the construction, any temporary exposed surface at the pond will be covered by impervious sheet or immediately backfilled during the construction phase, thus potential odour nuisance from exposed materials during pond filling, if any, should be kept to a minimum.

In order to minimise potential odour nuisance, the following control measures are recommended:

- Exposed surface shall be immediately filled by filling materials as far as possible;
- Malodorous materials, if any, should be placed as far as possible from any ASRs;
- Malodorous materials should be covered entirely by plastic tarpaulin sheets; and
- Regular odour patrol to examine the effectiveness of the above control measures.

With proper measures, potential odour impact is considered to be short-term and controllable.

3.6.1.3 Concurrent Construction Due to Adjacent Approved Government Projects

According to the approved EIA report, namely the "EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal[2]" (currently, the PWP No. 4235DS), a sewage pumping station (SPS) (San Tin No.1 SPS), has been proposed at an offsite location about 526m northeast of the Project Site. The approximate location of the proposed SPS, based on the above EIA report, is shown in **Figure 3-1**.

Under the same project (PWP No. 4235DS), a gravity trunk sewer will be constructed along Castle Peak Road between Ngau Tam Mei and San Tin, and a section of alignment will be constructed along the Ngau Tam Mei Channel at the same time as this development Project. The construction of the above sewerage project has been assessed in the above-mentioned EIA report.

2 Agreement No. CE 66/2001(EP), EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD), Environmental Impact Assessment (Final), March 2004.

Currently, there is no committed construction programme for the said sewage pumping station and the public sewers. The EIA report has stated that all works will be carried out in small section areas within a short period of time, thus construction activities should not generate significant amount of construction dust and result in cumulative impact. It was also recommended in the same report that the construction works will be carried out in 50m segments. The contractor is also obliged to follow the procedures and requirements given in the *Air Pollution Control (Construction Dust) Regulation*. Therefore, the active areas at any one time of the whole construction period should be small. In addition, respective project specific Environmental Monitoring and Audit (EM&A) programme will be implemented for this concurrent project to review the effectiveness of the mitigation measures implemented.

Similarly, based on the information in a separate EIA report for "Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" (EIA Register No.: AEIAR-133/2009), a cycle track will also be provided along the Castle Peak Road and the Yau Pok Road as part of the cycle track project between Tuen Mun and Sheung Shui under PWP Item 7259RS.

According to the EIA report, the concerned construction of cycle track project will involve construction of a narrow strip of cycle track, which will be constructed in sections. Typically, the working area will be 40 m long by 4 m wide and no adjacent sections (200m between two neighbouring sections) will be constructed simultaneously. It is understood there is still no fixed construction programme for the cycle track project. Nevertheless, given that the concerned works will be carried out in sections with dust mitigation measures, adverse air quality impact is not expected. In addition, the EIA report of cycle track project has concluded that the construction dust can be controlled at source to acceptable levels with the implementation of dust control measures as required under the *Air Pollution Control (Construction Dust) Regulation*. The approved EIA report has also recommended a series of measures for suppressing dust on site, including spraying the works area for site clearance with water before, during and after the operation so as to maintain the entire surface wet.

With the wetting of the whole construction site and keeping the construction area small, the potential dust impacts arising from the cycle track construction are expected to be minimum. Hence, no unacceptable impacts are anticipated. In addition, an EM&A programme will be implemented for the Project during the construction phase, to check effectiveness of the recommended mitigation measures and compliance with relevant statutory criteria.

Given that the concerned construction works of the two approved EIA projects are relatively small in scale (i.e. laying sewers along existing road, and construction of a cycle track), and the construction will only be carried out in small sections (less than 50m for the public sewers, and 40m for the cycle track), adverse dust impacts are not expected from the concerned construction works of these projects with the implementation of mitigation measures recommended in the approved EIA reports.

In addition, the contractors will be required to follow the procedures and requirements as stipulated in the Air Pollution Control (Construction Dust) Regulation and dust emissions will be effectively controlled through implementation of mitigation measures recommended in the above-mentioned EIA reports.

EM&A programmes will also be implemented for this Project to monitor the effectiveness of the mitigation measures during construction of the projects. As all of these approved projects will also be subject to control under the EIAO, cumulative air quality impact from this Project will be controlled through implementation measures described in this report and those committed for the other projects. According to the above-mentioned EIA reports, with the recommended mitigation measures, adverse dust impacts are not expected to arise from these projects and the residual construction air quality impacts are expected to be acceptable. As such, air quality impacts due to the above-mentioned adjacent projects are not considered further in this Study.

3.6.1.4 Concurrent Construction Due to Nearby Planned Development Projects

As discussed in **Sections 1.8 and 3.5.1**, there are a few planned development projects in adjacent to the Project Site. According to the EIA Study Brief of these planned development projects, the proposed developments of these projects are also for residential purpose (i.e. similar to this Project). Since all these projects are located in relatively flat area, it is expected that the construction scale of these project sites will be similar to this Project and major sources of air quality impact during the construction of these planned development sites would be fugitive dust emissions during the site formation stage.

A brief account on the status of these planned development projects and potential cumulative construction impacts are provided in **Section 1.8, Table 3-3 and Appendix 3-1A**. **Figure 1-2** shows the location of these planned development projects. Reference was made to the published information as well as construction programme obtained from the project proponents of the above-mentioned planned projects.

Planned "RD Site"

According to the best available information and the latest project programme of that project obtained from its project proponent, construction of the planned "RD site" will commence in year 2020, which is after the completion of this Project. It is also noted that project will still need to undertake its EIA study under the EIAO before the commencement of any construction activities, thus no cumulative impact due to concurrent construction with the planned "RD Site" is expected.

Planned "Yau Mei Site"

For the planned "Yau Mei Site" project, according to its approved EIA report, concurrent works with that project cannot be precluded at this stage. However, the planned "Yau Mei Site" is distant away from this Project with a shortest separation distance over 360m between the site boundary of this Project and the planned "Yau Mei Site" project boundary. There are currently no existing ASRs between the two project sites. As such, construction of that project is unlikely to result in any adverse impacts on ASRs. It is expected that air quality impact of that Project will be controlled through the implementation of mitigation measures committed for that project under its EIA study.

Nevertheless, a sensitivity test based on the peak construction period of the planned "Yau Mei Site" has been undertaken to evaluate potential cumulative impacts due to potential concurrent construction. Please refer to Section 3.10.3 and **Appendix 3-11** for details.

Planned "REC Site"

Based on the approved EIA report of the planned "REC Site", its site formation works will commence in November 2017 (Please refer to **Appendix 3-1A)**. While, the site formation of the current Project will be carried out between April 2017 and middle of November 2017 (**Appendix 1-1** refers). Thus, the site formation works' programme of this Project has largely avoided concurrent works with that of the planned "REC Site", and cumulative impacts have been avoided. It is expected that the cumulative air quality impacts from this Project and the planned "REC Site" will be controlled through the implementation of mitigation measures described in this report and those committed for the planned "REC Site" under its EIA report. In addition, there is no existing ASRs located in between the planned "REC Site" and this Project. Thus, no adverse impact due to cumulative construction activities is anticipated.

However, having considered the above construction programme that the site formation works of this Project may slightly overlap with that of the planned "REC Site" (i.e. for a period of about half month during the first half of November 2017) (see construction programme of the two projects in **Appendix 3-1A**), to be conservative, a sensitivity test has been carried out to

assess the potential cumulative impact due to such minor overlapped construction activities. Please refer to Section 3.10.3 and **Appendix 3-11A** for details.

3.6.2 Operational Phase

3.6.2.1 Identification of Potential Impacts

According to Para 3.9.1.4 (iv) of the EIA Study Brief of this Project a quantitative impact evaluation following the methodology in para. 3.9.1.4 (v) shall be carried out if the assessment indicates likely exceedance of the recommended limits set forth in the TM on the Project Area and at nearby ASRs. Given the scale of this Project (for small houses development), vehicular emissions due to traffic generated/ attracted by this Project is unlikely to be significant. It is expected that the Project itself will unlikely give rise to any adverse air quality impact during its operation (see Section 3.6.2.2). There is proposed vertical boundary noise barrier of this Project (4.5m high) along a portion of eastern site boundary (see Section 4.7.1 and **Figure 4-9**). Since the Project Site is in an open area and the Project is unlikely to give rise air pollution problem, the proposed vertical noise barrier will not affect dispersion of any air pollutants. Thus, no further assessment is necessary.

Vehicular Emissions

Vehicular emissions from off-site sources are identified as the only potential source of air pollution during the operational phase of the Project. However, since sufficient set back distance has already been provided between the development and the road networks, its potential impacts are anticipated to be insignificant.

Industrial Emissions

A review of chimney locations based on EPD's register previously obtained, were carried out. No chimney was identified within the Assessment Area. Additional chimney surveys were also conducted on 30 March 2009, 10 July 2009 and 29 October 2010 to verify the previous findings. There was no change to the site condition during the subsequent visits on 10 December 2010, 28 July 2011, 12 October 2011, 18 October 2013, 26 February 2014, 4 August 2014, and December 2015. As no industrial chimney was identified within the Assessment Area in the verification surveys, no air quality impacts related to chimney emission is expected and therefore not considered further in this assessment.

There are an existing open storage site and a godown to the east of the Project Site. The open storage site is used for storage of precast units, while the godown is a totally enclosed building used by a logistic company. As both sites are currently hard paved and used for storage only and the godown is totally enclosed, it is not expected to have adverse air quality impact due to dust emission. According to the previous site visits, no industrial chimney was identified at both sites. Thus, no adverse air quality impact is anticipated and no further assessment is necessary.

Odour Emissions

As there is no existing sewage treatment plants within the 500m Assessment Area from the Project Area, potential odour impacts are not a concern of this Project. The future San Tin No.1 Sewage Pumping Station (SPS) (under PWP No. 4235DS by Hong Kong SAR Government Drainage Services Department) is planned to be located at the junction of Kam Pok Road and Castle Peak Road (about 526m northeast from this Project outside the 500m study radius of this Project) (**Figure 3-1** refers). With the careful design of the pumping station and installation of odour removal system, it is expected that odour impact due to the pumping station will be insignificant.

Since the Project Site is not currently connected to existing public sewerage system, interim sewage treatment plant may be proposed within the Project Site. The interim sewage treatment plant will only be operated if the future public sewerage system is not yet in place when the residential development of the Project is occupied and the proposed development will ultimately connect to the public sewerage system when it becomes available. The location of the interim sewage treatment plant is shown in the MLP and provided in **Figure 2-1**. The proposed treatment plant includes a system of combination of biological treatment, membrane filtration and Reverse Osmosis processes. The membrane filtration system is a totally enclosed system; while the biological treatment will be a semi-enclosed system.

As the interim sewage treatment plant will be located within a totally enclosed building of which the biological treatment, membrane filtration and Reverse Osmosis processes will be located underground, potential odour impact is not anticipated. The concerned facility will only be temporary and will be carefully planned such that the brine disposal during maintenance (a potential odour source) will be away from the residential area as much as possible and close to the vehicular access connecting the nearby road. With environmental conscious design of an effective odour removal filtering system (with an odour removal efficiency of not less than 99.5%), the odour concentration at the exhaust would be significantly reduced and no odour impacts are expected to arise from the operation of the interim on-site STP. Therefore, it is expected that there will be no odour impact upon the surroundings due to the operation of the interim STP. With careful design, adverse odour impact due to operation of the interim sewage treatment plant is not expected. During the detailed design phase, the minimization of odour will be considered to further reduce any localized impact.

During operation, Refuse collection point (RCP) will be provided for the residential development. A licensed waste collector shall be employed to collect domestic waste on a daily basis. During the detailed design stage, the minimization of odour at the RCP will be considered further to reduce any localized impact. Thus, no adverse air quality impact is anticipated.

About 0.33ha abandoned pond is located at the south-eastern corner of the Project Site (**Figure 8-3** refers). Since sediment may be rich in organic matters, there could be potential odour problem due to anaerobic degradation of organic matters.

3.6.2.2 Evaluation of Impacts

Vehicular Emissions Upon Proposed Development

Vehicular emissions impact from the major roads (e.g. San Tin Highway (an Expressway) and Castle Peak Road (a Rural Road for the section near the Project)) are considered to be insignificant as the sensitive receivers of this Project are distant away from the concerned major roads (**Figure 3-1** refers). The concerned separation distance between the sensitive uses of this Project and the road edge of above-mentioned major roads (283m as shown in **Figure 3-1**) can already satisfy the buffer distance requirement for Trunk Road (i.e. >20m) for active and passive recreation uses according to Chapter 9, Environment of the Hong Kong Planning Standard and Guidelines (HKPSG).

As for nearby local access roads (e.g. Fairview Park Boulevard, Yau Pok Road, Kam Pok Road, Fung Chuk Road and Ha San Wai Road), the proposed development is also set back from these roads by existing general slopes surrounding the Project Site and the proposed landscape buffer. These slopes (shown as “landscape” area in the MLP) are proposed for landscaping use only and are not designed for access by the general public. The separation distance measured between the nearest sensitive uses of the Project Site and the road edge was shown in **Figure 3-1**, which varies from 7m to over 104m. The separation distance can already satisfy the buffer distance requirement for Local Distributor (i.e. >5m) for active and passive recreation uses according to Chapter 9 of the HKPSG.

Since the buffer distance provided can already satisfy the HKPSG requirement, no significant vehicular emission impact is expected.

In addition, with reference to the sensitivity test on vehicular emissions due to the additional traffic generated/ attracted by this Project (**Appendix 3-12** refers), it is found that contribution of vehicular emissions by this Project is insignificant. According to the PATH output data (Section 3.4.2 refers), the background air pollutants levels during the operational phase would be within the relevant AQO criteria. Thus, it is expected that cumulative air quality would be within the AQO criteria, and no adverse impact is anticipated. As such, it is not assessed further in this assessment.

Vehicular Emissions Upon Surrounding Environment

During operation of the proposed development, there will be additional traffic generated as a result, which may potentially affect other nearby existing/ planned ASRs. However, it is not expected that there will be any adverse air quality impact given the scale of this Project (for small house development). A sensitivity test on vehicular emissions upon nearby roads due to the additional traffic generated/ attracted by this Project (i.e. 18 vehicles/ hour during AM peak hour and 19 vehicles/ hour during PM peak hour, respectively), has been undertaken based on a worst case scenario (see **Appendix 3-12**). According to the sensitivity test results, the contribution of vehicular emissions by this Project is insignificant. As such this Project will not attribute to any deterioration on air quality. Furthermore, existing ASRs are further set back from Kam Pok Road with adequate separation distance, thus they are unlikely impacted by vehicular emission from the road.

It should also be noted that the Project Site is currently used as open car park (Section 2.3 refers). Vehicles attracted/ generated by the existing car park will also contribute to the existing traffic flow on nearby roads. In fact, many vehicles visiting the car park are heavy vehicles. Based on on-site traffic survey undertaken by the traffic consultant of this Project in January 2016, it was found that the total vehicles generated/ attracted by the existing car park operation during AM peak hour, was about 76 vehicles/ hour (~45% heavy vehicles). While about 40 vehicles/ hour (~65% heavy vehicles), was generated during the PM peak hour. All the concerned traffic generated/ attracted from the existing car park operation, will use Kam Pok Road as the access road (i.e. same as this Project). This is considered much higher when compared with the current proposed development (up to 19 vehicles/ hours and 20% heavy vehicles) both in terms of traffic flow and % of heavy vehicles.

As such, vehicular emission impact due to existing car parking operation would offset those to be generated/ attracted by this Project during operation as the proposed development will not result in an increase in traffic flow upon nearby roads when compared with its existing car parking operation. It is therefore expected that there will be no adverse air quality impact.

There are nearby planned development projects (Section 1.8 refers), which may contribute to vehicular emissions. However, this Project will not worsen the situation based on the reasons given above (i.e. this Project will not result in an increase in traffic flow when compared with its existing car parking operation).

Industrial Emissions

As discussed in Section 3.6.2.1, no industrial chimney was identified within the Assessment Area. Thus, potential air quality impacts due to emissions from chimneys are not anticipated for this Project. Thus, it is not assessed further.

Odour from Proposed San Tin No.1 SPS

The planned San Tin No.1 SPS is outside the 500m study radius of this Project about 526m northeast of the proposed development (**Figure 3-1** refers). According to the EIA report for the said SPS project, odour removal filtering system with efficiency of not less than 99.5% will be installed in the San Tin No.1 SPS and the maximum odour concentration at the existing ASRs would be reduced to 0.093 OU (Odour Unit), which is 1.9% of the 5 OU criteria. With the odour removal filtering system and long buffer distance from the SPS, odour impact on the proposed development is unlikely. Thus, no adverse impact is anticipated.

Odour Impact due to Interim STP of this Project

As discussed above, the proposed interim STP will be within totally enclosed building of which the biological treatment, membrane filtration and Reverse Osmosis processes will be located underground, potential odour impact is not anticipated. Given the scale of this Project (for development of 32 houses of 2 storeys), the amount of sewage generated would be small (with an ADWF of 51 m3/day (or 0.6 L/s) as estimated in Section 6.4 in Chapter 6).

Detailed design of the interim STP has yet been carried out, but the exhaust of the totally enclosed interim sewage system will be equipped with odour removal system, e.g. scrubbing system. With the proposed odour removal system (with an odour removal efficiency of not less than 99.5%), the odour concentration at the exhaust would be significantly reduced. As discussed above, odour removal system with similar removal efficiency was also proposed at the planned San Tin No. 1 SPS. According to its approved EIA report, with the odour removal system there will be no adverse odour impact anticipated. Similar odour removal system (with a removal efficiency of not less than 99.5%) was also proposed for an interim STP at the approved "Yau Mei Site" EIA project with ASRs surrounded the STP with a minimum separation distance of about 15m (AEIAR-189/2015, Section 3.6.2.2 (p.3-14) and Figure 3-1 of that EIA report refer). According to the assessment results of that EIA project, the residue odour level of STP would be within the relevant odour criteria with the adopted odour removal system, thus no adverse odour impact is anticipated.

As for the current proposed development, the development scale is smaller when compared with the approved "Yau Mei Site" project and that odour removal system (with an odour removal efficiency of not less than 99.5%) is also proposed at the interim STP. In addition, the exhaust of the STP will be directed away from nearby ASRs with a separation distance >15m (**Figure 3-1** refers). It is therefore expected there will be no significant odour impact upon the development site or its surroundings. Thus, no further assessment is considered necessary.

Odour of Pond Sediment

During construction, the concerned sediment at the existing pond is intended to be left in place and not to be disturbed as far as possible. The proposed development will be located on the land formed by imported soil, thus no adverse impact at proposed buildings during operational phase is anticipated.

3.7 Assessment Methodology

3.7.1 Emission during Construction Phase

As discussed earlier, fugitive dust could be generated during the site formation stage, and TSP, RSP and FSP have been identified as the parameter for air quality assessment.

The following paragraphs describe the air quality assessment methodology.

3.7.1.1 Emission Sources

According to the construction programme of this Project (**Appendix 1-1**), site formation of the Project Site will be carried out between April 2017 and first half of November 2017 for a duration of about 7.5 months.

According to Section 3.6.1.2, the following activities during site formation stage that would attribute to dust emissions have been taken into account in the assessment:

- Removal and unloading of soil materials by excavators;
- Earth loading/ unloading, and stockpiling;
- Bulldozing and surface compaction;
- Wind erosion on exposed ground; and
- Vehicle movements on haul roads;

3.7.1.2 Emission Strength

Unmitigated Scenario

Emission rates of the dusty activities given above were based on typical values and emission factors documented in Compilation of Air Pollutant Emission Factors (AP-42) 5th Edition published by USEPA. In order to represent the worst case scenario, the upper bound or the lower bound of the range of typical values provided in the AP-42 document has been used in deriving the emission rates (i.e. higher emission rate is adopted) (also refer to **Appendices 3-2 and 3-3** for details). The unmitigated scenario refers to the calculated emission rates based on AP-42 without any mitigation measures. The works area will refer to the site boundary of the whole Project Site. It is expected that paved haul road will be constructed.

The identified dust emission sources have been modelled as area sources. Detailed calculation of emission rates corresponding to each of the activities described in Section 3.7.1.1, are also given in **Appendices 3-2 and 3-3**.

In the assessment, it has been assumed that the whole area of the Project Site will be constructed at the same time and soil surface is exposed to atmosphere.

Mitigated Scenario

Based on the above worst case emission rates calculated according to the AP-42 document, the mitigated scenario refers to mitigated emission rates after the implementation of proposed mitigation measures of this Project and measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* (Section 3.9.1 of this report refers). Detailed calculation of mitigated emission rates corresponding to each of the activities described in Section 3.7.1.1, are also given in **Appendices 3-2 and 3-3**.

Currently, the Project Site comprises a paved car park area with concrete paved vacant site and grassland. During the construction phase, site formation works will be carried out in stages and the existing paved area at the unaffected area will be maintained so that the soil underneath is not exposed to the atmosphere (i.e. there will be no wind erosion).

For the purpose of this air quality impact assessment, assumptions on work areas, works programme, and construction method have been used in order to demonstrate a possible way to mitigate adverse impact due to construction dust emission during the site formation. With this approach, assessment was undertaken according to the methodology described in **Appendix 3-8**, which demonstrated a scenario of construction activities in this Project that are

controllable and the relevant air quality objectives can be complied with. During the detailed design stage, alternative construction approach may be proposed provided that it is effective in mitigating the construction dust level to an acceptable level. In addition, EM&A during the Project construction phase will monitor the air quality levels and to ensure the effectiveness of the mitigation measures implemented.

In order to minimize dust emission during site formation, it is expected that the site formation works will be carried out in stages. Regular site watering will be applied within the construction site in order to effectively supress dust emission, and that dusty materials will be properly covered to prevent wind erosion. As mentioned above, the Project Site is currently a paved ground/ green field site, as such, the construction works within the active works area will be the only emission source as the remaining areas of the Project Site is either paved or covered by grass, which will not be affected (i.e. no dust emission from the remaining areas).

According to the current construction programme shown in **Appendix 1-1**, the site formation works will require a construction period of about 7.5 months. The site formation will commence in April 2017 and complete in mid-November 2017. The above information has been used in the air quality assessment.

Since the site formation will last for about 7.5 months, after that the site will be hard paved and there is no significant air quality impact anticipated at the site. Thus, in assessing the short-term impact (i.e. hourly and daily), it is based on 7.5 months' construction period only. For long-term impact (i.e. annually), there will be no contribution to RSP and FSP levels due to the Project works for the remaining 4.5 months of the year, thus only background level is taken into account during this period of time.

In order to avoid adverse construction dust impact, controlled number of plants will be used for construction at any one time. Thus, the construction activities that would contribute to dust emissions as identified in Section 3.7.1.1, particularly the removal and unloading of soil materials by excavators; earth loading/ unloading, stockpiling; and bulldozing and surface compaction, will unlikely to operate at the same time. However, to be conservative, air quality impacts due to simultaneous construction of these activities have been taken into account in the assessment.

3.7.1.3 Modelling Approach

Use of ISCST Model for Dispersion Modelling

The TSP, RSP and FSP were modelled using the software "Industrial Source Complex Short Term (ISCST)" developed by Trinity Consultants Incorporated. The ISCST model is based on the principle of Gaussian dispersion and is widely accepted by authorities worldwide including the United States Environmental Protection Agency (USEPA) and the Hong Kong Environmental Protection Department (EPD). The model has used the following input data/ parameters in the simulation:

- Hourly mixing height data from MM5 was adopted;
- Hourly Pasquill stability classes generated by PCRAMMET;
- Wind direction and speed, temperature, raw from MM5;
- Pre-processed wind speeds capped at 1 m/s;
- Anemometer height taken at 10mAG which is half of the thickness of Layer 0 (ground layer) of the MM5 model;
- “Rural” dispersion option was used; and
- No wet and dry deposition assumed

Since the representative ASRs identified for construction phase impact assessment (Section 3.5 refers) are mainly low-rise (about 2 to 3 storeys high buildings), the assessment height for the ASRs is taken from the ground level including 1.5m breathing zone up to 7.5m for the upper floor at the ASRs.

Processing of the MM5 Meteorological Data

Meteorological data derived using MM5 model has been adopted for the assessment. To enable the use of MM5 meteorological data in a format that can readily be accepted by the Gaussian models ISCST3, raw MM5 data were extracted, converted and pre-processing by PCRAMMET. PCRAMMET combines the twice-daily mixing heights data record measured at the King’s Park weather station (2010) to produce the following additional data:

- Hourly Pasquill stability classes;
- Interpolated hourly values from daily morning and maximum mixing heights measured at King’s Park in 2010;
- Converted meteorological data in a format acceptable to the ISCST3/ CALINE4.

Background Air Pollutants Concentrations

For the purpose of evaluating the construction and operational phase air quality impacts, background contributions are based on EPD’s PATH concentration output. According to “Guidelines on Assessing the 'TOTAL' Air Quality Impacts” published in EPD’s website, hour-by-hour background contribution is estimated using output of PATH model.

The background hourly air quality data at the same grid covering the ASRs are extracted from PATH model output file to calculate the overall air pollutants concentrations for each hour. Grids (20,40) of the PATH domain are considered relevant as they coincide with the locations of the ASRs mentioned in Section 3.5.

For a conservative assessment, the PATH simulated background air quality data of Year 2015 has been adopted.

Background contributions of RSP is based on concentration of each hour in PATH's concentration output. As background contribution of FSP is not directly available from PATH model. According to "Guidelines on the Estimation of FSP for Air Quality Assessment in Hong Kong", background contribution of FSP is deduced based on the following conservative formula.

Daily($\mu g/m^3$): FSP = 0.75 x RSP

Annual($\mu g/m^3$): FSP = 0.71 x RSP

For TSP background contribution, the RSP contribution in PATH's concentration output is adopted instead.

Post-Processing of Model Output Data

Maximum 1-hour average TSP concentrations, as well as 24-hour average, and annual average of RSP and FSP concentrations were predicted at the representative ASRs. The outputs were then combined and post-processed on an hour-by-hour basis, and then superimposed with the hourly background level derived from the PATH output (see Section 3.4) for comparison with the air quality criteria specified in **Table 3-1** as well as the 1-hour TSP limit of 500$\mu g/m^3$ specified in the EIAO-TM.

Contour plots of the above parameters are prepared based on the worst hit level. Contour plots of the maximum 1-hour average TSP concentrations and the annual average RSP and FSP concentrations are based on the maximum predicted level. Contour plots of the 24-hour average RSP and FSP concentrations are based on the 10th highest predicted level in accordance with the relevant AQOs.

Assumptions Adopted in Modelling

The following assumptions have been adopted in the modelling exercise for both the unmitigated and mitigated scenarios:

- The construction works will be undertaken from 0800 to 1800 hours during general weekdays (i.e. day-time);
- It is expected that there will be no construction works during restricted hours (i.e. 1900 to 0700 hours of the next day, and any time on a general holidays, including Sunday). Construction works within restricted hours would require advance application for a Construction Noise Permit from EPD;
- Since there will be no construction activities during restricted hours, and on Sundays and general holidays, the calculated emission rates due to construction activities as presented in Section 3.7.1.1 have been applied to day-time hours during general weekdays only (i.e. 0800 to 1800 hours) only. While the hours from 1800 to 0800 during general workdays and on Sundays and general holidays, are adopted for impact assessment of wind erosion on the site;
- The designated haul road should be hard paved; and
- The estimated maximum no. of trucks during site formation is 8 trucks per hour according to the Engineer.

For the unmitigated scenario, it is assumed that the construction activities will be carried out at the whole Project Site at the same time.

For the mitigated scenario, the following assumptions have been adopted in the modelling exercise:

- The construction programme and duration of site formation works has been based on the construction programme in **Appendix 1-1**, and the construction in stages as described in **Appendix 3-8**;
- As the construction will be carried out in stages, the duration of construction works in adjacent to an ASR will be relatively short. The construction works will then be moved to another works area which is relatively far away from the same ASR (i.e. less affected by construction works);
- During construction, construction activities within the works area will be the only dust emission source, while the remaining area of the Project Site is currently paved or covered by grass and will not contribute to any emission (i.e. zero contribution);
- Dust suppression measures in terms of frequent watering are proposed. Water to be sprayed frequently during construction period with water browser or manually. The calculated dust suppression efficiency taken into account the dust suppression measures is also provided in **Appendix 3-9**. The concerned dust suppression efficiency has been applied to both the short-term impacts (e.g. hourly and daily) and long-term impacts (e.g. annual); and
- Relevant requirement of the above has also been stated in Section 3.9.1 and will be included in the Project EM&A Manual for implementation.

3.7.2 Operational Phase

3.7.2.1 Vehicular Emissions Due to the Project

As discussed in Section 3.6.2.2, the proposed development can satisfy the HKPSG requirements in terms of buffer distance from nearby roads and there is no industrial chimney identified within the Assessment Area.

In addition, as discussed in Section 3.6.2.2, a sensitivity test on vehicular emissions due to the additional traffic generated/ attracted by this Project, has been undertaken. Details of the assessment methodology and assumptions are already listed in **Appendix 3-12**, which is not repeated here. The following paragraphs briefly describe the assessment methodology, while details should refer to **Appendix 3-12.**

RSP, FSP and NO_2 have been determined to be focused in the assessment. Peak hour traffic flow data was obtained from the traffic consultant, and emission model EMFAC-HK was adopted to calculate the vehicle emission factors.

In order to represent a worst case scenario, it has also been assumed that the peak hour traffic flow and traffic composition would persist for 24 hours of a day and throughout the whole year although this is very unlikely to occur. Typical worst-case meteorological conditions were assumed:

- Wind direction: worst-case angle selected by model
- Wind speed: 1 m/s
- Directional Variability: 6°
- Stability Class: F
- Mixing Height: 500 m
- Temperature: 20 ℃

Vehicular emissions were calculated by the dispersion model “CALINE4”. The modelled hourly concentrations have been converted to daily average concentration and the annual average level was also calculated.

According to the sensitivity results, vehicular emissions due to the additional traffic generated/ attracted by this Project are found to be insignificant. Also, according to the PATH output data (Section 3.4.2 refers), the background air pollutants levels during the operational phase would be within the relevant AQO criteria. Thus, it is expected that cumulative air quality would be within the AQO criteria, and no adverse impact is anticipated. As such, it is not assessed further in this assessment. During the operational stage, no adverse impact is anticipated as the proposed residential development itself will not have any emission generating activities during the operational phase.

3.7.2.2 Odour of Pond Sediment

As discussed in Section 3.6.2.2, during construction, the concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. The future residential development will be located on the land formed by imported soil, thus no adverse impact at proposed buildings during operational phase is anticipated.

3.7.2.3 Odour Due to Proposed STP

The interim sewage treatment plant will be within a totally enclosed building, which comprises a biological treatment system, membrane filtration and Reverse Osmosis processes to be located underground. Details of the design of STP is provided in Chapter 6 of this report. The exhaust will be directed away from nearby ASRs. With environmental conscious design of an effective odour removal system at the exhaust of the STP (with an odour removal efficiency of not less than 99.5%), the odour concentration at the exhaust would be significantly reduced. With these measures in place, potential air quality impacts during the operational phase will be insignificant and no adverse impacts are anticipated.

3.8 Construction Phase Air Quality Assessment Results (Unmitigated Scenario)

3.8.1 Short-term and Long-term Impact

The predicted unmitigated maximum hourly TSP concentrations as well as daily average and annual average RSP and FSP concentrations due to this Project were assessed according to the methodology described in Section 3.7.1, and the results are presented in **Table 3-4** to **Table 3-8**. Location map of ASRs is shown in **Figure 3-2**.

Details of the calculated emission rates are also provided in **Appendices 3-2 and 3-3**. Detailed assessment results are also presented in **Appendices 3-4 and 3-5**. Contour plots based on the worst hit level are also provided in **Figures 3-3 to 3-7**.

Table 3-4 Predicted Maximum Hourly TSP Concentrations at Representative ASRs Due to This Project (Unmitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	TSP Concentration (µg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	1253 / 1153 / 1016	1089 / 989 / 852
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	1188 / 1115 / 1074	1024 / 951 / 910
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	2549 / 2344 / 1986	2385 / 2180 / 1822
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	2472 / 2252 / 1876	2308 / 2088 / 1712
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	3889 / 3047 / 1923	3725 / 2883 / 1759
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	3905 / 2951 / 1761	3741 / 2787 / 1597
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	1489 / 1430 / 1322	1325 / 1266 / 1158
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	1703 / 1634 / 1507	1539 / 1470 / 1343
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	1318 / 1283 / 1216	1154 / 1119 / 1052
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	1166 / 1122 / 1041	1002 / 958 / 877
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	1058 / 1040 / 1005	894 / 876 / 841
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	1004 / 990 / 964	840 / 826 / 800
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	1381 / 1329 / 1232	1217 / 1165 / 1068
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	1325 / 1280 / 1194	1161 / 1116 / 1030
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	3182 / 2629 / 1820	3018 / 2465 / 1656
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	2991 / 2596 / 1970	2827 / 2432 / 1806
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	3762 / 3517 / 3097	3598 / 3353 / 2933
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	3106 / 2953 / 2681	2942 / 2789 / 2517
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	1383 / 1316 / 1193	1219 / 1152 / 1029
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	1567 / 1496 / 1366	1403 / 1332 / 1202
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	2125 / 2006 / 1793	1961 / 1842 / 1629
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	1238 / 1218 / 1179	1074 / 1054 / 1015
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	1307 / 1283 / 1236	1143 / 1119 / 1072
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	858 / 850 / 835	694 / 686 / 671
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	901 / 892 / 873	737 / 728 / 709
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	1447 / 1384 / 1267	1283 / 1220 / 1103
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	1337 / 1258 / 1118	1173 / 1094 / 954
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	1527 / 1486 / 1407	1363 / 1322 / 1243
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	1747 / 1691 / 1584	1583 / 1527 / 1420
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	710 / 703 / 688	546 / 539 / 524

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	TSP Concentration (µg/m^3)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	702 / 695 / 682	538 / 531 / 518
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	806 / 799 / 785	642 / 635 / 621
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	749 / 743 / 731	585 / 579 / 567
A27	Existing building	4.5	1.5 / 4.5 / 7.5	6884 / 4389 / 3174	6720 / 4225 / 3010
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	1104 / 1086 / 1050	940 / 922 / 886
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	1007 / 989 / 955	843 / 825 / 791
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	1924 / 1813 / 1626	1760 / 1649 / 1462
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	901 / 889 / 865	737 / 725 / 701
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	3749 / 2977 / 2508	3585 / 2813 / 2344
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	1272 / 1232 / 1155	1108 / 1068 / 991
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	930 / 911 / 876	766 / 747 / 712
A35	Palm Springs	5	1.5 / 4.5 / 7.5	732 / 726 / 714	568 / 562 / 550
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	981 / 970 / 947	817 / 806 / 783
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	1364 / 1332 / 1269	1200 / 1168 / 1105
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	3671 / 3293 / 2771	3507 / 3129 / 2607
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	1520 / 1460 / 1389	1356 / 1296 / 1225
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	4683 / 3219 / 1913	4519 / 3055 / 1749
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	1323 / 1296 / 1242	1159 / 1132 / 1078
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	4228 / 3489 / 2611	4064 / 3325 / 2447
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	986 / 968 / 933	822 / 804 / 769
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	3975 / 3115 / 2160	3811 / 2951 / 1996
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	6832 / 4455 / 3167	6668 / 4291 / 3003
Max. Conc.	**-**		**-**	**6884**	**6720**
Criteria	**-**		**-**	**500**	**500**

Remark:

* Concentration due to contribution of Project Site.

** Total concentration due to contribution of the Project Site as well as background concentration in the PATH output. The predicted TSP level due to this Project has already exceeded the relevant air quality criteria regardless the background level (i.e. mitigation measures will be required regardless the background level), thus in calculating the total concentration of TSP (i.e. background + Project contribution), the maximum hourly RSP level from the PATH output file (i.e. 164 µg/m^3 according to Appendix 3-1B) is used as a conservative approach.

Table 3-5 Predicted Daily Average RSP Concentrations at Representative ASRs Due to This Project (Unmitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	186 / 183 / 178	64 / 61 / 56
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	187 / 183 / 178	65 / 61 / 56
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	186 / 183 / 178	64 / 61 / 56
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	192 / 187 / 180	70 / 65 / 58
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	260 / 240 / 211	138 / 118 / 89
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	222 / 205 / 192	100 / 83 / 70
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	167 / 165 / 161	45 / 43 / 39
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	177 / 175 / 170	55 / 53 / 48
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	150 / 149 / 148	28 / 27 / 26
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	155 / 154 / 153	33 / 32 / 31
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	156 / 155 / 154	34 / 33 / 32
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	149 / 149 / 148	27 / 27 / 26
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	184 / 181 / 176	62 / 59 / 54
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	180 / 177 / 173	58 / 55 / 51
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	237 / 224 / 203	115 / 102 / 81
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	214 / 205 / 192	92 / 83 / 70
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	291 / 257 / 222	169 / 135 / 100
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	198 / 188 / 176	76 / 66 / 54
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	206 / 200 / 188	84 / 78 / 66
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	200 / 195 / 188	78 / 73 / 66
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	223 / 216 / 204	101 / 94 / 82
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	160 / 159 / 158	38 / 37 / 36
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	161 / 160 / 158	39 / 38 / 36
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	144 / 143 / 143	22 / 21 / 21
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	143 / 143 / 142	21 / 21 / 20
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	184 / 181 / 176	62 / 59 / 54
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	186 / 182 / 176	64 / 60 / 54
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	201 / 196 / 187	79 / 74 / 65
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	164 / 160 / 154	42 / 38 / 32
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	144 / 143 / 143	22 / 21 / 21

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (µg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	144 / 143 / 143	22 / 21 / 21
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	140 / 140 / 140	18 / 18 / 18
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	136 / 136 / 135	14 / 14 / 13
A27	Existing building	4.5	1.5 / 4.5 / 7.5	377 / 257 / 216	255 / 135 / 94
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	141 / 141 / 140	19 / 19 / 18
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	142 / 141 / 141	20 / 19 / 19
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	213 / 206 / 196	91 / 84 / 74
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	149 / 149 / 148	27 / 27 / 26
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	353 / 297 / 234	231 / 175 / 112
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	152 / 151 / 150	30 / 29 / 28
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	139 / 139 / 139	17 / 17 / 17
A35	Palm Springs	5	1.5 / 4.5 / 7.5	145 / 144 / 144	23 / 22 / 22
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	145 / 145 / 144	23 / 23 / 22
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	164 / 163 / 160	42 / 41 / 38
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	298 / 254 / 228	176 / 132 / 106
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	170 / 169 / 166	48 / 47 / 44
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	271 / 237 / 208	149 / 115 / 86
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	165 / 164 / 162	43 / 42 / 40
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	335 / 270 / 214	213 / 148 / 92
V02	Planned "V" zone	2.4	1.5 / 4.5 / 7.5	160 / 159 / 157	38 / 37 / 35
V03	Planned "V" zone	3	1.5 / 4.5 / 7.5	334 / 273 / 218	212 / 151 / 96
V04	Planned "RD" zone	4.8	1.5 / 4.5 / 7.5	482 / 288 / 224	360 / 166 / 102
Max. Conc.			**-**	**482**	**360**
No. of exceedance @				**>9**	**>9**
Criteria		**-**		**100 (no. of exceedance allowed <= 9)**	

Remark:

The above results are based on the 1st highest daily average concentrations.

@ According to Appendix 3-5, the no. of exceedance would exceed the relevant air quality criteria/ AQOs as the 10th highest value would also exceed the relevant air quality criteria/ AQOs.

* Concentration due to contribution of Project Site.

** Total concentration due to contribution of the Project Site as well as background concentration in the PATH output. The predicted RSP level due to this Project at some of the ASRs nearby has already exceeded the relevant air quality criteria/ AQOs regardless the background level, thus in calculating the total concentration of RSP (i.e. background + Project contribution), the maximum daily average RSP level from the PATH output file (i.e. 122 µg/m³ according to Appendix 3-1B) is used as a conservative approach.

Table 3-6 Predicted Daily Average FSP Concentrations at Representative ASRs Due to This Project (Unmitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	110 / 109 / 108	19 / 18 / 17
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	110 / 109 / 108	19 / 18 / 17
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	110 / 109 / 108	19 / 18 / 17
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	112 / 111 / 108	21 / 20 / 17
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	133 / 126 / 118	42 / 35 / 27
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	121 / 116 / 112	30 / 25 / 21
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	105 / 104 / 103	14 / 13 / 12
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	108 / 107 / 105	17 / 16 / 14
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	99 / 99 / 99	8 / 8 / 8
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	101 / 101 / 100	10 / 10 / 9
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	101 / 101 / 101	10 / 10 / 10
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	99 / 99 / 99	8 / 8 / 8
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	110 / 109 / 107	19 / 18 / 16
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	108 / 108 / 106	17 / 17 / 15
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	126 / 122 / 115	35 / 31 / 24
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	118 / 116 / 112	27 / 25 / 21
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	142 / 131 / 121	51 / 40 / 30
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	114 / 111 / 107	23 / 20 / 16
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	116 / 114 / 111	25 / 23 / 20
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	114 / 113 / 111	23 / 22 / 20
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	121 / 119 / 116	30 / 28 / 25
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	102 / 102 / 102	11 / 11 / 11
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	103 / 102 / 102	12 / 11 / 11
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	97 / 97 / 97	6 / 6 / 6
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	97 / 97 / 97	6 / 6 / 6
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	110 / 109 / 107	19 / 18 / 16
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	110 / 109 / 107	19 / 18 / 16
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	115 / 113 / 110	24 / 22 / 19
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	104 / 102 / 101	13 / 11 / 10
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	97 / 97 / 97	6 / 6 / 6

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (μg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	97 / 97 / 97	6 / 6 / 6
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	96 / 96 / 96	5 / 5 / 5
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	95 / 95 / 95	4 / 4 / 4
A27	Existing building	4.5	1.5 / 4.5 / 7.5	167 / 131 / 119	76 / 40 / 28
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	97 / 97 / 96	6 / 6 / 5
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	97 / 97 / 97	6 / 6 / 6
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	118 / 116 / 113	27 / 25 / 22
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	99 / 99 / 99	8 / 8 / 8
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	160 / 144 / 125	69 / 53 / 34
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	100 / 100 / 99	9 / 9 / 8
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	96 / 96 / 96	5 / 5 / 5
A35	Palm Springs	5	1.5 / 4.5 / 7.5	98 / 98 / 98	7 / 7 / 7
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	98 / 98 / 98	7 / 7 / 7
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	104 / 103 / 102	13 / 12 / 11
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	144 / 131 / 123	53 / 40 / 32
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	105 / 105 / 104	14 / 14 / 13
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	136 / 126 / 117	45 / 35 / 26
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	104 / 104 / 103	13 / 13 / 12
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	155 / 135 / 119	64 / 44 / 28
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	102 / 102 / 102	11 / 11 / 11
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	155 / 136 / 120	64 / 45 / 29
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	199 / 141 / 122	108 / 50 / 31
Max. Conc.			**-**	**199**	**108**
No. of exceedance @				**>9**	**>9**
Criteria			**-**	**75 (no. of exceedance allowed <= 9)**	

Remark:

The above results are based on the 1st highest daily average concentrations.

@ According to Appendix 3-5, the no. of exceedance would exceed the relevant air quality criteria/ AQOs as the 10th highest value would also exceed the relevant air quality criteria/ AQOs.

* Concentration due to contribution of Project Site.

** Total concentration due to contribution of the Project Site as well as background concentration in the PATH output. The predicted FSP level due to this Project at some of the ASRs nearby has already exceeded the relevant air quality criteria/ AQOs regardless the background level, thus in calculating the total concentration of FSP (i.e. background + Project contribution), the maximum daily average FSP level from the PATH output file (i.e. 91 μg/m³ according to Appendix 3-1B) is used as a conservative approach.

Table 3-7 Predicted Annual Average RSP Concentrations at Representative ASRs Due to This Project (Unmitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (µg/m^3)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	54 / 53 / 52	11 / 10 / 9
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	55 / 54 / 53	12 / 11 / 10
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	52 / 52 / 51	9 / 9 / 8
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	52 / 52 / 51	9 / 9 / 8
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	63 / 60 / 57	20 / 17 / 14
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	55 / 53 / 51	12 / 10 / 8
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	47 / 47 / 47	4 / 4 / 4
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	51 / 51 / 50	8 / 8 / 7
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	50 / 49 / 49	7 / 6 / 6
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	61 / 59 / 56	18 / 16 / 13
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	58 / 56 / 54	15 / 13 / 11
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	70 / 65 / 59	27 / 22 / 16
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	48 / 47 / 47	5 / 4 / 4
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	58 / 57 / 55	15 / 14 / 12
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	56 / 56 / 54	13 / 13 / 11
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	56 / 55 / 54	13 / 12 / 11
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	49 / 49 / 49	6 / 6 / 6
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	50 / 50 / 49	7 / 7 / 6
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	47 / 47 / 47	4 / 4 / 4
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	50 / 49 / 49	7 / 6 / 6
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	51 / 51 / 50	8 / 8 / 7
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	53 / 53 / 52	10 / 10 / 9
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	48 / 48 / 47	5 / 5 / 4
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	45 / 45 / 45	2 / 2 / 2

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (µg/m^3)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	45 / 45 / 45	2 / 2 / 2
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	45 / 45 / 45	2 / 2 / 2
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	44 / 44 / 44	1 / 1 / 1
A27	Existing building	4.5	1.5 / 4.5 / 7.5	77 / 59 / 52	34 / 16 / 9
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	45 / 45 / 45	2 / 2 / 2
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	45 / 45 / 45	2 / 2 / 2
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	50 / 49 / 48	7 / 6 / 5
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	81 / 73 / 65	38 / 30 / 22
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	48 / 48 / 48	5 / 5 / 5
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A35	Palm Springs	5	1.5 / 4.5 / 7.5	47 / 47 / 46	4 / 4 / 3
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	46 / 46 / 46	3 / 3 / 3
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	49 / 49 / 48	6 / 6 / 5
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	88 / 79 / 70	45 / 36 / 27
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	51 / 51 / 51	8 / 8 / 8
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	62 / 59 / 54	19 / 16 / 11
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	50 / 50 / 49	7 / 7 / 6
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	84 / 76 / 67	41 / 33 / 24
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	47 / 47 / 47	4 / 4 / 4
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	101 / 83 / 67	58 / 40 / 24
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	141 / 91 / 69	98 / 48 / 26
Max. Conc.	**-**		**-**	**141**	**98**
Criteria	**-**		**-**	**50**	**50**

Remark:

* Concentration due to contribution of Project Site.

** Total concentration due to contribution of the Project Site as well as background concentration in the PATH output. The predicted RSP level due to this Project at some of the ASRs nearby has already exceeded the relevant air quality criteria/ AQOs regardless the background level, thus in calculating the total concentration of RSP (i.e. background + Project contribution), the maximum annual average RSP level from the PATH output file (i.e. 43 µg/m^3 according to Appendix 3-1B) is used as a conservative approach.

Table 3-8 Predicted Annual Average FSP Concentrations at Representative ASRs Due to This Project (Unmitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	34 / 34 / 34	3 / 3 / 3
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	35 / 34 / 34	4 / 3 / 3
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	34 / 34 / 33	3 / 3 / 2
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	34 / 34 / 33	3 / 3 / 2
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	37 / 36 / 35	6 / 5 / 4
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	35 / 34 / 33	4 / 3 / 2
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	36 / 36 / 35	5 / 5 / 4
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	35 / 35 / 34	4 / 4 / 3
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	39 / 38 / 36	8 / 7 / 5
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	35 / 35 / 35	4 / 4 / 4
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	35 / 35 / 34	4 / 4 / 3
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	35 / 35 / 34	4 / 4 / 3
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	34 / 34 / 34	3 / 3 / 3
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (µg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	31 / 31 / 31	0 / 0 / 0
A27	Existing building	4.5	1.5 / 4.5 / 7.5	41 / 36 / 34	10 / 5 / 3
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	33 / 33 / 32	2 / 2 / 1
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	42 / 40 / 38	11 / 9 / 7
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A35	Palm Springs	5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	44 / 42 / 39	13 / 11 / 8
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	37 / 36 / 34	6 / 5 / 3
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	33 / 33 / 33	2 / 2 / 2
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	43 / 41 / 38	12 / 10 / 7
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	32 / 32 / 32	1 / 1 / 1
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	48 / 43 / 38	17 / 12 / 7
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	60 / 45 / 39	29 / 14 / 8
Max. Conc.	**-**		**-**	**60**	**29**
Criteria	**-**		**-**	**35**	**35**

Remark:

* Concentration due to contribution of Project Site.

** Total concentration due to contribution of the Project Site as well as background concentration in the PATH output. In calculating the total concentration of annual FSP (i.e. background + Project contribution), the maximum annual average FSP level from the PATH output file (i.e. 31 µg/m³ according to Appendix 3-1B) is used as a conservative approach.

Based on the above results, in the absence of any mitigation measures the unmitigated TSP, RSP and FSP levels due to construction of the Project Site would exceed the relevant air quality criteria/ AQOs as well as the no. of exceedance allowed under the AQO. Thus, mitigation measures as stipulated in Section 3.9.1 will be required to be implemented in order to alleviate adverse impacts.

3.9 Mitigation of Impacts

3.9.1 During Construction

To ensure compliance with the AQOs at the ASRs at all times, it is recommended to include requirements of good site practice in the contract clauses in order to minimize cumulative dust impact and to implement a dust monitoring and audit programme to ensure proper implementation of the identified mitigation measures. The Contractor shall follow the requirements stipulated in the Air Pollution Control (Construction Dust) Regulation to ensure constructional dust impacts are controlled within the relevant standards.

Good site management practices are important in reducing potential air quality impacts. As a general guidance, the contractor shall maintain high standard of housekeeping to prevent emission of fugitive dust emission. Loading, unloading, handling and storage of fuel, raw materials, products, wastes or by-products should be carried out in a manner so as to minimise the release of visible dust emission. For example, dusty materials to be covered to prevent wind erosion and dust emission could be suppressed by regular site watering. Increasing the watering frequency would achieve higher dust suppression efficiency. Based on the assessment in **Appendix 3-9**, it is recommended that the active works areas within the construction site to be watered regularly during the construction period so as to suppress dust emission effectively.

The speed of the trucks travelling on haul roads within the Project Site to be controlled at 10 kph in order to reduce dust impact and for safe movement around the Project Site. Any piles of materials accumulated on-site to be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas to be carried out in a manner without generating fugitive dust emissions. The material to be handled properly to prevent fugitive dust emission before cleaning.

It is expected that no concrete batching will be required for the Project works, and concrete will be brought to the site in “ready-mixed” state or in pre-cast sections instead. However, if concrete batching is required at the site, the plant should be cleaned and watered regularly as a good practice. Cement and other fine grained materials delivered in bulk should be stored in enclosed silos fitted with high level alarm indicator. Wet mix batching process is preferred over dry mix batching. In addition, concrete batching plant shall comply with the specified process (SP) licence requirements including specified emission limits and dust control measures.

<u>General Mitigation Measure</u>

All the relevant dust control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* would be fully implemented. Typical mitigation measures include:

- The designated haul road should be hard paved to minimize fugitive dust emission;
- During the site formation works, the active works areas should be water sprayed with water browser or sprayed regularly during the construction period. The Contractor(s) should ensure that the amount of water spraying is just enough to dampen the exposed surfaces without over-watering which could result in surface water runoff;
- Dump trucks for material transport should be totally enclosed using impervious sheeting;
- Any excavated dusty materials or stockpile of dusty materials to be covered by impervious sheeting or sprayed with water so as to maintain the entire surface wet, and recovered or backfilled or reinstated as soon as practicable;
- Dusty materials remaining after a stockpile is removed should be wetted with water;

- The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with e.g. concrete, bituminous materials or hardcore or similar;
- The Contractor(s) shall only transport adequate amount of fill materials to the Project Site to minimise stockpiling of fill materials on-site, thus reducing fugitive dust emission due to wind erosion;
- Should temporary stockpiling of dusty materials be required, it shall be either covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides; or sprayed with water so as to maintain the entire surface wet;
- All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet;
- Vehicle speed to be limited to 10 kph except on completed access roads;
- The portion of road leading only to a construction site that is within 30 m of a designated vehicle entrance or exit should be kept clear of dusty materials;
- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites;
- The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- The working area of excavation should be sprayed with water before, during and after (as necessary) the works so as to maintain the entire surface wet; and
- Use of effective dust screens, sheeting or netting to be provided to enclose dry scaffolding which may be provided from the ground floor level of the building or if a canopy is provided at the first floor level, from the first floor level, up to the highest level (maximum two floors for this Project) of the scaffolding where scaffolding is erected around the perimeter of a building under construction.

Site-specific Mitigation Measures

In order to minimize dust emission, the site formation works should be carried out in stages. Regular site watering will be applied within the construction site in order to effectively supress dust emission, and that dusty materials will be properly covered to prevent wind erosion. Works area to be properly covered at the end of working day to minimize wind erosion.

Therefore, with appropriate dust control measures and good housekeeping practice, adverse dust impact is not anticipated. EM&A during the Project construction phase will monitor the air quality impacts and to ensure the effectiveness of the mitigation measures implemented. With the continual monitoring and review of dust impact in the area and the proper control measures, it is expected that there will be no adverse construction dust impacts on the ASRs.

Odour Impact of Pond Sediment

As discussed earlier, the concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. However, in case pond sediment is involved during construction at the abandoned pond area, the following precautionary measures are proposed:

- Exposed surface shall be filled by filling materials;
- Malodorous material, if any, should be placed as far as possible from any ASRs;

- Malodorous materials should be covered by plastic tarpaulin sheets; and
- Regular odour patrol to examine the effectiveness of the above control measures.

With proper measures, potential odour impact will be short-term and controllable.

3.9.2 During Operation

During the operational stage, an interim sewage treatment plant is proposed within the Project Site before connection to the public sewerage system becomes available. Detailed design of the interim STP has yet been carried out, but the interim sewage treatment plant will be within a totally enclosed building with biological treatment, membrane filtration and Reverse Osmosis processes to be located underground. The concerned facility will only be temporary and will be carefully planned such that the brine disposal during maintenance (a potential odour source) will be away from the residential area as much as possible and will be close to the vehicular access connecting the nearby road.

The STP will be equipped with odour removal system (with an odour removal efficiency of not less than 99.5%). In addition, the exhaust of the STP will be directed away from nearby ASRs. With these measures, the odour concentration at the exhaust would be significantly reduced and no odour impact is expected to arise from the operation of the interim on-site STP.

During the detailed design phase, the minimisation of odour will be duly considered to further reduce any localized impact and no adverse odour impact due to operation of the interim sewage treatment plant is expected.

During operation, RCP will be provided for the residential development. A licensed waste collector shall be employed to collect domestic waste on daily basis. Localized impact and minimization of odour nuisance will be considered during detailed design. With these measures, no adverse air quality impact is anticipated during operation.

The sediment at an abandoned pond within the Project Site is intended to be left in place and not to be disturbed as far as possible. After the filling, the proposed development will be located on the land formed by imported soil, thus no adverse impact at proposed buildings during operational phase is anticipated.

In terms of vehicular emission impacts, as discussed in Section 3.6.2.2, the required minimum separation distance between sensitive uses of this Project and the edge of nearby roads surrounding the Project Site should be >5m as stipulated in Chapter 9 of HKPSG. The current proposed development (with separation distance of 7m to over 104m between air quality sensitive uses of this Project and the edge of nearby roads surrounding the Project Site) can satisfy the above-mentioned minimum separation distance (**Figure 3-1** refers).

3.10 Construction Phase Air Quality Impact Assessment Results (Mitigated Scenario)

3.10.1 Short-term and Long-term Impacts

The predicted mitigated maximum hourly TSP concentrations as well as daily average and annual average RSP and FSP concentrations due to construction of this Project with the implementation of mitigation measures provided in Section 3.9.1, were assessed according to the methodology described in Section 3.7.1, and the results are presented in **Table 3-9 to Table 3-13**. Location map of representative ASRs selected for construction phase air quality impact assessment is presented in **Figure 3-2**.

Details of the calculated emission rates are also provided in **Appendices 3-2 and 3-3**. Details of assessment results are also presented in **Appendices 3-6** and **3-7.** Contour plots based on the worst hit level (Section 3.7.1.3 refers) are also provided in **Figures 3-8 to 3-12.**

Table 3-9 Predicted Maximum Hourly TSP Concentrations at Representative ASRs Due to This Project (Mitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	TSP Concentration (μg/m^3)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	35 / 31 / 25
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	32 / 30 / 27
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	28 / 26 / 24
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	35 / 31 / 24
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	61 / 45 / 32
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	164 / 164 / 164	53 / 42 / 29
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	17 / 16 / 15
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	24 / 23 / 22
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	15 / 14 / 14
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	21 / 19 / 18
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	15 / 15 / 14
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	164 / 164 / 164	8 / 8 / 7
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	164 / 164 / 164	16 / 15 / 14
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	164 / 164 / 164	19 / 15 / 13
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	54 / 43 / 38
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	46 / 40 / 33
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	171 / 164 / 164	88 / 72 / 48
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	166 / 166 / 165	56 / 52 / 45
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	164 / 164 / 164	38 / 36 / 31
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	45 / 42 / 37
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	164 / 164 / 164	36 / 34 / 30
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	10 / 10 / 10
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	11 / 11 / 10
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	164 / 164 / 164	6 / 6 / 6
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	164 / 164 / 164	10 / 10 / 10
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	164 / 164 / 164	26 / 24 / 21
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	33 / 31 / 26
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	164 / 164 / 164	36 / 33 / 28

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	TSP Concentration (µg/m³)	
				With Background **	Without Background *
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	165 / 164 / 164	49 / 47 / 43
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	164 / 164 / 164	9 / 9 / 9
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	164 / 164 / 164	9 / 9 / 8
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	164 / 164 / 164	10 / 9 / 9
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	164 / 164 / 164	9 / 9 / 9
A27	Existing building	4.5	1.5 / 4.5 / 7.5	316 / 252 / 182	226 / 163 / 92
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	164 / 164 / 164	10 / 10 / 10
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	164 / 164 / 164	11 / 11 / 10
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	164 / 164 / 164	44 / 42 / 38
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	164 / 164 / 164	14 / 13 / 12
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	166 / 164 / 164	89 / 82 / 70
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	164 / 164 / 164	19 / 18 / 16
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	164 / 164 / 164	13 / 13 / 12
A35	Palm Springs	5	1.5 / 4.5 / 7.5	164 / 164 / 164	6 / 6 / 6
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	164 / 164 / 164	11 / 11 / 10
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	166 / 166 / 165	19 / 18 / 18
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	176 / 167 / 165	109 / 94 / 71
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	164 / 164 / 164	17 / 16 / 14
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	213 / 164 / 164	179 / 110 / 43
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	164 / 164 / 164	13 / 13 / 13
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	168 / 164 / 164	152 / 67 / 51
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	167 / 167 / 166	15 / 14 / 14
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	227 / 175 / 164	164 / 96 / 65
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	224 / 164 / 164	143 / 77 / 65
Max. Conc.	**-**		**-**	**316**	**226**
Criteria	**-**		**-**	**500**	**500**

Remark:

* Concentration due to contribution of Project Site.

** The above results have included the background level extracted from the PATH Output (year 2015). The hour-by-hour background contribution is estimated using output file of PATH model, and added hour-by-hour to the Project contribution in order to calculate the total TSP level.

Table 3-10 Predicted Daily Average RSP Concentrations at Representative ASRs Due to This Project (Mitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (µg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 2 / 1
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 1 / 1
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 2 / 1
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 0
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 2 / 1
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	122 / 122 / 122	9 / 7 / 4
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 2 / 1
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	122 / 122 / 122	2 / 1 / 1
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	122 / 122 / 122	3 / 2 / 2
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 0
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (µg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A27	Existing building	4.5	1.5 / 4.5 / 7.5	122 / 122 / 122	11 / 5 / 3
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	122 / 122 / 122	6 / 5 / 3
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A35	Palm Springs	5	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	124 / 123 / 123	4 / 3 / 2
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 0
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	122 / 122 / 122	5 / 3 / 2
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	122 / 122 / 122	1 / 1 / 1
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	124 / 123 / 123	4 / 2 / 1
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	122 / 122 / 122	0 / 0 / 0
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	122 / 122 / 122	6 / 3 / 2
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	122 / 122 / 122	10 / 5 / 2
Max. Conc. #			**-**	**124**	**11**
No. of exceedance @				**1**	**-**
Criteria		**-**		**100 (no. of exceedance allowed <= 9)**	

Remark:

The above results are based on the 1st highest daily average concentrations.

* Concentration due to contribution of Project Site.

** The above results have included the background level extracted from the PATH Output (year 2015). The hour-by-hour background contribution is estimated using output of PATH model, and added hour-by-hour to the Project contribution in order to calculate the daily average total RSP levels.

@ The total no. of exceedance based on the calculated RSP concentrations.

Based on the calculated maximum 1st highest daily average concentrations of RSP. According to Appendix 3-7, the calculated maximum 10th highest daily average RSP is 80 µg/m³, which can comply with the relevant AQO criteria.

Table 3-11 Predicted Daily Average FSP Concentrations at Representative ASRs Due to This Project (Mitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 0 / 0
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 0 / 0
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 1 / 0
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 1 / 0
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	91 / 91 / 91	3 / 2 / 1
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 0 / 0
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 1 / 1
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	92 / 92 / 91	0 / 0 / 0
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (µg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A27	Existing building	4.5	1.5 / 4.5 / 7.5	91 / 91 / 91	3 / 2 / 1
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	91 / 91 / 91	2 / 1 / 1
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A35	Palm Springs	5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	92 / 92 / 92	1 / 1 / 1
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	91 / 91 / 91	1 / 1 / 1
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	92 / 92 / 92	1 / 1 / 0
V02	Planned "V" zone	2.4	1.5 / 4.5 / 7.5	91 / 91 / 91	0 / 0 / 0
V03	Planned "V" zone	3	1.5 / 4.5 / 7.5	91 / 91 / 91	2 / 1 / 1
V04	Planned "RD" zone	4.8	1.5 / 4.5 / 7.5	91 / 91 / 91	3 / 1 / 1
Max. Conc. #			**-**	**92**	**3**
No. of exceedance @				**1**	**-**
Criteria			**-**	**75 (no. of exceedance allowed <= 9)**	

Remark:

The above results are based on the 1st highest daily average concentrations.

* Concentration due to contribution of Project Site.

** The above results have included the background level extracted from the PATH Output (year 2015). The hour-by-hour background contribution is estimated using output of PATH model, and added hour-by-hour to the Project contribution in order to calculate the daily average FSP levels.

@ The total no. of exceedance based on the calculated daily average FSP concentrations.

Based on the calculated maximum 1st highest daily average concentrations of FSP. According to Appendix 3-7, the calculated maximum 10th highest daily average FSP is 59 µg/m³, which can comply with the relevant AQO criteria.

Table 3-12 Predicted Annual Average RSP Concentrations at Representative ASRs Due to This Project (Mitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	43.4 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	43.4 / 43.4 / 43.3	0.1 / 0.1 / 0.1
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	43.4 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	43.4 / 43.4 / 43.3	0.2 / 0.1 / 0.1
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	43.4 / 43.4 / 43.3	0.1 / 0.1 / 0.1
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0.1 / 0
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	RSP Concentration (μg/m³)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A27	Existing building	4.5	1.5 / 4.5 / 7.5	43.4 / 43.3 / 43.3	0.2 / 0.1 / 0
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0.1 / 0 / 0
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	43.4 / 43.4 / 43.3	0.2 / 0.1 / 0.1
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A35	Palm Springs	5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	43.5 / 43.5 / 43.4	0.3 / 0.2 / 0.2
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	43.4 / 43.3 / 43.3	0.1 / 0.1 / 0.1
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	43.5 / 43.4 / 43.4	0.3 / 0.2 / 0.1
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	43.3 / 43.3 / 43.3	0 / 0 / 0
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	43.5 / 43.4 / 43.4	0.3 / 0.2 / 0.1
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	43.7 / 43.4 / 43.4	0.4 / 0.2 / 0.1
Max. Conc.	**-**		**-**	**43.7**	**0.4**
Criteria	**-**		**-**	**50**	**50**

Remark:

* Concentration due to contribution of Project Site.

** The above results have included the background level extracted from the PATH Output (year 2015). The hour-by-hour background contribution is estimated using output of PATH model, and added hour-by-hour to the Project contribution in order to calculate the annual average total RSP level.

Table 3-13 Predicted Annual Average FSP Concentrations at Representative ASRs Due to This Project (Mitigated Scenario)

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (μg/m³)	
				With Background **	Without Background *
A01	Fairview Park	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A01A	Fairview Park	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A02	Fairview Park	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A02A	Fairview Park	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A03	Fairview Park	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A04	Fairview Park	4.3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A05	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A05A	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A05B	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A06	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A06A	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A07	Yau Mei San Tsuen village house	3.1	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A08	Chuk Yuen Tsuen village house	2.3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A09	Chuk Yuen Tsuen village house	3.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A10	Bethel High School	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A10A	Bethel High School	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A11	Helene Terrace	4.5	1.5 / 4.5 / 7.5	30.8 / 30.7 / 30.7	0 / 0 / 0
A12	Villa Camellia	6.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A13	Fairview Park	4.6	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A14	Wong Chan Sook Ying Memorial School	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A15	Man Yuen Tsuen village house	4.1	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A16	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A16A	Fairview Park	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A17	Palm Springs	5.7	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A18	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A19	Chuk Yuen Tsuen village house	3.3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A20	Hang Fook Garden	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A21	Ha San Wai village house	4.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A22	Ha San Wai village house	3.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A23	Yau Mei San Tsuen village house	3.6	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0

ASR No.	Description	Ground Level, mPD	Height Above Ground, m	FSP Concentration (µg/m^3)	
				With Background **	Without Background *
A24	Christian Ministry Institute	3.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A25	Royal Palms	4.9	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A26	Hong Chi Morninglight School Yuen Long	4.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A27	Existing building	4.5	1.5 / 4.5 / 7.5	30.8 / 30.7 / 30.7	0.1 / 0 / 0
A28	Fairview Park	4.3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A29	Fairview Park	4.3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A30	Fairview Park	4.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A31	Fairview Park	3.9	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A32	A Restaurant near Helene Terrace	4.5	1.5 / 4.5 / 7.5	30.8 / 30.7 / 30.7	0.1 / 0 / 0
A33	Fairview Park	3.9	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A34	Palm Springs	5.2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A35	Palm Springs	5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A36	Yau Mei San Tsuen village house	3.5	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A1Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A2Pa	Planned RD Site	3	1.5 / 4.5 / 7.5	30.8 / 30.8 / 30.8	0.1 / 0.1 / 0
A3Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A4Pa	Planned REC Site	3	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
A5Pa	Planned Yau Mei Site	2	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
V01	Planned NT exempted houses	3	1.5 / 4.5 / 7.5	30.8 / 30.8 / 30.7	0.1 / 0.1 / 0
V02	Planned “V” zone	2.4	1.5 / 4.5 / 7.5	30.7 / 30.7 / 30.7	0 / 0 / 0
V03	Planned “V” zone	3	1.5 / 4.5 / 7.5	30.8 / 30.8 / 30.7	0.1 / 0.1 / 0
V04	Planned “RD” zone	4.8	1.5 / 4.5 / 7.5	30.8 / 30.8 / 30.7	0.1 / 0.1 / 0
Max. Conc.	**-**		**-**	**30.8**	**0.1**
Criteria	**-**		**-**	**35**	**35**

Remark:

* Concentration due to contribution of Project Site.

** The above results have included the background level extracted from the PATH Output (year 2015). The hour-by-hour background contribution is estimated using output of PATH model, and added hour-by-hour to the Project contribution in order to calculate the annual average total FSP level.

3.10.2 Findings of Mitigated Scenario

It is found that with the implementation of general mitigation measures listed out in Section 3.9.1; and the proposed site-specific measures, the dust level can be significantly reduced and can comply with the relevant air quality criteria/ AQOs for TSP, RSP and FSP, respectively. Thus, no further mitigation measures will be necessary.

As the dust level can comply with the relevant air quality criteria/ AQOs, no residual impact is anticipated.

With regard to the above, the air quality impact of construction activities has been assessed using a conservative emission rate in order to represent a worst case scenario. To be conservative, simultaneous construction of construction activities as identified in Section 3.7.1.1 (i.e. removal and unloading of soil materials by excavators; earth loading/ unloading, stockpiling; and bulldozing and surface compaction), has also been assumed. Thus, the predicted air quality impact upon ASRs as shown above is based on a conservative approach. However, the concerned activities are considered unlikely to operate at the same time, where there are limited space and controlled number of construction plants available for construction at any one time. Thus, it is expected that the actual air quality impact due to construction works would be less significant.

The site formation works of this Project will only last for about 7.5 months. After that, the site will be hard paved and there will be no significant air quality impact at the site over the long term. In addition, the construction works will be carried out in stages, thus the construction duration of each works area would be relatively short. As a result, the air quality impact upon ASRs will be relatively short-term and temporary as the nearest dust emission sources of an individual ASR will not last for the whole period of site formation stage and will discontinue after a short period of time.

It should also note that practical mitigation measures have already been proposed in Section 3.9.1; the works area will be constructed in stages; frequent watering will be applied; exposed surfaces will be compacted or covered after works. Thus, the air quality impact due to construction of this Project has already been reduced to a minimum and practical mitigation measures have been exhausted.

3.10.3 Concurrent Construction with Planned Development Site

As discussed in Sections 3.6.1.3 and 3.6.1.4, there are planned development projects nearby. Potential impact due to concurrent construction with these planned projects has been evaluated in the said sections of this report. It is found that site formation works of the planned “Yau Mei Site” and planned “REC Site” may potentially overlap with this Project, thus it is investigated further.

Given the concerned “Yau Mei Site” project is distant away from this Project (over 360m apart) and there are currently no existing ASRs between the two project sites, it is expected that concurrent construction is unlikely to result in any adverse impacts on ASRs. Nevertheless, a sensitivity test based on the peak construction period during site formation of that project has been undertaken to evaluate potential cumulative impacts due to concurrent construction with that of the current Project.

Information of predicted TSP, RSP and FSP levels from the approved “Yau Mei Site” project, has been extracted directly from its approved EIA report, and the cumulative impact upon nearby ASRs (same locations as this Project) are evaluated. Please refer to **Appendix 3-11** for details of assessment.

For the planned "REC Site", as discussed in Section 3.6.1.4, the site formation works of this Project have largely avoided concurrent works with that project. Thus, adverse cumulative impact is not anticipated. Nevertheless, to be conservative, a sensitivity test on cumulative impact due to such minor overlapped construction activities has been assessed, which are provided in **Appendix 3-11A**. Information of predicted TSP, RSP and FSP levels from the approved "REC Site" project, has been extracted directly from its approved EIA report. Cumulative impact upon nearby ASRs (same locations as this Project) by considering site formation works of the current Project; the planned "Yau Mei Site"; as well as the planned "REC Site", are then evaluated.

According to the sensitivity test results presented in **Appendix 3-11** and **Appendix 3-11A**, the cumulative dust emissions due to concurrent construction of the two project sites would not adversely impact on ASRs as the contribution due to the planned "Yau Mei Site" Project as well as from the "REC Site" is very small and insignificant. The cumulative dust levels can comply with the relevant air quality objectives/ criteria. As such, there will be no adverse cumulative impact anticipated during construction stage.

3.11 Residual Environmental Impacts

No residual impact is anticipated during construction and operation of this Project.

3.12 Environmental Monitoring and Audit

Given the mitigated TSP, RSP and FSP levels (with implementation of recommended mitigation measures) can comply with the relevant air quality criteria/ AQOs, no adverse impact will be anticipated due to the Project works, and no environmental monitoring and audit (EM&A) will be necessary.

Nevertheless, in order to ensure the effectiveness of implementation of mitigation measures, it is proposed that an environmental monitoring and audit (EM&A) program is carried out during construction phase to monitor the short-term impacts. The Environmental Team (ET) shall check the contractor(s)' practice and ensure the above recommendations are properly implemented. Should adverse dust impacts be identified, the source of fugitive dust emission should be identified. Additional mitigation measures shall be proposed by the Contractor(s) before concerned construction works is continued. Details of the EM&A requirements are provided in **Chapter 13** of this report.

3.13 Impact Summary and Conclusion

Construction Phase

Through implementation of dust control measures required under the Air Pollution Control (Construction Dust) Regulation; recommended specific measures in the EIA report; and good housekeeping practice by the works contractors, construction dust impacts can be controlled to acceptable levels. Practical mitigation measures have already been proposed for this Project to alleviate potential impacts. The concerned site formation works will only be short-term and potential air quality impacts have been reduced to a minimum through recommended mitigation measures, and can comply with the relevant air quality criteria/ AQOs. The predicted mitigated air pollutants levels are also summarised below.

Table 3-14 Summary Table of Predicted Mitigated Air Pollutants Concentrations During Construction Phase

	TSP (1-hour average)	RSP (24-hour average)	RSP (Annual average)	PM2.5 (24-hour average)	PM2.5 (Annual average)
Predicted Range, µg/m^3	164 – 316 **	78-80 *	43.3 – 43.7 **	59-59 *	30.7 – 30.8 **
No. of Exceedance	n/a	1 ***	n/a	1 ***	n/a
Compliance with Air Quality Criteria?	Yes	Yes #	Yes	Yes #	Yes
Air Quality Criteria, µg/m^3	500	100	50	75	35
No. of Exceedance Allowed	n/a	9	n/a	9	n/a

Remark: * The 24-hour average levels are based on the 10th highest 24-hour average concentrations at the receivers (**Appendix 3-7** of EIA report refers).

** Predicted concentrations at ASRs (Tables 3-9, 3-12 to 3-13 of the EIA report refer).

*** Based on the maximum number of exceedances of the model-predicted 24-hour average concentrations at the receivers (Tables 3-10 to 3-11 of the EIA report refer).

The predicted 10th highest 24-hour average concentrations as well as the no. of exceedances from the calculated 24-hour average concentrations are both within the air quality criteria / AQO.

During the construction phase, the concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. Potential odour impact is therefore not considered to be an issue.

Therefore, no adverse impact is anticipated. There is no residual impact as a result.

Operational Phase

During operation, appropriate precautionary measures (e.g. peripheral set back from the site boundaries by means of landscape area) have been incorporated in the layout to alleviate potential vehicular emissions impacts. It was found that the Project Site can satisfy the buffer distance requirements stated in the HKPSG for both active and passive recreational uses, thus no unacceptable air quality impacts due to vehicular emission is expected. No unacceptable air quality impact due to industrial emission is expected as no industrial emission source has been identified within 500m from the Study boundary. The existing open storage site and an enclosed godown to the east of the Project Site are unlikely to have adverse air quality impact upon the development. Thus, no adverse air quality impact is anticipated.

Given the scale of the Project (for small houses development), there is no major planned dust generating or air pollutant emission source from the proposed development that would contribute to any adverse impact on air quality. In addition, vehicular emission due to additional traffic generated/ attracted by this Project is found to be insignificant (~19 vehicles/ hour during peak hour). In addition, this Project would not contribute to additional traffic flow on nearby roads when compared with traffic flow generated by its existing open car park operation. The Project Site itself is unlikely to generate any air pollution nuisance. During the operational phase, a licensed waste collector will be employed to collect domestic waste on a daily basis and RCP will be provided for the residential development. Localized impact and minimization of odour nuisance will be considered during detailed design. Thus, no adverse odour impact is anticipated.

During the operational stage, an interim sewage treatment plant is proposed within the Project Site before connection to the public sewerage system becomes available. The interim sewage treatment plant will be within a totally enclosed building with biological treatment, membrane filtration and Reverse Osmosis processes to be located underground. It will be equipped with odour absorptive system (with odour removal efficiency of not less than 99.5%) and the exhaust will be directed away from nearby ASRs. Thus, adverse odour impact is not expected. Brine disposal during maintenance will be away from residential area as much as possible and close to the vehicular access connecting the nearby road. With the careful design and odour control measures, adverse odour impact due to operation of the interim sewage treatment plant is not anticipated.

With the recommended mitigation measures in place, no non-compliance with the criteria as set out in Annex 4 of the EIAO-TM is anticipated for both vehicular emissions and odour impacts. No adverse residual air quality impact due to the Project is anticipated.

4. NOISE

4.1 Introduction

This Chapter presents a noise assessment conducted to predict the future noise impact at the proposed Development. This Chapter follows the criteria and guidelines for evaluating and assessing noise impacts as stated in Annex 5 and Annex 13 of the TM and has covered the scope outlined in Clause 3.9.2 of the EIA Study Brief.

4.2 Legislation, Standards, Guidelines and Criteria

4.2.1 Road Traffic Noise Criterion

Noise criteria for the assessment of road traffic noise impact on the Project are provided in Table 1A of Annex 5 of EIAO-TM and are summarised below. According to the guidelines, the maximum allowed road traffic noise level, measured in terms of L_{10}(1-hr), at typical facades of new dwellings of the proposed Project is to be 70 dB(A).

Noise standards are recommended in Table 1A of the Technical Memorandum on Environmental Impact Assessment Process for planning against possible noise impact from road traffic, railway and aircrafts. According to the guidelines, the maximum allowed road traffic noise level, measured in terms of L10(1-hr.), at typical facades of new dwellings like the proposed development is recommended to be 70 dB(A).

Table 4-1 Relevant Road Traffic Noise Standard

Common Uses	Road Traffic Noise L10 (1 hour), dB(A)
All domestic premises including temporary housing accommodation	70
Hotel and hostels	70
Offices	70
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	65
Places of public worship and courts of law	65
Hospital, clinics, convalescences and homes for the aged, diagnostic rooms, wards	55

Note:

(i) The above standards apply to uses which reply on opened windows for ventilation;

(ii) The above standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external façade.

4.2.2 Aircraft Noise Criteria

The recommended NEF25 contour of the Chek Lap Kok Airport in the HKPSG should not be exceeded for the Development.

4.2.3 Industrial Noise Criterion

Noise Control Ordinance (NCO)

The Noise Control Ordinance (NCO) provides the statutory framework for the control of fixed plant. It defines statutory limits applicable to the fixed plants used during the operational phase of the Project. The Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM) sets the criteria - Acceptable Noise Level (ANL) for governing fixed plant noise.

Environmental Impact Assessment Ordinance (EIAO)

According to the Table 1A of EIAO-TM, the noise impact due to fixed noise sources shall comply with the following criteria:

- 5 dB(A) below the appropriate Acceptable Noise Levels (ANLs) given in Table 2 of the IND-TM; or
- The prevailing background noise levels where it is 5 dB(A) below the ANL.

Noise sensitive receivers (NSR) are classified according to the Area Sensitivity Rating (ASR). Any NSR shall be assigned an ASR of "C" if it is within 100 m of a zone designated as "Industrial" or "Industrial Estate" on a statutory Outline Zoning Plan, or an ASR of "B" if it is between 100 m and 250 m from such a zone, except for cases which indicate an ASR of "C". **Table 4-2** presents the ASRs in different areas.

As Project Site is located in rural area, to be conservative, the Area Sensitive Rating (ASR) of "A" has been assumed, and the planning noise standard of "ANL–5 dB(A)" should be 55 dB(A) for day-time and evening time periods, and 45 dB(A) for night time accordingly. The ANL for Area Sensitivity Ratings of "A" is depicted in **Table 4-3**.

Table 4-2 Area Sensitivity Ratings (ASRs)

Type of Area Containing NSR	Degree to which NSR is affected by Influencing Factor		
	Not Affected	Indirectly Affected	Directly Affected
Rural area, including country parks or village type developments	A	B	B
Low density residential area consisting of low-rise or isolated high-rise developments	A	B	C
Urban area	B	C	C
Area other than those above	B	B	C

Table 4-3 Relevant Noise Standard for Fixed Noise Sources

Standards	Criteria in relevant Time Periods	Acceptable Noise Level (ANL)	Criteria (ANL-5 dB(A))
NCO	Day and Evening (07:00 – 23:00)	60 dB(A) and	55 dB(A) and
NCO	Night (23:00 – 07:00)	50 dB(A)	45 dB(A)

4.2.4 Rail Noise Criteria

It is recommended in the HKPSG that the rail traffic noise limits for noise sensitive receivers should be 65dB(A) L_{eq}(24 hrs) and 85dB(A) L_{max}(2300-0700 hr). These noise limits apply to uses which rely on open windows for ventilation.

Noise limits recommended in the Noise Control Ordinance are 60dB(A) L_{eq}(30mins) during day and evening periods and 50dB(A) L_{eq}(30mins) during the night-time for the Development, which is assigned an Area Sensitivity Rating (ASR) of "A".

4.2.5 Construction Noise Criteria

Construction noise is controlled under the Noise Control Ordinance (NCO) which prohibits the use of powered mechanical equipment (PME) during the restricted hours (7 p.m. to 7 a.m. on normal weekdays and any time on a public holiday, including Sunday) without a valid Construction Noise Permit (CNP) granted by the Authority. The criteria and procedures for issuing such a permit are specified in the "Technical Memorandum on Noise From Construction Works Other than Percussive Piling" (TM1).

For construction works other than percussive piling, although TM1 do not provide control over daytime construction activities, noise limits are set out in Annex 5 of the EIAO-TM. The TM applies to designated projects, including residential or recreational development planned within Deep Bay Buffer Zones 1 or 2. The relevant noise standards are summarised in **Table 4-4** below.

Table 4-4 Noise Limits for Daytime Construction Activities

NSR	0700 to 1900 hours on any day not being a Sunday or general holiday L_{eq} (30 min.) dB (A)
All domestic premises including temporary housing accommodation	75
Educational institutions including kindergartens, nurseries.	70 65 (during examination)

N.B.

(i) The above standards apply to uses which reply on opened windows for ventilation.

(ii) The above standards shall be viewed as the maximum permissible noise levels assessed at 1m from the external facade.

Noise impacts arising from general construction activities (excluding percussive piling) conducted during the restricted hours (19:00-07:00 hours on any day and anytime on Sunday or general holiday) and percussive piling during anytime are governed by the Noise Control Ordinance ("NCO").

For carrying out of any general construction activities involving the use of any Powered Mechanical Equipment ("PME") within restricted hours, a Construction Noise Permit (CNP) is required from the Authority under the NCO.

The noise criteria and the assessment procedures for issuing a CNP are specified in Technical Memorandum on Noise from Construction Work Other Than Percussive Piling (GW-TM) under the NCO.

The use of Specified PME ("SPME") and/or the carrying out of Prescribed Construction Work ("PCW") within a Designated Area ("DA") under the NCO during the restricted hours are also prohibited without a CNP. The relevant technical details can be referred to Technical Memorandum on Noise from Construction Work in Designated Areas (DA-TM) under NCO.

Designated areas, in which the control of SPME and PCW shall apply, are established through the Noise Control (Construction Work Designated Areas) Notice made under Section 8A(1) of the NCO.

According to the latest Designated Area defined under the NCO [Plan No.: EPD/AN/NT-01 by the Environment Bureau], the Project Area is within Designated Areas.

During the construction phase, the Contractor has the responsibility to check the latest status and coverage of the Designated Areas at time of construction of the project.

Percussive piling is only permitted when the Authority has granted a CNP. Technical Memorandum on Noise from Percussive Piling (PP-TM) under the NCO sets out the permitted hours of operation of percussive piling and Acceptable Noise Level ("ANL") requirements, which are dependent on the level of exceedance of the Acceptable Noise Level ("ANL"). Should percussive piling method be found necessary due to engineering reason during the detailed design stage, it will be subject be a CNP to be issued by EPD.

Regardless of any description or assessment made in this chapter, in assessing a filed application for a CNP the Authority will be guided by the relevant Technical Memoranda. The Authority will consider all the factors affecting their decision taking contemporary situations/ conditions into account. Nothing in this report shall pre-empt the Authority in making their decisions, and there is no guarantee that a CNP will be issued. If a CNP were issued, the Authority may include any conditions they consider appropriate and such conditions are to be followed while the works covered by the CNP are being carried out. Failing to do so may lead to cancellation of the permit and prosecution action under the NCO.

4.3 Proposed Development and Nearby Environment

The Proposed Development is located at East of Kam Pok Road, Yuen Long. It is bounded by Fung Chuk Road to the north and Ha Chuk Yuen Road to the east, Kam Pok Road to the west and Ha San Wai Road to the south (**Figure 1-1**).

The Development comprises 32 houses with 2 storeys in height (**Figure 2-1**). Details of the proposed development and the concerned MLP, have been provided in Section 1.6.

There are existing and planned developments surrounding the Project Site, these are potential sensitive receivers during construction and operation of the Project, which are described in Section 4.5.

4.4 Identification of Potential Noise Impacts

4.4.1 Industrial Noise Survey

Dates and Time

Site surveys were conducted on 4 July 2014, 12 September 2013, 10 February 2012 and 6 January 2010 by Westwood Hong & Associates Ltd (WHA). The aim of the survey is to establish whether or not the Development would be significantly affected by the industrial noise sources in the neighbourhood. Photographs taken on site are given in **Appendix 4-1**. The surveys were conducted by WHA.

Noise Sensitive Receivers in the Vicinity

The identified Noise Sensitive Receivers (NSRs) in the vicinity were Fairview Park, Villa Camellia and 3-storey village dwellings in Ha San Wai (Plates 4 and 5 in **Appendix 4-1**).

Observation of Construction Works

No construction activity was being carried out at the site located to the east of the Development.

Industrial Noise Sources in the Vicinity

Figure 4-4 shows the locations of identified industrial noise sources in vicinity, photographs were also provided in **Appendix 4-1**.

Inspections revealed that the open storage (Fan Keung Kee) adjoining the eastern site boundary of the Project Site was for storage use of precast units. The identified industrial noise sources were a mobile crane, a lorry and a forklift within the yard. Site surveys revealed that the lorry was moving slowly in the yard, the mobile crane was loading a prefabricated unit to or from the lorry with insignificant engine noise (Plate 1 of **Appendix 4-1**). Also, a forklift was used for loading/unloading and that the site had occasional slight hammering noise.

Inspections revealed that the Shing Fat Logistics Ltd adjoining the eastern site boundary of the Project Site was for storage use. The identified industrial noise sources were a lorry and an electrical forklift. The lorry was moving slowly within the yard and stopped close to the godown building and the forklift was moving within the godown building for loading/ unloading from the lorry (Plates 2 – 3 of **Appendix 4-1**).

The pumping station (DSD's Chuk Yuen Flood Water Pumping Station) located north of the Development was quiet during the site survey (Plates 6 –7 in **Appendix 4-1**).

The identified industrial noise sources and number of plants are summarised in **Table 4-5**.

Table 4-5 Identified Industrial Sites and Noise Sources

Source ID	Industrial Site	Description	Consideration of Shielding Effect	Identified Noise Source	Max. No. of Plants Used in Noise Assessment
S1-1	Fan Keung Kee	Sheltered warehouse	The concerned warehouse is within a sheltered area with hoarding erected on 3 sides and the top, which shields the Development from this warehouse	Operating noise	General operating noise of the warehouse
S2-3		Open storage	-	Loading and unloading using forklift	One forklift
S2-1		For open storage of precast units	-	Movement of Lorry	Movement of one lorry
S2-2		For open storage of precast units	-	Lifting of container by a mobile crane	One mobile crane
S10-1	Shing Fat Logistics	Totally enclosed godown	The structure of the godown shields the Development	Loading and unloading using forklift	One forklift
S10-2		Totally enclosed godown	The structure of the godown shields the Development	Movement of lorry	One lorry

Instrumentation

The instruments used by Westwood Hong & Associates Ltd for the survey comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). They are listed in **Table 4-6**.

Table 4-6 Instruments Used for the Noise Survey

MANUFACTURER	TYPE
Ono Sokki	Precision Integrating Sound Level Meter (Serial no.: 04100820)
Ono Sokki	Foam Windshield
Bruel and Kjaer	Noise Calibrator Type 4231 (Serial no.: 1807333)

The sound level meter was calibrated before use in accordance with the manufacturer's recommendations and further checks on completion of the survey confirmed that there had been no significant drift of calibration.

Weather Conditions

The weather conditions on site were checked to ensure the measurements were made only during "dry" weather conditions without the presence of fog and rain. The wind speed had been checked to ensure that the wind speed did not exceed 5m/s and 10m/s in any direction for steady and gusty wind respectively.

Survey Method

The site was inspected before commencing the noise measurements to ascertain that there was minimal noise from occupational activities being carried out in the vicinity. The occupational activity in the neighbourhood was not considered to have any significant increase on the measured road traffic and industrial noise levels.

The sound level meter was adjusted to determine the A-weighted statistical sound pressure levels such as L_{10} and L_{eq}. The measurement locations were given in **Figure 4-5**.

Noise Measurement Results

Site surveys have revealed that industrial noise from Fan Keung Kee is insignificant at Villa Camellia and the measured noise levels were in the range of 56 – 57dB(A) (Loc 1 of **Figure 4-5**).

Site surveys have also revealed that industrial noise from Shing Fat Logistics Ltd is insignificant and the measured noise levels at Ha San Wai village were in the range of 47 – 49dB(A) (Loc 2 of **Figure 4-5**).

For Fan Keung Kee, the sound power levels of the plant are summarized in **Table 4-7**, which are used in the industrial noise assessment for projecting the noise level at the planned NSRs of the Development.

Table 4-7 Summary of noise measurement data for Fan Keung Kee

Source ID	Observed Activities/ Equipment	Measured SPL, dB(A)	Measurement Distance, m	Distance correction, dB(A)	SWL, dB(A)
S1-1	Operation noise of the warehouse	66	10	28	94
S2-1	Movement of Lorry	73	8	26	99
S2-2	Lifting of container by a Mobile crane	69	10	28	97
S2-3	Loading and unloading using Forklift	69	5	22	91

For Shing Fat Logistics Ltd, the sound power levels of the plant are summarized in **Table 4-8**, which are used in the industrial noise assessment for projecting the noise level at the planned NSRs of the Development.

Table 4-8 Summary of noise measurement data for Shing Fat Logistics Ltd.

Source ID	Observed Activities/ Equipment	Measured SPL, dB(A)	Measurement Distance, m	Distance correction, dB(A)	SWL, dB(A)
S10-1	Loading and unloading using forklift	63	10	28	91
S10-2	Movement of lorry	74	7	25	99

4.4.2 Road Traffic Noise Impact

Upon Proposed Development Site

The proposed development site is surrounded by existing road networks such as Kam Pok Road, Fairview Boulevard, Yau Pok Road, Castle Peak Road, and San Tin Highway. There could be road traffic noise impact upon the proposed development site due to vehicles travelling on the nearby road networks during the operational phase of the development. As discussed in Section 1.8, there are planned development projects nearby, which may contribute to the future traffic flow on surrounding roads during operation of this Project. A road traffic noise impact assessment for the Project Site (based on projected cumulative traffic flow with the inclusion of concerned nearby planned development project sites), has been conducted and details of which are described in **Section 4.6.2** below.

Upon Surrounding Environment

As for the noise impact of traffic attracted/ generated by the proposed development upon the surrounding environment, it is estimated that only about 18 vehicles/ hour and 19 vehicles/ hour will be attracted/ generated by this Project during the AM and PM peak hours, respectively. The majority of concerned traffic flow (80%) will be private cars and with about 20% heavy vehicles. Thus, adverse noise impact due to this traffic flow is unlikely to occur.

It shall also be noted that the Project Site is currently used as open car park (Section 2.3 refers). Vehicles generated/ attracted by the existing car park will also contribute to the existing traffic flow on nearby roads. In fact, many vehicles visiting the car park are heavy vehicles. According to on-site traffic survey undertaken by the traffic consultant of this Project in January 2016, the total vehicles generated/ attracted by the existing car park operation during AM peak hour, was about 76 vehicles/ hour (with about 45% heavy vehicles). While a traffic flow of 40 vehicles/ hour (with about 65% heavy vehicles), was generated during the PM peak hour. All the concerned traffic generated/ attracted from the existing car park operation, will use Kam Pok Road as the access road (i.e. same as this Project). This is considered much higher when compared with the current proposed development both in terms of traffic flow and % of heavy vehicles. Thus, the proposed development will not result in an increase in traffic flow upon nearby roads when compared with its existing condition.

In addition, traffic generated by this Project is expected to take the shortest path and go south along Kam Pok Road to Fairview Park Boulevard (instead of going north along Kam Pok Road to Castle Peak Road, where it would merge with traffic generated by other nearby development projects to the north), thus accumulation of traffic flow is not expected.

As such, adverse noise impact upon surrounding environment due to proposed development is not expected.

4.4.3 Temporary Sewage Treatment Plant Noise

The plant noise control is essential as the temporary sewage treatment plant in the Development may need to be in operation during the evening (1900 to 2300 hours) and night (2300 to 0700 hours).

The permissible SWL for the STP is summarised in **Table 4-8A**.

Table 4-8A Permissible sound power level (SWL) for the proposed STP

Most Critical NSR No. #	Distance from STP, m	Distance Correction, dB(A)	Required Façade Noise Level, dB(A) ##	Façade Correction, dB(A)	Permissible SWL at the Louvre, dB(A)
NSR 60	21	-35	42	3	**74** (42+35-3)

Remark:

Industrial noise calculation refers to Appendix 4-6.

The night-time noise criteria is 45dB(A). With considering the other fixed noise sources, the required façade noise level due to STP is 42dB(A).

With reference to the measurement carried out in the existing Ha Tsuen Sewage Pumping Station (Table A5-1 in Annex A of the EIA report of YLKTSSDS-1), a noise level of 81dB(A) was measured at 1m from the louvre opening (which is equivalent to Sound Power Level of 94dB(A) at Louvre on assuming area source of louvre size of 1.65m x 1.65m, SWL= Measured SPL + 10log (conformal surface), where the conformal surface at 1m is approximate 19.4m^2). According to the EIA report of YLKTSSDS-1, the existing Ha Tsuen SPS is currently without any acoustic treatment. In view of the above calculation, the recommended maximum permissible SWL is not particularly onerous and could be achieved by using conventional plant with the adoption of proper acoustic treatments and building design, where necessary. From **Table 4-8A**, the permissible SWL is 74dB(A), which is 20dB(A) lower than that of the common pumping station without mitigation measures. **Table 4-8B** proposes the mitigation measures that are required in practice to reduce the noise levels.

According to the approved "EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS-Yuen Long and Kam Tin Sewerage and Sewage Disposal", maximum permissible SWLs at louvre of sewage pumping station are reported to be in the range of 64 – 74dB(A) by the same noise mitigation measures such as acoustic silencer and enclosure.

Table 4-8B Proposed Mitigation Measures for STP

Source	Proposed Mitigation Measures	Reduction dB(A)
Fan	Acoustic Enclosure Silencer at inlet and outlet	20 – 30
Pump	Acoustic Enclosure Anti-vibration Spring Mount	20 – 30

During detailed design, the acoustic performance of the STP should be reviewed and acoustic treatments such as provision of acoustic silencer and acoustic enclosure shall be proposed so that the SWL of STP should be 74dB(A) or below in order to meet the noise criteria.

With careful design of the STP and appropriate noise treatments, it is anticipated that the STP would not cause unacceptable noise impact on the surrounding noise sensitive receivers. Thus, there will be no adverse noise impact due to operation of the sewage treatment plant.

4.4.4 Construction Noise

Noise impacts arising from construction of the proposed development are mainly due to the use of powered mechanical equipment (PME) for various construction activities. The construction work for the proposed development is generally divided into the following stages:

- Stage A – Site Formation, Filling and Excavation;
- Stage B – Construction of Underground Services and Utilities;
- Stage C – Construction of Roadworks;
- Stage D – Foundation; and
- Stage E – Superstructure

Stage A works mainly involve site clearance, site formation, excavation and filling activities. While, Stages B to E involve construction of underground utilities, foundation, infrastructure and superstructure works, as well as landscaping works of the residential portion at the Project Site.

Piling activities will be required for the foundation works of the proposed development. Non-percussive piling was assessed based on proposed construction plants and construction activities. The construction activities that are likely to cause noise impacts include excavation, piling, materials loading and unloading and concreting. No noisy operations are expected during the landscaping works and the “finishing” activities inside the buildings. The landscaping works would involve planting of various plantations; while the “finishing” activities would be carried out inside the buildings. The potential noise impact during the construction phase of the development was assessed quantitatively in later Sections.

4.4.5 Aircraft Noise

The Development lies beyond the NEF25 contour of the Chek Lap Kok Airport. Hence, there will be no aircraft noise restrictions on the Development. As such, aircraft noise is not considered further in this noise assessment.

4.4.6 Rail Noise

West Rail tracks are located at more than 500m from the Development Site. Hence, the proposed Development would not be adversely affected by the Rail noise. As such, rail noise is not considered further in this noise assessment.

4.5 Determination of Noise Sensitive Receivers

4.5.1 Planned Sensitive Uses Under This Project for Road Traffic Noise Impact Assessment

Noise sensitive uses of this Project are the planned residential blocks within the boundary of Project Site. The proposed development includes 2 storeys buildings with a maximum building height of 6.6m. Thus, the selected noise assessment points have included both the ground floor (G/F) and first floor (1/F) uses 1.2m above the corresponding floor level.

Representative sensitive uses are selected for operational phase road traffic noise assessment and their geographical locations are also depicted in **Appendix 4-3**.

4.5.2 Planned Sensitive Uses Under This Project for Industrial Noise Impact Assessment

Similarly, representative sensitive uses are selected for industrial noise impact assessment and their geographical locations are also depicted in **Appendix 4-4.**

4.5.3 Existing Sensitive Uses For Construction Noise Impact Assessment

With reference to Annex 13 of the EIAO-TM, noise sensitive receivers are identified within the 300m radius of the Assessment Area. These NSRs included all existing NSRs.

The uses and description of the identified representative existing noise sensitive uses within the Assessment Area are shown in **Table 4-9**. The locations of assessment points for construction noise impact assessment are also shown in **Figure 4-2A**, photographs of the selected NSRs are also provided in **Figure 4-2B**.

Table 4-9 Identified Existing Noise Sensitive Receivers For Construction Noise Assessment

NSR ID	Description	Current Use	No. of Storey	Ground mPD level, m
N1	Fairview Park	Residential	3	4.4
N2	Fairview Park	Residential	3	4.4
N3	Fairview Park	Residential	3	4.4
N4	Fairview Park	Residential	3	4.3
N5	Fairview Park	Residential	3	4.2
N6	Chuk Yuen Tsuen	Residential	2	2.3
N7	Chuk Yuen Tsuen	Residential	3	3.5
N8	Bethel High School	Education	3	4.4
N9	Helene Terrace	Residential	3	4.5
N10	Villa Camellia	Residential	3	6.5
N11	Fairview Park	Residential	3	4.6
N12	Wong Chan Sook Ying Memorial School	Education	4	4.4
N13	Man Yuen Chuen	Residential	3	4.1
N14	Chuk Yuen Tsuen	Residential	3	3.3
N15	Hang Fook Garden	Residential	3	4.2
N16	Ha San Wai	Residential	3	4.2
N17	Ha San Wai	Residential	3	3.5

4.5.4 Potential Planned Sensitive Uses For Construction Noise Impact Assessment

Information such as relevant plans[3] , current Outline Zoning Plan No. S/YL-MP/6, and Town Planning Board (TPB) records have been reviewed in order to identify potential planned/ committed NSRs. The registry of EIAO projects was also reviewed for EIA projects. Based on information reviewed, there are a few residential development projects in the vicinity of the proposed development site. These residential developments are also classified as designated project under the EIAO; as such they have to go through the EIAO process.

These potential future development cases are listed in **Table 4-10** below, and their geographical locations are also shown in **Figure 4-2A**.

Table 4-10 Status of the Proposed Near-by Sensitive Uses

Site Ref. No.	NSR ID	EIAO Application Number / Relevant Town Planning Board Ref. No.	Description	Appro-val of TPO	Appro-val of EIAO	mPD Level (1.2m Above Upper Floor Level), m
		Planned residential development proposals				
REC Site	N1P	ESB-207/2009, AEIAR-182/2014, EP-484/2014	Proposed Residential cum Passive Recreational Development within "Recreation" ("REC") Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long	Yes #	Yes	8.9 *
	N2P					6.6 *
RD Site	N3P	ESB-204/2009. Different scales of development and site areas were also under A/YL-MP/132, A/YL-MP/146, A/YL-MP/193 and A/YL-MP/205	Proposed Residential Development within R(D) Zone at Various Lots in DD 104.	Yes	No	6.6 *
Yau Mei Site	-	ESB-182/2008, AEIAR-189/2015	Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long	No	Yes	7.4 *
"V" Zone	V1P	-	New territories exempted house development	Yes	N/A	**
	V4P	-	Planned "V" Zone	-	-	**
"R(D)" Zone	V2P, V3P	-	Planned R(D) Zone	-	-	***

Remark: * According to the OZP, allowed building height of the planned development sites are 6m high. Thus, it is assumed the planned developments are 2 storeys buildings with floor to floor height at 3m. The mPD level

3 According to information available on Planning Department's website (available at: http://www.pland.gov.hk/pland_en/info_serv/tp_plan/index.html), the Project Site is not covered by existing Development Permission Area Plans. Instead, it is currently covered by the Outline Zoning Plan (OZP) No. S/YL-MP/6. Records of both the adopted and draft departmental plans in the area were obtained from Planning Department. According to the records obtained, relevant plans were reviewed such as the "L/YL-FP/1C Residential Layout - Fairview Park Access Road, Yuen Long" adopted in year 1982; as well as the draft departmental plan "DP/NWNT/1C North West New Territories - Development Plan" approved in year 1984. As all of these plans were prepared in 1980s', planned uses indicated in these plans are outdated and are superceded by the exsiting OZP. As advised by Planning Department, the existing OZP is the latest version regarding planned land uses in the area.

shown in the table is based on 1.2m above the upper floor level. For example, the mPD level for N3P is calculated by 2.4m (existing ground mPD level) + 3m/ per floor + 1.2m above the ground floor = 6.6mPD).

** No information is available. It is assumed the proposed new territories exempted village houses will be typical 3 storeys buildings; 2.8m floor to floor height.

*** According to the OZP No. S/YL-MP/6 , 2 storeys residential development with a maximum building height of 6m is allowed within the planed R(D) Zone. Thus, 2 storey building (with a building height of 6m) has been assumed in this assessment.

A rezoning application for the development site was agreed by TPB under the planning application no. Y/YL-MP/3. The exact new zoning of that site is still subject to Government's further review. However, it is noted that the submitted development scheme is the same as that approved under the EIAO.

None of the above planned residential development projects (i.e. "RD Site", and "Yau Mei Site") have obtained approval from both the TP Ordinance (TPO) and under the EIAO, except planned "REC Site" which has already obtained approval from both ordinances.

For the planned "REC Site", its EIA report was approved. As the construction programme of that project may overlap with this Project, cumulative construction noise impact assessment has been carried out and presented in Section 4.9 based on information extracted from its EIA report.

For the planned "RD Site", it was previously approved under the Town Planning Ordinance. However, it is noted that project will still need to undertake its EIA study according to the EIAO. There is no committed development programme for that project. To be conservative, cumulative noise impact has considered that project as well.

For the planned "Yau Mei Site" development project, its EIA report was recently approved. Since the planned "Yau Mei Site" is outside the 300m study radius of this Project, thus it is not considered further in the cumulative construction noise assessment.

According to the OZP No. S/YL-MP/6, residential development may be permitted upon application to the TPB. As such, the above planned development projects are considered as potential future NSRs in this noise assessment (except "Yau Mei Site" which is outside 300m study radius from this Project).

According to TPB records, there are approved new territories exempted house development sites on the opposite side of Ngau Tam Mei Drainage Channel (e.g. case number A/YL-MP/172-3 and A/YL-MP/183-1) within the Village Development ("V") zone under the Outline Zoning Plan (OZP) No. S/YL-MP/6 near to the Chuk Yuen Tsuen (see **Figure 4-2A**) ((V1P refers). There is also planned village development ("V" zone) under the same OZP (**Figure 4-2A**) (V4P refers). There is currently no committed development programme for these village houses development at the moment, however since there could be future NSRs within this area, representative location is also selected for noise assessment. It is expected that these proposed new territories exempted village houses will be typical 3 storeys buildings.

Asides from the above, there is also planned "R(D)" zone under the OZP No. S/YL-MP/6. These include the planned "R(D)" Site described **Table 4-10** above as well as this Project Site, which is also located within the "R(D)" zone. There are two remaining small land parcels within the "R(D)" zone that are current vacant, these are to the south and north-east of the Project Site respectively. There is currently no committed development programme within these locations. To be conservative, representative locations V2P and V3P are selected for noise assessment and their locations are presented in **Figure 4-2A**.

4.6 Assessment Methodology

4.6.1 Industrial Noise Survey

4.6.1.1 Fixed Noise Sources

The extent of noise assessment was based on an area within 300m radius from the Development boundary. The identified industrial noise sources include an open storage site and a godown as discussed in **Section 4.4.1**. The pattern of operation of these industrial sites and the type and number of equipment used, were identified during site surveys. Background noise was also measured near the Development for the noise assessment.

In evaluating the impact of these industrial sites, Sound Power Levels (SWL) of the identified plants is based on site measurement and general acoustic principal (**Tables Table** 4-3 **and Table** 4-4). Noise measurements were by using Ono Sokki Precision Integrating Sound Level Meter, which complies with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The weather condition was good with calm wind condition (<5m/s) during measurement, which satisfies the required criteria. The equipment was properly calibrated immediately prior to and following each measurement by a B&K Sound Level Calibrator Type 4231. The noise levels before and after measurement agreed to within 1.0dB(A). During the noise measurement, the noise level was dominated by the identified noise source.

In assessing the noise level, it is assumed that the identified noisy equipment is located at the notional noise source location in order to represent a worst case scenario (**Figures 4-11A and 4-11B**).

To predict the noise level at the future noise sensitive uses, the following correction factors have been accounted for:

- Distance correction: based on the slant distance between the identified noise sources and the NSR, the distance correction is projected based on standard acoustical principle for point source;
- As observed during the site visits, the noise sources were found to operate occasionally. Although it is unlikely that all the identified industrial sources will be in operation simultaneously, to be conservative, it has been assumed that all the identified noise sources are in operation at the same time, which also represents a worst case scenario. Noise sources are assumed to operate continuously instead of in occasion as observed on-site and all noise sources are regarded as point source;
- Façade correction: a +3dB(A) correction is applied to account for noise reflection from façade; and

Corrected Noise Level (CNL) at the NSRs of the proposed development can be calculated by applying the above corrections to the measured SWL of the noise sources in accordance with the following formula:

$$\mathbf{CNL = SWL + C_{dist} + C_{fac} + C_{barr}}$$

Where,

CNL is the corrected noise level at the Noise Sensitive Receiver in dB(A)

SWL is the measured sound power level of the industrial plant in dB(A)

C_{dist} is the distance correction in dB(A) in accordance with the Technical Memorandum on Noise From Construction Works Other than Percussive Piling.

C_{fac} is façade correction, +3 dB(A)

C_{barr} is the barrier correction in dB(A). The barrier attenuation is calculated based on Path Difference Method. Maekawa equation and general acoustic principle is applied in the calculation of barrier effect.

As there are existing residential development sites that are much closer to the concerned industrial sites than the Development and with a separate distance of about 72m (from Villa Camellia) and 90m (from Ha San Wai Village), respectively (**Figures 4-10A and 4-10B**), these village houses would be most affected by the concerned industrial sites when compared with the Development. The potential industrial noise impact under the worst case scenario was then checked. For establishment of worst case scenario, it is assumed that the existence of NSRs would limit the extent and scale of operation as noise emissions would be capped by the ANL (60/50 dB(A) day/night) under the NCO. Detailed description for the worst case scenario can be found in Sections 4.6.1.4.

4.6.1.2 Existing Pumping Station

As discussed in **Section 4.4.1** above, there is an existing floodwater pumping station (i.e. Chuk Yuen Floodwater Pumping Station) in the Assessment Area. The potential impacts due to operation of the pumping station are evaluated further in the following paragraphs.

It was found that the totally enclosed Chuk Yuen Floodwater pumping station, managed by Hong Kong Government Drainage Services Department (DSD) is located to the north of the Development. This pumping station is a completely enclosed structure and it is designed for discharge of collected rainwater during heavy rainfall, i.e. it will only operate under extreme condition when there is a threat of flooding in the area under extreme storm event.

According to the approved EIA report of this pumping station under the “Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin” Project, Sound Pressure Level immediately outside the louvre at the pumping station is 79dB(A). Thus, noise level at the representative NSR location of the Development is calculated, and the result is also presented in **Table 4-11**. Geographical locations of the NSRs are shown in **Figure 4-12.**

Table 4-11 Calculated Noise Level at the Existing Chuk Yuen Floodwater Pumping Station and Sound Pressure Level from Approved EIA Report

NSR ID	Noise Level in the Approved EIA report, dB(A)	Horizontal Distance between NSR and the Pumping Station, m	Distance Correction, dB(A)	Façade Correction, dB(A)	Calculated Noise Level at NSR, dB(A)
107	79 #	76	-46	3	36
111	79 #	53	-42	3	40

Remark: # According to Sections 8.3.6 and 8.3.7 of the "Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin" EIA Report in year 1996, the reverberant noise Sound Pressure Level inside the plant room is 85dB(A). While the Sound Pressure level immediately outside the louvre at the pumping station is estimated by substracting 6dB(A) from the reverberant Sound Pressure level (i.e. 85 – 6 = 79dB(A)).

Based on information in the EIA report of the 'Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin" in year 1996, the noise level at nearby NSR location of the Development is within the noise criteria described in Table 4-3.

4.6.1.3 Industrial Noise Assessment Results (Based on Field Survey)

There are several industrial operations identified within the Project Assessment (**Figure 4-4**). According to the approved EIA "Proposed Residential cum Passive Recreational Development within REC Zone and R(C) Zone at Various Lots in DD 104, Yuen Long, N.T." , the identified industrial sites have no night-time operation based on site observations from February 2008 to October 2013 (over 5 years' observations). In addition, night-time noise measurements were carried out and no operation of the industrial sites during night-time period was observed. Additional night-time noise surveys have also been undertaken for 7 consecutive days which further confirms that absence of noisy industrial activities during night-time period. The above observations were verified by independent site surveys of WHA from 2010 to 2014. As night-time operation of industrial sites was not observed, day-time noise assessment was undertaken below.

For industrial noise assessment, the identified industrial noise sources, number of plants, and the observed existing condition on-site are summarised in **Table 4-5**, which are also reproduced below:

Open Storage Site:

- Loading and unloading using forklift x 1 No.
- Lifting of container/ materials by mobile crane x 1 No.
- Moving in/out of lorry x 1 No.
- General operation of warehouse x 1 No.

Enclosed Godown:

- Loading and unloading using forklift x 1 No.
- Moving in/out of lorry x 1 No.

The recorded number of plants at each industrial site and sound power levels of the plants are also summarised in Tables **Table 4-7** and **Table 4-8**, which are used in the noise assessment

for projecting the noise level at the planned NSRs under the Development. The geographical locations of NSRs used for the noise assessment is provided in **Appendix 4-4**.

Although it is unlikely that all the identified industrial noise sources will be in operation simultaneously, to be conservative, it has been assumed that all the identified noise sources are in operation at the same time, which also represents a worst case scenario. Noise sources are assumed to operate continuously instead of in occasion as observed on-site and all noise sources are regarded as point source.

Detailed noise calculations and assumptions based on field observations are provided in **Appendix 4-4**. Based on the noise assessment results, with the provision of noise barrier (**Figure 4-8**), the estimated noise levels due to identified fixed noise sources can comply with the day-time noise criteria specified in **Table 4-3** above (i.e. 55dB(A)). Therefore, no unacceptable industrial noise impact is anticipated.

4.6.1.4 Further industrial Noise Assessment based on Worst Case Scenario

As mentioned in **Section 4.6.1** above, the concerned two industrial sites include an open storage site and its associated warehouse, and an enclosed godown. The type and no. of noisy equipment used for the above noise assessment have been verified through continuous site surveys, which can represent the operational activities of the concerned industrial sites to date.

It shall be noted there are existing NSRs nearby the Development and the industrial sites, which are most affected by the concerned industrial activities (due to shorter separation distance) (**Section 4.6.1** refers). These existing NSRs include Villa Camellia to the south of the open storage site and village houses at Ha San Wai village to the southeast of the godown as shown in **Figures 4-10A and 4-10B**, which is also tabulated below. The operation of the concerned industrial sites will also need to comply with the relevant noise criteria (ANL) with respect to these existing NSRs. For establishment of worst case scenario, it is therefore assumed that the existence of NSRs would limit the extent and scale of operation as noise emissions would be capped by the ANL (60/50 dB(A) day/night) under the NCO. Details are provided in the following paragraphs.

Table 4-12 Distance between industrial site and nearest existing NSRs

Industrial site	Nearest Existing NSRs	Distance
Enclosed Godown	Ha San Wai Village	90m (refer to Figure 4-10B)
Open Storage Site	Villa Camellia	72m (refer to Figure 4-10A)

Open Storage Site

For the open storage site, as the majority of the site is used for storage of precast units, the remaining land area would limit the maximum no. of noisy equipment that can be used at any one time. Also, for safety reason it is unlikely that additional mobile crane can be used on-site within a limited site area. Taking into account the site condition and the ANL at nearest NSR, a sensitively test has been carried out by assuming a maximum of 2 lorries to be used during day-time (i.e. one lorry leaving the site while another lorry arriving the site). This would represent the worst case scenario of the operation of this industrial site during day-time. For the night-time operation, although no night-time works were observed, assumption has been made by assuming the workshop operates during night-time in the worst case scenario. These are summarised below:

- Daytime:
  - Loading and unloading using forklift x 1 No.
  - Lifting of container/ materials by mobile crane x 1 No.
  - Moving in/out of lorry x 2 Nos.
  - General operation of warehouse x 1 No.
- Night-time:
  - General operation of warehouse x 1 No.

Enclosed Godown

For the enclosed godown, based on site observation, operation of this site will involve loading and unloading by forklift and movement of lorry with limited traffic flow in and out of the godown. Taking into account the site condition (where most of the site area is occupied by totally enclosed building structures with limited open space available for parking of equipment) and the ANL at its nearest NSR at Ha San Wai village, a sensitivity test has been carried out by assuming a maximum of 3 lorries (i.e. one leaving the site; one unloading materials and one arriving the site) and a maximum of 2 forklifts (one loading materials onto the lorry and one unloading materials from lorry), respectively during day-time. Further increase in equipment will not be feasible due to site constraints. For the night-time operation, although no night-time works were observed at this site, assumption has been made by assuming that the forklifts are used at night within the godown. These are summarised below:

- Daytime:
  - Loading and unloading using forklift x 2 No.
  - Moving in/out of lorry x 3 Nos.
- Night-time:
  - Loading and unloading using forklift x 2 No.

The above assumptions regarding the open storage site and the godown have been counter-checked against the ANL at existing nearest NSR for each of the industrial sites, and the results are tabulated blow and in **Appendix 4-5**. Based on the assumption mentioned above, the ANLs at the nearest NSR (both daytime and night-time) can just be met. Thus, the assumption on noisy equipment would represent the operation of industrial sites under a worst case scenario.

Table 4-13 Predicted Noise levels for existing NSRs for Daytime

Industrial site	Noise sources (Daytime)	No.	Predicted Noise Levels	
			NSR 1 – Ha San Wai Village	NSR 2 - Villa Camellia
Open Storage	- Loading and unloading using forklift - Lifting of container/ materials by mobile crane - Moving in/out of lorry - General operation of warehouse	1 1 2 1	59.2dB(A)	58.5dB(A)
Enclosed Godown	- Loading and unloading using forklift - Moving in/out of lorry	2 3		

Table 4-14 Predicted Noise levels for existing NSRs for Night-time

Industrial site	Noise sources (Night-time)	No.	Predicted Noise Levels	
			NSR 1 – Ha San Wai Village	NSR 2 - Villa Camellia
Open Storage	General operation of warehouse	1	48.2(A)	49.2dB(A)
Enclosed Godown	Loading and unloading using forklift	2		

As such, the noise level at the Development was then projected based on the same assumption. With the provision of noise barrier, the calculated noise levels at the NSRs of the Development would comply with the relevant noise criteria (ANL-5) for both daytime and night-time periods (**Appendices 4-6 and 4-7**). Therefore, the Development is not affected by the industrial noise sources.

4.6.1.5 Cumulative Noise Due to Industrial Noise and Existing Pumping Station

To be conservative, cumulative noise level due to the existing Chuk Yuen Pumping Station and the identified industrial noise sources at the representative NSR locations are also calculated and the results are provided in **Appendix 4-7A**.

Based on the results, the estimated cumulative noise levels can comply with the relevant noise criteria specified in **Table 4-3**. Therefore, no unacceptable industrial noise impact is anticipated.

4.6.1.6 Summary of Operational Phase Noise Mitigation Measures

With the noise mitigation measures of noise barrier (**Figure 4-8**), noise impact assessment results have shown that the relevant noise criteria would be complied with and there will be no adverse noise impact. The proposed noise mitigation measures are practicable and welly adopted practices, no side effects or constraints due to inclusion of such measures are expected.

4.6.2 Road Traffic Noise

The noise prediction has been conducted by employing the RoadNoise 2000[3] computer software licensed to use by WS Atkins.

Traffic Forecast Data

According to Section 1.6.3, the Project is planned for completion by year 2018. To provide a conservative approach, traffic forecast has been undertaken for year 2033, which represents the worst case scenario of projected traffic flows between year 2018 and year 2033. The traffic forecast has taken into account nearby proposed development projects along Kam Pok Road as well as the future Kam Pok Road Extension.

The AM and PM peak traffic forecasts for Year 2033 are provided by the Traffic Consultant (CKM Asia Ltd). The traffic forecast data has been endorsed by the Transport Department (TD) (Appendix 4-2 refers). The heavy vehicles are as defined in the UK Department of Transport's "Calculation of Road Traffic Noise (1988)" (CRTN). Review of the data indicates that the AM peak is higher than the PM peak. Therefore, the AM peak is employed for the assessment.

The AM peak traffic forecast data is shown in **Table 4-15**. A summary of the traffic forecast predicted for Year 2033 is also illustrated in **Figure 4-6**.

Table 4-15 Traffic forecast for Year 2033, AM Peak

Ref.	Road Name	Traffic Forecast, AM peak	
		Veh./hr	% HGV
A	Fairview Park Boulevard	1450	27
B	Castle Peak road – Tam Mi	950	39
C	Slip Road to San Tin Highway – NB	500	38
D	Slip Road from San Tin Highway – SB	450	47
E	San Tam Road	700	37
F	San Tam Road	900	45
G	Slip Road to San Tin Highway – SB	1050	21
H	Slip Road from San Tin Highway – NB	800	32
J	Castle Peak Road – tam Mi	600	43
K	Kam Pok Road	300	23
L	Yau Pok Road	50	20
M	San Tin Highway NB	3250	40
N	San Tin Highway SB	3000	50

Methodology

The traffic noise levels at the Development have been predicted, basing on the predicted traffic flows in Year 2033 and calculation methods in accordance with the CRTN[4]. The predicted noise levels at the building facades include a 2.5dB(A) facade reflection and correction factors for effects due to gradient, distance, view angle and barriers.

4.6.3 Construction Noise

According to the EIAO-TM, the construction noise standard relevant to daytime construction activities for domestic premises is $L_{Aeq\ (30\ minutes)}$ 75 dB(A) and that for education institute is $L_{Aeq\ (30\ minutes)}$ 70 dB(A) (65 dB(A) during examination period). As indicated in Section 4.2.5, construction works in restricted hours and percussive piling works are controlled under NCO. Should such works be required for the Project, suitable CNP applications will need to be made to the Noise Control Authority in advance.

The approach used in the assessment of noise from construction works other than percussive piling is based on standard acoustic principles, and the guidelines given in Para. 5.3 and 5.4 of Annex 13 of the EIAO-TM. The methodology adopted is the same as that presented in TM1.

Noise impact arising from the construction works of this Project have been predicted using the following typical procedures: -

- Based on the tentative construction programme (see **Appendix 1-1**). The worst construction scenarios of each construction activities were identified;
- Identify the corresponding SWL of each preliminary planned powered mechanical equipment (PME) as listed in the Technical Memorandum on Noise from Construction Works other than Percussive Piling of the Noise Control Ordinance and EPD's Quality PMEs (QPMEs) inventory, where appropriate;
- Select representative NSRs for the construction noise impact assessment;
- Identify the notional source position for each representative assessment point (RAP). The identification of the notional source position will follow the methodology given in the section 2 of the Technical Memorandum on Noise from Construction Works other than Percussive Piling of the Noise Control Ordinance;
- Calculate the Predicted Noise Level (PNL) based on distance attenuation from notional source positions to the representative NSRs;
- With consideration of the effect of facade reflection at the NSRs, the Corrected Noise Level (CNL) at the NSRs was predicted; and
- Based on a comparison of the CNL with the noise criteria presented in **Table 4-4**, situations/ locations where the need for noise mitigation measures can be identified.

As discussed in earlier paragraphs, the Project Site involves construction of residential buildings and ancillary facilities as discussed in Section 1.6. Thus, construction noise level due to construction activities within the Project Site is considered in this noise assessment.

As the Project Site is adjacent to the existing residential developments such as Helene Terrace, Villa Camellia, Fairview Park and Ha San Wai Tsuen, thoughtful consideration has been undertaken when developing the Project construction programme/ sequence, type of equipment to be used, and construction method in order to minimise potential construction noise impact to adjacent NSRs. The Project construction programme has also been designed in such a way that concurrent construction activities are avoided/ minimised as much as possible. The current construction programme with indication of concurrent construction activities of this Project is provided in **Appendix 1-1**.

Table 4-16 shows the list of plant inventory for construction works of the proposed development. As confirmed by the Project Engineer, the plant inventory and the number of equipment are considered to be appropriate and practical for completing works within the

proposed works programme. Cumulative construction noise due to potential concurrent construction activities of this Project (construction programme in **Appendix 1-1** refers), and also due to other nearby planned development projects, were also estimated in order to represent the worst case scenario.

With regard to noise level due to travelling of dump trucks on haul road within the Project construction area, it was evaluated according to the procedure given in British Standard, Noise Control on Construction and Open Sites, BS 5228: Part 1:2009 with the equation below:

$$LAeq = SWL - 33 + 10\log_{10} Q - 10\ Log_{10} V - 10\log_{10} D$$

Where,

SWL = Sound Power Level of the dump truck

Q is the number of vehicles per hour (no. of veh./hr)

V is the average speed (10 km/hr)

D is the distance of receiver position from the haul road (m).

Table 4-16 Inventory of Powered Mechanical Equipment (Unmitigated)

Construction Activity	Sub. Work Group #		Powered Mechanical Equipment	TM Ref.	Quantity	SWL per unit, dB(A)
Site Formation, Filling and Excavation	A1	Excavation and Filling	Air Compressor	CNP003	2	104
			Breaker, Excavator mounted	CNP027	2	122
			Excavator	CNP081	3	112
			Generator, Standard	CNP101	3	108
			Dump Truck	CNP067	2	117
	A2	Ground Compression	Roller, vibratory	CNP186	2	108
			Bulldozer	CNP030	2	115
Construction of Underground Services and Utilities	B1	Earthwork	Breaker, Excavator mounted	CNP027	1	122
			Dump Truck	CNP067	2	117
			Excavator	CNP081	2	112
	B2	Utilities laying	Air Compressor	CNP003	2	104
			Generator, Standard	CNP101	2	108
			Lorry	CNP141	1	112
			Water Pump, Submersible (Electric)	CNP283	2	85
	B3	Ground reinstatement	Concrete Lorry Mixer	CNP044	1	109
			Power Rammer (Petrol)	CNP169	1	108
			Poker, Vibratory, Hand-held	CNP170	1	113
			Roller, Vibratory	CNP186	1	108
Road works	C1	Earthwork	Dump Truck	CNP067	2	117
			Excavator	CNP081	1	112
	C2	Concreting Works	Concrete Lorry Mixer	CNP044	2	109
			Generator, Standard	CNP101	2	108
			Poker, Vibratory, Hand-held	CNP170	2	113
	C3	Road Finishing	Air Compressor	CNP003	2	104
			Asphalt Paver	CNP004	2	109
			Generator, Standard	CNP101	2	108
			Lorry	CNP141	2	112

Construction Activity	Sub. Work Group #		Powered Mechanical Equipment	TM Ref.	Quantity	SWL per unit, dB(A)
			Power Rammer (Petrol)	CNP169	1	108
			Road Roller	CNP185	1	108
Foundation	D1	General foundation construction	Air Compressor	CNP003	5	104
			Bar bender and cutter (electric)	CNP021	5	90
			Crane, tower (electric)	CNP049	3	95
			Generator, standard	CNP101	4	108
			Lorry	CNP141	2	112
			Drill/grinder, hand-held (electric)	CNP065	4	98
			Excavator	CNP081	3	112
			Saw, circular, wood	CNP201	4	108
			Water pump, submersible (electric)	CNP283	4	85
	D2	Piling Works	Generator, standard	CNP101	4	108
			Non-percussive piling machine	**	2	115
	D3	Concreting Works	Concrete Lorry Mixer	CNP044	3	109
			Generator, standard	CNP101	4	108
			Poker, vibratory, hand-held	CNP170	3	113
Superstructure	E1	General construction works	Air Compressor	CNP003	6	104
			Bar bender and cutter (electric)	CNP021	9	90
			Mobile Crane	CNP048	3	112
			Drill/grinder, hand-held (electric)	CNP065	10	98
			Generator, standard	CNP101	4	108
			Saw, circular, wood	CNP201	7	108
	E2	Concreting works	Concrete Lorry Mixer	CNP044	8	109
			Concrete Pump	CNP047	4	109
			Generator, standard	CNP101	4	108
			Poker, vibratory, hand-held	CNP170	7	113
Dump Trucks Travelling on Haul Road during site formation (Veh./hr)	F	Dump Truck (Moving on Haul Road)	Dump Truck	CNP067	8	117

Remark: # Each Construction Activity has been divided into several sub. work groups based on the sequence of construction works. The respective sub-work groups of each Construction Activity will not overlap with one another.

** Non-percussive type piling machine will be used, subject to the detailed design stage the exact type of non-percussive piling machine will proposed. To be conservative, noise level of commonly used non-percussive piling machine according to the Technical Memorandum on Noise From Construction Work Other Than Percussive Piling, has been used for noise calculation.

The calculated highest SWLs of each Construction Activity used for construction noise impact assessment, are provided in **Appendix 4-8**.

4.7 Prediction and Evaluation of Noise Impacts

4.7.1 Industrial Noise

Proactive Noise Measures Incorporated in the Design

Given to the site condition and the presence of industrial noise sources in adjacent to the Project Site as discussed in Section 4.6.1 above (i.e. fixed noise sources in adjacent site) as well as the proposed interim STP, proactive noise protection measures have already been incorporated into the design of the proposed development, which include placing noise tolerant uses such as the proposed STP (with 10.4mPD at roof level) between the proposed house and the industrial noise source; and a noise barrier along the remaining eastern site boundary with a minimum 4.5m tall solid boundary wall. The locations of the above-mentioned proactive measures are shown in **Figure 4-8**. In addition, recommendations on noise mitigation measures have also been proposed in Section 4.4.3 to alleviate noise impact from the proposed interim STP.

The above-mentioned proactive noise protection measures have been taken into account in the noise assessment, and the results are presented in the following paragraphs.

Predicted Industrial Noise Levels

The Development requires noise levels of the fixed industrial noise sources not to exceed (ANL - 5) and the prevailing background noise levels. For daytime, the prevailing background noise levels are in the range of 56 – 58dB(A), which is higher than (ANL – 5) (Section 4.4.1 refers). Therefore, the ANL – 5 (i.e. 55dB(A) for daytime) is used as the industrial noise criteria.

With the above-mentioned proactive noise protection measures in place, it is found that the proposed development will not be adversely affected by the activities carried out at the industrial noise sources in the vicinity. According to the predicted facade noise levels at the NSRs (**Appendices 4-6** and **4-7** refer), 100% noise compliance could be achieved. Thus, no unacceptable noise impact is expected.

Please refer to Sections 4.4.3 and 4.6.1 for the noise assessment, and **Appendices 4-6 to 4-7** for details of the predicted noise levels at NSRs and the sample noise calculations.

As for existing Chuk Yuen Floodwater Pumping Station, no adverse noise impact is anticipated according to the noise assessment results provided in 4.6.1.2. A cumulative noise impact assessment was also provided in Section 4.6.1.5 with the above-mentioned industrial noise sources, proposed interim STP and the Chuk Yuen Floodwater Pumping Station. The noise assessment results are also provided in Appendix 4-7A. It was found that the estimated cumulative noise levels can comply with the relevant noise criteria and no adverse impact is anticipated. Thus, no further noise mitigation measures are necessary.

4.7.2 Road Traffic Noise

Road traffic noise impacts were assessed based on the methodology described in Section 4.6.2. The proposed development layout has provided set back from Kam Pok Road (>8m between nearest NSR and the edge of Kam Pok Road as shown in **Figure 4-7**). The predicted road traffic noise levels at the Noise Sensitive Receivers (NSRs) of the residential blocks are presented in **Figure 4-7**. Details of the computer output and input files are shown in **Appendix 4-3**. Computer plot of the road scheme is also shown in **Figure 4-6**.

According to the calculation results, the noise level at all residential flats (i.e. 100%) will be within the stipulated noise limit of 70dB(A), thus the proposed development will not be subject to adverse impact as a result of road traffic noise.

4.7.3 Unmitigated Construction Phase Noise

According to the EIAO-TM, the construction noise standard for domestic premises is $L_{eq\ (30\ minutes)}$ 75 dB(A) and that for education institute is $L_{eq\ (30\ minutes)}$ 70 dB(A) (65 dB(A) during examination period).

Construction noise level due to this Project has been assessed based on the plant inventory shown in **Table 4-16** and the construction programme in **Appendix 1-1**. Noise due to concurrent construction works is also assessed. Information such as SWLs used for the noise calculation, NSRs separation distance, and sample calculation of construction noise levels are also provided in **Appendix 4-8**.

Table 4-17 below shows the predicted construction noise levels at the representative NSRs due to construction of this Project. The geographical locations of the NSRs are also depicted in **Figure 4-2A**.

According to the assessment results, the noise levels due to construction activities of this Project at the representative NSRs would exceed the relevant noise criteria specified in **Table 4-4** above. As such, noise mitigation measures (e.g. using quiet type construction equipment and movable noise barriers) have been proposed in order to alleviate the potential construction noise impacts. Details of the assessment with the proposed noise mitigation measures are depicted in Section 4.8.

Table 4-17 Estimated Unmitigated Construction Noise Levels at Representative NSRs

NSR Label	Descriptions	Construction Noise Level from Each Work Group						Cumulative Construction Noise Due to Concurrent Works				Highest Noise Level, dB(A)	Noise Criteria, dB(A)
		A	B	C	D	E	F	A+F	B+D	B+E	C+E		
		Site Formation, Filling and Excavation	Construction of Underground Services and Utilities	Road works	Foundation	Superstructure	Dump Trucks Travelling on Haul Road						
Existing NSRs													
N1	Fairview Park	72	70	66	68	69	67	73	72	73	71	**73**	75
N2	Fairview Park	72	70	66	68	69	67	73	72	72	70	**73**	75
N3	Fairview Park	**77**	75	71	73	74	70	**78**	**77**	**77**	**76**	**78**	75
N4	Fairview Park	**78**	**76**	72	74	75	70	**78**	**78**	**78**	**77**	**78**	75
N5	Fairview Park	72	70	66	68	69	67	73	72	73	71	**73**	75
N6	Chuk Yuen Tsuen	73	71	67	69	70	67	74	73	73	71	**74**	75
N7	Chuk Yuen Tsuen	72	70	66	68	69	67	73	72	73	71	**73**	75
N8	Bethel High School	**76**	**74**	70	**72**	**73**	69	**76**	**76**	**76**	**74**	**76**	70 (65 during examination)
N9	Helene Terrace	**80**	**78**	74	**76**	**77**	71	**81**	**80**	**81**	**79**	**81**	75
N10	Villa Camllia	**79**	**77**	73	75	**76**	71	**80**	**79**	**80**	**78**	**80**	75
N11	Fairview Park	75	73	69	71	72	68	**76**	75	75	73	**76**	75
N12	Wong Chan Sook Ying Memorial School	**74**	**72**	68	70	**71**	68	**75**	**74**	**75**	**73**	**75**	70 (65 during examination)
N13	Man Yuen Tsuen	75	73	69	71	72	68	**76**	75	75	73	**76**	75
N14	Chuk Yuen Tsuen	73	71	67	69	70	68	74	73	74	72	**74**	75
N15	Hang Fook Garden	74	72	68	70	71	68	75	74	75	73	**75**	75
N16	Ha San Wai	74	72	68	70	71	68	75	74	75	73	**75**	75
N17	Ha San Wai	73	71	67	69	70	68	74	74	74	72	**74**	75
Planned NSRs													
N1P	Planned Development at REC Site	**77**	75	71	73	74	69	**78**	**77**	**77**	**76**	**78**	75
N2P	Planned Development at REC Site	**80**	**78**	74	**76**	**77**	71	**81**	**80**	**81**	**79**	**81**	75
N3P	Planned Development at RD Site	**84**	**82**	**78**	**80**	**81**	73	**84**	**84**	**85**	**83**	**85**	75
V1P	Village Zone Development	**84**	**82**	**78**	**80**	**81**	73	**84**	**84**	**84**	**82**	**84**	75
V2P	Planned R(D) Zone	**87**	**85**	**81**	**83**	**84**	75	**87**	**87**	**88**	**86**	**88**	75
V3P	Planned R(D) Zone	**82**	**80**	**76**	**78**	**79**	72	**82**	**82**	**82**	**81**	**82**	75
V4P	Planned "V" Zone	**87**	**85**	**81**	**83**	**84**	75	**87**	**87**	**88**	**86**	**88**	75

Note: Please refer to **Appendix 4-8** for the sample calculation and **Figure 4-2A** for the NSR locations.

* Please refer to **Table 4-16** and **Appendix 1-1** for the equipment inventory, construction programme and duration of concurrent construction activities.

Hatched numbers indicate exceedance of the relevant noise criteria for construction activities.

4.8 Mitigation of Noise Impacts After Noise Mitigation Measures (Mitigated Scenario)

4.8.1 Mitigated Construction Noise with Adoption of QPMEs

Since the estimated unmitigated noise level at NSRs would exceed the relevant noise criteria, EPD's quality powered mechanical equipment (QPME) inventory is reviewed and proposed to be used wherever possible as a noise mitigation measure, and the updated equipment inventory is shown in **Table 4-18**. The Contractor of this Project should diligently seek equivalent models of quiet/ silenced PMEs, and the requirement will be included in the Project EM&A Manual.

Table 4-18 Inventory of Powered Mechanical Equipment (with QPMEs)

Construction Activity	Sub. Work Group #		Powered Mechanical Equipment	TM Ref.	Qty	SWL per unit, dB(A)
Site Formation, Filling and Excavation	A1	Excavation and Filling	Air Compressor	CNP001	2	100
			Breaker, excavator mounted	EPD *	2	115
			Excavator, wheeled/ tracked	KATO model HD820V (EPD-01233)	3	99
			Generator, super silenced	CNP103	3	95
			Dump Truck (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	2	105
	A2	Ground Compression	Roller, vibratory	SAKAI model SW250-1 (EPD-00509)	2	95
			Bulldozer	Komatsu modelled D21A-8	2	102
Construction of Underground Services and Utilities	B1	Earthwork	Breaker, excavator mounted	EPD *	1	115
			Dump Truck (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	2	105
			Excavator, mini-robot mounted	EPD *	2	94
	B2	Utilities laying	Air Compressor	CNP001	2	100
			Generator, Standard	CNP103	2	95
			Lorry (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	1	105
			Water Pump, Submersible (Electric)	CNP283	2	85
	B3	Ground reinstatement	Concrete Lorry Mixer	CNP044	1	109
			Power Rammer (Petrol)	Dynapac model LT700 (EPD-00536)	1	107
			Poker, Vibratory, Hand-held	EPD *	1	102

Construction Activity	Sub. Work Group #		Powered Mechanical Equipment	TM Ref.	Qty	SWL per unit, dB(A)
			Roller, Vibratory	SAKAI model SW250-1 (EPD-00509)	1	95
Road works	C1	Earthwork	Dump Truck (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	2	105
			Excavator, wheeled/tracked	KATO model HD820V (EPD-01233)	1	99
	C2	Concreting Works	Concrete Lorry Mixer	CNP044	2	109
			Generator, Standard	CNP103	2	95
			Poker, Vibratory, Hand-held	EPD *	2	102
	C3	Road Finishing	Air Compressor	CNP001	2	100
			Asphalt Paver	VOLVO model. No. ABG5770 (EPD-01226)	2	104
			Generator, super silenced	CNP103	2	95
			Lorry (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	2	105
			Power Rammer (Petrol)	Dynapac model LT700 (EPD-00536)	1	107
			Road Roller	HITACHI model CP220-3 (EPD-01183)	1	97
Foundation	D1	General foundation construction	Air Compressor	CNP001	5	100
			Bar bender and cutter (electric)	CNP021	5	90
			Mobile Crane	Hitachi Sumitomo SCX700, 132kW	3	101
			Generator, standard	CNP103	4	95
			Lorry (5.5 tonne < Gross vehicle weight <= 38 tonne)	EPD *	2	105
			Drill/grinder, hand-held (electric)	CNP065	4	98
			Excavator, wheeled/tracked	KATO model HD820V (EPD-01233)	3	99
			Saw, circular, wood	CNP201	4	108
			Water pump, submersible (electric)	CNP283	4	85
	D2	Piling works	Generator, standard	CNP103	4	95
			Non-percussive piling machine	**	2	115
	D3	Concreting Works	Concrete Lorry Mixer	CNP044	3	109

Construction Activity	Sub. Work Group #		Powered Mechanical Equipment	TM Ref.	Qty	SWL per unit, dB(A)
			Generator, standard	CNP103	4	95
			Poker, vibratory, hand-held	EPD *	3	102
Superstructure	E1	General construction works	Air Compressor	CNP001	6	100
			Bar bender and cutter (electric)	CNP021	9	90
			Mobile Crane	Hitachi Sumitomo SCX700, 132kW	3	101
			Drill/grinder, hand-held (electric)	CNP065	10	98
			Generator, standard	CNP103	4	95
			Saw, circular, wood	CNP201	7	108
	E2	Concreting works	Concrete Lorry Mixer	CNP044	8	109
			Concrete Pump	CNP047	4	109
			Generator, standard	CNP103	4	95
			Poker, vibratory, hand-held	EPD *	7	102
Dump Trucks Travelling on Haul Road during site formation (Veh./hr)	F	Dump Truck (Moving on Haul Road)	Dump Truck	EPD *	10	105

Remark: # Each Construction Activity has been divided into several sub. work groups based on the sequence of construction works. The respective sub-work groups of each Construction Activity will not overlap with one another. The calculated highest SWLs of each Construction Activity used for construction noise impact assessment, are provided in **Appendix 4-9**.

* EPD website: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

** Non-percussive type piling machine will be used, subject to the detailed design stage the exact type of non-percussive piling machine will proposed. To be conservative, noise level of commonly used non-percussive piling machine according to the Technical Memorandum on Noise From Construction Work Other Than Percussive Piling, has been used for noise calculation.

4.8.2 Mitigation Measures with Adoption of QPMEs and Movable Noise Barriers

Asides from QPMEs mentioned above, additional noise mitigation measures in terms of movable noise barriers are also proposed. Movable noise barriers are proposed to shield construction plants. The movable noise barriers should have sufficient surface density of at least 10 kg/m^2 or material providing equivalent acoustic performance to block the line of sight from the sensitive receivers. There should not be any gaps and openings at the noise barriers to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineer's Representative (ER) and the Environmental Team in accordance with the Project EM&A Manual.

According to EIAO Guidance Note No. 9/2010, with provision of noise barriers, a 5dB(A) noise reduction for movable plant, 10 dB(A) for stationary plant and 15 dB(A) for enclosed ones can be assumed.

The estimated noise level at both existing and planned NSRs with the adoption of QPMEs and movable noise barriers are provided in **Table 4-19**.

According to the estimated noise levels, with the proposed noise mitigation measures the construction noise levels at the NSRs due to this Project would comply with the relevant construction noise criteria.

Table 4-19 Estimated Mitigated Construction Noise Levels Due to This Project With the Use of QPMEs and Movable Noise Barriers

NSR Label	Descriptions	Construction Noise Level from Each Work Group						Cumulative Construction Noise Due to Concurrent Works				Highest Noise Level, dB(A)	Noise Criteria, dB(A)
		A	B	C	D	E	F	A+F	B+D	B+E	C+E		
		Site Formation, Filling and Excavation	Construction of Underground Services and Utilities	Road works	Foundation	Superstructure	Dump Trucks Travelling on Haul Road						
N1	Fairview Park	56	55	56	56	55	55	59	59	58	59	**59**	75
N2	Fairview Park	56	55	56	56	55	55	58	58	58	58	**58**	75
N3	Fairview Park	61	60	61	61	60	58	63	63	63	63	**63**	75
N4	Fairview Park	62	61	62	62	61	58	63	64	64	64	**64**	75
N5	Fairview Park	56	55	56	56	55	55	59	59	58	59	**59**	75
N6	Chuk Yuen Tsuen	57	56	57	57	56	55	59	59	59	59	**59**	75
N7	Chuk Yuen Tsuen	56	55	56	56	55	55	59	59	58	59	**59**	75
N8	Bethel High School	60	59	60	60	59	57	61	62	62	62	**62**	70 (65 during examination)
N9	Helene Terrace	64	63	64	64	63	59	65	67	66	67	**67**	75
N10	Villa Camllia	63	62	63	63	62	59	65	66	65	66	**66**	75
N11	Fairview Park	59	58	59	59	58	56	61	61	61	61	**61**	75
N12	Wong Chan Sook Ying Memorial School	58	57	58	58	57	56	60	61	60	61	**61**	70 (65 during examination)
N13	Man Yuen Tsuen	59	58	59	59	58	56	61	61	61	61	**61**	75
N14	Chuk Yuen Tsuen	57	56	57	57	56	56	59	60	59	60	**60**	75
N15	Hang Fook Garden	58	57	58	58	57	56	60	61	60	61	**61**	75
N16	Ha San Wai	58	57	58	58	57	56	60	61	60	61	**61**	75
N17	Ha San Wai	57	56	57	57	56	56	60	60	59	60	**60**	75
Planned NSRs													
N1P	Planned Development at REC Site	61	60	61	61	60	57	62	63	63	63	**63**	75
N2P	Planned Development at REC Site	64	63	64	64	63	59	65	67	66	67	**67**	75
N3P	Planned Development at RD Site	68	67	68	68	67	61	69	71	70	71	**71**	75
V1P	Village Zone Development	68	67	68	68	67	61	69	70	70	70	**70**	75
V2P	Planned R(D) Zone	71	70	71	71	70	63	72	74	73	74	**74**	75
V3P	Planned R(D) Zone	66	65	66	66	65	60	67	68	68	68	**68**	75
V4P	Planned "V" Zone	71	70	71	71	70	63	72	74	73	74	**74**	75

Note: Please refer to **Appendix 4-9** for the sample calculation and **Figure 4-2A** for the NSR locations.

* Please refer to **Table 4-18** and **Appendix 1-1** for the construction programme and the duration of concurrent construction activities.
Hatched numbers indicate exceedance of the relevant noise criteria for construction activities.

4.8.3 Recommendations on Noise Mitigation Measures (Construction Phase)

It is also recommended that good housekeeping activities shall also be carried out to further minimise the potential construction noise impact, and these are summarised below. The following good site practices are also recommended for incorporation into the contractual requirements.

- Before the commencement of any work, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures intended to be used at the Project Site;
- Contractor shall comply with and observe the Noise Control Ordinance (NCO) and its current subsidiary regulations;
- Contractor shall devise and execute working methods that will minimise the noise impact on the surrounding environment; and shall provide experienced personnel with suitable training to ensure that these methods are implemented;
- Only well-maintained plants should be operated on-site;
- Plants should be serviced regularly during the construction programme;
- Machines that may be in intermittent use should be shut down or throttled down to a minimum between work periods;
- Silencer and mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;
- Noisy activities can be scheduled to minimise exposure of nearby NSRs to high levels of construction noise. For example, noisy activities can be scheduled for midday or at times coinciding with periods of high background noise (such as during peak traffic hours);
- Noisy equipment such as emergency generators shall always be sited as far away as possible from noise sensitive receivers;
- Provision of mobile noise barriers in adjacent to construction plants, piling machine, or provision of acoustic screens by the Contractor(s);
- Mobile plants should be sited as far away from NSRs as possible;
- Material stockpiles and other structures should be effectively utilised as noise barrier, where practicable;
- The contractor(s) is also encouraged to arrange construction activities with care so that concurrent construction activities are avoided as much as possible. The contractor(s) should closely liaise with the school so that noisy activities are not undertaken during school's examination period. With the above noise mitigation measures in place and good site practices, residual noise impact at the school would be temporary and unacceptable noise impact is not expected; and
- Similar to other EIA projects, EM&A will be carried out for this Project during the Project construction phase in order to monitor the construction noise level and to verify the effectiveness of the noise mitigation measures. A Project Environmental Team will be formed as part of the Project EM&A works, which will closely monitor contractor(s)' performance and the residual noise level at the school. Should unacceptable construction noise level be identified during the construction noise monitoring, necessary actions

following the standard Event and Action Plan specified in the Project EM&A Manual, will be required by the Project Environmental Team.

4.8.4 Noise Mitigation Measures During Operational Phase

Given to the site condition and the presence of industrial noise sources in adjacent to the Project Site and the proposed interim STP as discussed in Section 4.7.1 above, proactive noise protection measures have already been incorporated into the design of the proposed development, which include placing noise tolerant uses such as the proposed STP (with 10.4mPD at roof level) between the proposed house and the industrial noise source; and a noise barrier along the remaining eastern site boundary with a minimum 4.5m tall solid boundary wall. The locations of the above-mentioned noise barriers and noise tolerant uses as proactive measures are shown in **Figure 4-8**.

In addition, recommendations have also been proposed in Section 4.4.3 for the proposed interim STP. During detailed design, the acoustic performance of the temporary STP should be reviewed and acoustic treatments such as provision of acoustic silencer and acoustic enclosure shall be proposed so that the SWL of STP should be 74dB(A) or below in order to meet the stipulated noise criteria.

With these mitigation measures in place, no adverse noise impact is anticipated during operation of the Project.

As for road traffic noise, based on the current layout in the MLP including setback from Kam Pok Road, there will be no adverse noise impact expected (Section 4.4.2 refers). Thus, no noise mitigation measure is proposed.

4.9 Cumulative Construction Noise Impacts

4.9.1 *Concurrent Construction Projects*

As discussed in Section 1.8, there are a few works projects near the Project Site. These are the approved cycle track project; approved public sewerage project; and 3 planned private development sites (namely, the planned “REC Site”, “RD Site” and “Yau Mei Site” as shown in Figure 1-2). The first two projects are Government projects which have already obtained approval on their EIA reports under the EIAO process. There is currently no fixed construction programme available and overlapping of their works programme with this Project cannot be precluded at this stage. However, to be conservative, these approved projects have been taken into account in the cumulative noise assessment of this Project.

For the planned private development projects, no committed development programme has been available for those projects (except “REC Site”). For the planned “Yau Mei Site”, it has obtained an approval under the EIAO. However, since that project is outside the 300m study radius of this Project, it is not considered further. Published information has been obtained for the remaining two projects. According to the best available information (Section 1.8 refers), planned development projects with published information which may overlap with this Project (i.e. planned “RD Site” and planned “REC Site”) have been selected for cumulative noise impact assessment.

Potential cumulative impacts have been addressed in the following paragraphs.

4.9.2 *Cumulative Construction Noise Due to Adjacent Approved Government Projects*

Within the Assessment Area, there is a proposed public sewerage project near Ngau Tam Mei Channel and Castle Peak Road between Ngau Tam Mei and San Tin under PWP Item 4235DS. The concerned public sewerage project has been assessed in a separate EIA report for “Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2” (EIA Application No.

EIA-094/2004). The concerned public sewerage project near Ngau Tam Mei covers the construction of a section of gravity trunk sewer underneath Kam Pok Road and Yau Pok Road as well as construction of proposed San Tin No.1 Sewage Pumping Station (ST1SPS) near the road junction between Kam Pok Road and Castle Peak Road.

The EIA report has stated that all works will be carried out in small section areas within a short period. These activities should not generate significant amount of construction noise and result in cumulative impact. It has also recommended in the same report the construction works will be carried out in 50m segments. The section of proposed public sewers and the ST1SPS are shown in **Figure 4-2A**. Since the SPS is outside the 300m radius Assessment Area (**Figure 4-2A** refers), it is not considered further in this noise assessment.

There is currently no fixed construction programme for the above-mentioned public sewerage project. Since overlapping of construction programme of these projects with the construction programme of this Project cannot be precluded at this stage, cumulative construction noise due to construction of the public sewers and the construction of this Project has been considered in this assessment as a worst case scenario. Information such as the plant inventory and SWLs has been extracted from the corresponding EIA report, which is also summarised in **Appendix 4-10**. The calculated construction noise levels due to these approved EIA projects are also presented in **Appendix 4-10**.

Asides from the proposed public sewerage works, there is also a proposed alignment of cycle track between Sha Po Tsuen and Shek Sheung River (EIA Application No. EIA 159/2008). The section of cycle track near the Project Site will be constructed along the edge of Yau Pok Road on the other side of existing Ngau Tam Mei Channel. According to the EIA report, the concerned construction of cycle track project will involve construction of a narrow strip of cycle track, which will be constructed in sections. Typically, the working area will be 40 m long by 4 m wide and no adjacent sections (200m between two neighbouring sections) will be constructed simultaneously. Currently, there is no fixed construction programme for the cycle track project.

Construction plant inventory presented in the approved EIA report of the above-mentioned projects has been adopted in this noise assessment. Cumulative construction noise impact has also been assessed based on the highest noise level predicted for the above approved projects and that predicted for this Project in order to represent the worst case scenario, and the results are present in the following paragraphs.

4.9.3 *Cumulative Construction Noise Due to Adjacent Planned "RD Site" and "REC Site" Development Projects*

As discussed in Section 1.8, there are other planned development projects in adjacent to the Project Site which may overlap with construction works of this Project. For the planned "Yau Mei Site", as discussed in Section 4.5.4, this development project is outside the 300m study radius from this Project and is not considered further in this noise assessment. The remaining planned development Projects that may overlap with construction of this Project, has been identified in Section 1.8 (i.e. the planned "RD Site" and planned "REC Site") and are assessed. As the concerned planned development projects will be subject to approval from both TPB and EIAO, and also subject to fulfilment of relevant approval conditions, it is expected that overlapping of the peak construction activities of the development site is not very likely to occur. Thus, adverse impacts due to concurrent construction of peak construction activities of the project are not anticipated. Having said that, a sensitivity test based on the assumption has been conducted to provide a more conservative assessment.

For the planned "RD Site" project, according to the Study Brief of that project, its development intentions are also for low-rise and low-density residential developments (similar to this Project). Since the planned project is located in relatively flat area, it is expected that the

construction scale of the project site will be similar to this Project. Thus, the construction scale and plant inventory of this project have been based on best available information and assumptions, which is also presented in **Appendix 4-11**. Since the planned "RD Site" project will be controlled under the EIAO, it is expected that noise mitigation measures (e.g. QPMEs and movable noise barriers) would be adopted during its construction, which has been taken into account for the purpose of this cumulative noise assessment.

For the planned "REC Site" project, since its EIA report was recently approved. Construction activities of this Project which may be constructed concurrently with the planned "REC Site" project, have been identified and shown in **Appendix 4-12**. Calculated mitigated noise level due to the planned "REC Site" was then directly extracted from its EIA report and is presented in **Appendix 4-12**.

4.9.4 Cumulative Construction Noise Assessment Results

With QPMEs and Movable Noise Barriers proposed for This Project

As the Project Site is subject to both the approved EIA projects as well as adjacent planned development project, cumulative construction noise impact due to these projects has also been assessed. The assessment has been conducted for both the existing NSRs and planned NSRs based on the following assumptions.

For existing NSRs, cumulative construction noise levels due to the adjacent approved EIA projects as well as planned development sites, have been estimated.

As for planned NSRs discussed in **Section 4.5.4** above, since these planned development projects have no committed development programme, two scenarios have been assumed in the noise assessment:

- Scenario A – the planned private development sites are already occupied during the construction of this Project; and

- Scenario B – the planned private development sites are constructed at the same time during the construction of this Project.

Noise calculation has been undertaken for the representative NSR location. Results of the estimated cumulative construction noise levels are presented in **Table 4-20**. The calculation of cumulative construction noise due to concurrent projects should be based on concurrent construction activities shown in the respective construction programme and its plant inventory for evaluation of cumulative impacts. However, due to lack of committed construction programme of the concerned nearby project sites, the noise levels presented is based on a conservative approach by assuming concurrent construction of the peak construction activities of these projects (i.e. calculation of cumulative noise is based on highest noise level to be generated from the nearby project sites), which is not very likely to occur.

Based on the assessment results, the calculated cumulative construction noise levels with noise mitigation measures would comply with the relevant noise criteria at most of the NSR locations (except N4, N13, N1P, N2P, and V2P). However, for these few NSRs, their noise level is dominant by other construction projects while the contribution due to this Project is negligible.

For NSR N8 (i.e. the Bethel High School), calculated construction noise due to this Project alone would comply with the relevant noise criteria. However, it is found that the cumulative noise level would slightly exceed the relevant noise criteria when this Project is constructed concurrently with the planned cycle track project and the public sewerage project.

As such, further noise mitigation measures in terms of temporary fixed noise barriers have been proposed along a portion of western site boundary in order to alleviate adverse noise impacts (**Figure 4-3A** and **Figure 4-3B** refer).

Since site hoarding will be erected along the site boundary, the proposed temporary fixed noise barriers may be combined with the site hoarding. It is proposed that 3m tall temporary fixed noise barrier would be required along the western site boundary in order to shield N8 (i.e. the Bethel High School) from construction site of this Project. The proposed noise barrier will also benefit existing NSRs such as N1 to N4; N15 to N17, as well as planned NSRs such as V1P, V3P and V4P by providing additional noise shielding effect.

It shall be noted that these proposed temporary fixed noise barriers are only required when this Project is constructed concurrently with the nearby approved EIA projects (namely, the approved cycle track project; and the approved public sewerage project).

The exact alignment and design of these temporary noise barriers is subject to the contractor(s) and the prior approval from the Engineer's Representative (ER). To minimize potential impact, erection of temporary fixed noise barriers will be carried out section by section and precast units will be used for the foundation of the noise barrier. These noise barriers shall be erected before the commencement of construction works of this Project. The temporary fixed noise barriers should have sufficient surface density of at least 10 kg/m^2 or material providing equivalent acoustic performance. There should not be any gaps and openings at the noise barriers and site hoardings to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineer's Representative (ER) and the Environmental Team (ET) in accordance with the Project EM&A Manual (potential visual impact of noise barrier and its design is also addressed in Chapter 11).

With QPMEs, Movable Noise Barriers and Temporary Fixed Noise Barriers proposed for This Project

With the proposed temporary fixed noise barriers, the calculated further mitigated cumulative noise level at N8 has been presented in **Table 4-21**. Since the concerned temporary fixed noise barriers would also benefit other nearby existing NSRs such as N1 to N4; N15 to N17, and V1P, V3P and V4P, cumulative noise level at these NSRs are also presented in **Table 4-21**.

With the proposed noise mitigation measures, the cumulative noise level at N8 would comply with the relevant noise criteria (Scenario A), or the noise level is dominant by other construction projects while the contribution due to this Project is negligible (Scenario B). As such, no further noise mitigation measure is proposed.

Although the mitigated noise level at the school (i.e. N8) would comply with the noise criteria for schools (i.e. 70dB(A) during non-examination period), the contractor(s) is required to closely liaise with the school so that noisy activities are not undertaken during school's examination period. With the above noise mitigation measures in place and good site practices, residual noise impact at the school would be temporary and unacceptable noise impact is not expected.

Nevertheless, the Project Environmental Team shall closely monitor contractor(s)' performance and noise level at sensitive receivers throughout the construction. Should unacceptable construction noise level be identified during the construction, the concerned construction works shall be stopped temporarily and necessary actions following the standard Event and Action Plan specified in the Project EM&A Manual, shall be implemented. The above requirement will be included in the EM&A manual of this Project for implementation.

With the implementation of the recommended noise mitigation measures, unacceptable construction noise impact is not anticipated. Cumulative construction noise impact from this Project will be controlled through implementation measures described in this report and those committed for the other projects.

Table 4-20 Estimated Mitigated Cumulative Construction Noise Levels at NSRs With QPMEs and Movable Noise Barriers

NSR Label		Calculated Noise Level due to Approved EIA Projects *		Calculated Noise Level due to Adjacent Planned Development Projects *		Cumulative Noise Level - Scenario A			Cumulative Noise Level - Scenario B			Noise Criteria
		Construction of Cycle Track, dB(A)	Construction of Public Sewers, dB(A)	Construction of REC site, dB(A)	Construction of RD site, dB(A)	Cumulative Noise Level Due to Approved EIA Projects only, dB(A)	Highest Mitigated Noise Level Due to Current Project, dB(A) #	Cumulative Noise Level, dB(A)	Cumulative Noise Level Due to Approved EIA Projects and Planned Development Projects, dB(A)	Highest Mitigated Noise Level Due to Current Project, dB(A) #	Cumulative Noise Level, dB(A)	
		A	B	E	F	= A+B	D	=A+B+D	=A+B+E+F	D	=A+B+F+D	
Existing NSRs	N1	56	53	74	59	58	59	62	74	59	74	75
	N2	55	52	74	59	57	58	61	74	58	74	75
	N3	67	71	69	62	72	63	73	74	63	74	75
	N4	70	75	71	64	76	64	76	78	64	78	75
	N5	62	60	73	64	64	59	65	74	59	74	75
	N6	55	58	62	75	60	59	63	75	59	75	75
	N7	55	57	61	74	59	59	62	74	59	74	75
	N8	64	69	69	61	70	62	71	73	62	73	70 (65 during examination)
	N9	60	67	66	59	68	67	71	70	67	72	75
	N10	54	56	61	59	58	66	67	64	66	68	75
	N11	62	57	71	58	63	61	65	72	61	72	75
	N12	62	60	67	57	64	61	66	69	61	70	70 (65 during examination)
	N13	80	85	64	57	86	61	86	86	61	86	75
	N14	51	52	@	68	55	60	61	69	60	70	75
	N15	49	50	@	64	53	61	62	66	61	67	75
	N16	50	51	@	63	54	61	62	65	61	66	75
	N17	51	51	@	59	54	60	61	64	60	65	75
Planned Develop-ment Sites	N1P	86	81	-	-	87	63	87	-	-	-	75
	N2P	86	81	-	-	87	67	87	-	-	-	75
	N3P	55	57	-	-	59	71	71	-	-	-	75
Planned village house, "planned "R(D) zone	V1P	54	56	69	71	58	70	70	73	70	75	75
	V2P	65	84	68	59	84	74	84	84	74	84	75
	V3P	54	56	69	72	58	68	68	74	68	75	75
	V4P	56	58	69	63	60	74	74	70	74	75	75

Note: * Please refer to **Appendix 4-10 and Appendices 4-11** and **4-12** for the calculation of construction noise level as a result of the approved EIA projects and planned development projects, respectively. Since the planned development site (i.e. the RD site) is subject to approval from both the TPB and EIAO, the estimated construction noise levels are presented here for reference only, which were calculated based on best available information and the assumptions of adoption of QPMEs and movable noise barriers. For the planned "REC Site", calculated construction noise level was based on concurrent works directly extracted from its published EIA report (EIA-220/2014) (please refer to **Appendix 4-12**).

** For NSRs N14 to N17, they are outside 300m radius from the "REC Site" and were not assessed in that report. Thus, the nearest NSR locations at N9 and N12, which are worst affected by the construction of "REC Site", has been used instead. Similarly, NSRs V1P, V3P and V4P are based on N3P in the "REC Site" EIA report; and V2P is based on N2P in the "REC Site" EIA report, respectively. Please refer to **Appendix 4-12** for extracted information from the published "REC Site" EIA report.

The calculated mitigated noise level due to construction of this Project is provided in **Appendix 4-9**; Please refer to **Figure 4-2A** for the construction NSR locations.

@ The concerned NSRs are outside 300m study radius from the boundary of planned "REC Site" project, thus these are not included in the cumulative impact assessment.

Hatched numbers indicate exceedance of the relevant noise criteria for construction activities.

Table 4-21 Estimated Mitigated Construction Noise Levels at NSRs With QPMEs, Movable Noise Barriers and Temporary Fixed Noise Barrier

NSR Label		Calculated Noise Level due to Approved EIA Projects *		Calculated Noise Level due to Adjacent Planned Development Projects *		Cumulative Noise Level - Scenario A			Cumulative Noise Level - Scenario B			Noise Criteria
		Construction of Cycle Track, dB(A)	Construction of Public Sewers, dB(A)	Construction of REC site, dB(A)	Construction of RD site, dB(A)	Cumulative Noise Level Due to Approved EIA Projects only, dB(A)	Highest Mitigated Noise Level Due to Current Project, dB(A) #	Cumulative Noise Level, dB(A)	Cumulative Noise Level Due to Approved EIA Projects and Planned Development Projects, dB(A)	Highest Mitigated Noise Level Due to Current Project, dB(A) #	Cumulative Noise Level, dB(A)	
		A	B	E	F	= A+B	D	=A+B+D	=A+B+E+F	D	=A+B+F+D	
Existing NSRs	N1	56	53	74	59	58	57	**61**	74	57	**74**	75
	N2	55	52	74	59	57	57	**60**	74	57	**74**	75
	N3	67	71	69	62	72	62	**72**	74	62	**74**	75
	N4	70	75	71	64	76	63	**76**	78	63	**78**	75
	N5	62	60	73	64	64	59	**65**	74	59	**74**	75
	N6	55	58	62	75	60	59	**63**	75	59	**75**	75
	N7	55	57	61	74	59	59	**62**	74	59	**74**	75
	N8	64	69	69	61	70	60	**70**	73	60	**73**	70 (65 during examination)
	N9	60	67	66	59	68	67	**71**	70	67	**72**	75
	N10	54	56	61	59	58	66	**67**	64	66	**68**	75
	N11	62	57	71	58	63	61	**65**	72	61	**72**	75
	N12	62	60	67	57	64	61	**66**	69	61	**70**	70 (65 during examination)
	N13	80	85	64	57	86	61	**86**	86	61	**86**	75
	N14	51	52	@	68	55	60	**61**	69	60	**70**	75
	N15	49	50	@	64	53	59	**60**	66	59	**67**	75
	N16	50	51	@	63	54	59	**60**	65	59	**66**	75
	N17	51	51	@	59	54	58	**59**	64	58	**65**	75
Planned Development Sites	N1P	86	81	-	-	87	63	**87**	-	-	-	75
	N2P	86	81	-	-	87	67	**87**	-	-	-	75
	N3P	55	57	-	-	59	71	**71**	-	-	-	75
Planned village house, "planned "R(D) zone	V1P	54	56	69	71	58	69	**69**	73	69	**74**	75
	V2P	65	84	68	59	84	74	**84**	84	74	**84**	75
	V3P	54	56	69	72	58	67	**68**	74	67	**75**	75
	V4P	56	58	69	63	60	72	**72**	70	72	**74**	75

Remark: # The calculated mitigated noise level for each NSR due to construction of this Project with QPMEs and movable noise barriers (please refer to **Appendix 4-9**). For NSRs N1 to N4; N8; N15 to N17; V1P, V3P, and V4P, the above figures are based on mitigated noise level with QPMEs, movable noise barriers, and proposed temporary fixed noise barrier (**Appendix 4-9A** refers). Please refer to **Figure 4-2A** for the construction NSR locations.

4.10 Residual Impacts

No residual noise impact is anticipated during both construction and operation of the Project.

4.11 Environmental Monitoring and Audit

Given the mitigation measures are in place, no adverse noise impact will be anticipated due to the Project works and no environmental monitoring and audit (EM&A) will be necessary.

Nevertheless, in order to ensure the effectiveness of implementation of mitigation measures, it is proposed that an environmental monitoring and audit (EM&A) program is carried out during construction to monitoring the short-term impacts. The Environmental Team (ET) shall check the contractor(s)' practice and ensure the above recommendations are properly implemented. Should adverse dust impacts be identified, the source should be identified and additional mitigation measures shall be proposed by the Contractor(s) before concerned construction works is continued. Details of the EM&A requirements are provided in **Chapter 13** of this report.

4.12 Impact Summary and Conclusion

4.12.1 Operational Phase

The proposed development scheme has been reviewed and the noise levels at all the facades have been predicted. The proposed development layout has provided set back from Kam Pok Road (>8m between nearest NSR and the edge of Kam Pok Road as shown in **Figure 4-7**). All the residential flats (i.e. 100%) will be subject to road traffic noise levels within the stipulated 70dB(A) noise criterion.

With the provision of mitigation measures including noise barrier and placing noise tolerant use (i.e. STP) as shown in **Figure 4-8** as well as recommended noise mitigation measures for the proposed interim STP in Section 4.8.4 the prediction results indicate that the predicted facade noise levels at the proposed Development due to industrial noise sources (i.e. fixed noise sources in adjacent site and the proposed interim STP) would comply with the stipulated daytime noise criterion. Thus, no further noise mitigation measures are considered to be necessary and no residual noise impact is anticipated.

	Calculated Noise Level, dB(A)	**Noise Criteria, dB(A)**
Road Traffic Noise *	**46 - 70**	**70**
Industrial Noise **	**52 / 45 (day-time/ night-time)**	**55 (day-time); and 45 (night-time)**

Remark: * Extracted from road traffic noise level in **Appendix 4-3** of the EIA report.

** Estimated maximum noise level due to nearby industrial noise sources during day-time period and night-time period, respectively under a worst case scenario. Extracted from **Appendices 4-6** and **4-7** of the EIA report.

No adverse noise impact is expected due to the existing Chuk Yuen Floodwater Pumping Station, and no further noise mitigation measure is therefore proposed.

4.12.2 Construction Phase

Construction noise due to construction of this Project has been assessed. Noise mitigation measures such as use of quiet type equipment, scheduling of construction programme to avoid concurrent works, and provision of movable/ fixed temporary noise barriers have been proposed in order to mitigate the noise levels.

It was found that with the implementation of proposed noise mitigation measures such as QPMEs, movable noise barriers, and good practices, construction noise level at the NSRs due to construction of this Project alone would comply with the noise standard. Cumulative construction noise impacts due to adjacent approved/ planned EIA projects have also been assessed based on worst case assumption. It was found that the cumulative noise levels at NSRs are mainly dominant by the approved EIA Projects rather this Project. In order to alleviate adverse noise impact due to concurrent construction of this Project and that of the nearby planned construction projects (namely, the approved cycle track project; the approved public sewerage project; and planned development site (planned R(D) Site)), a short section of temporary fixed noise barrier is also proposed along part of the western and south-western site boundary. It is found that with the proposed noise mitigation measures, no unacceptable noise impact is anticipated.

Unmitigated Noise Level, dB(A)	**Mitigated Noise Level, dB(A) ***	**Noise Criteria, dB(A)**	**Mitigation Measures**
>75 (for dwellings)	58 - 74	75dB(A) for residential uses; and 70dB(A) for educational institutions (65B(A) during school examination period)	Quiet type construction equipment; scheduling of construction programme to avoid concurrent works; best practices; and provision of movable noise barriers and fixed temporary noise barriers.
>70 (for educational institutions)	61-62		

Remark: * Mitigated construction noise level due to construction of this Project. Extracted from **Table 4-19** of the EIA report.

As such, with the proposed mitigation measures in place, no residual noise impact is expected.

4.13 Reference

[1] Hong Kong Government "Hong Kong Planning Standards & Guidelines" June 1998.

[2] Environmental Protection Department "Technical memorandum for the assessment of noise from places other than domestic premises, public places or construction sites", June 1997 (DP - TM).

[3] WS Atkins Noise and Vibration, England "RoadNoise 2000" computer software, 2000.

[4] Department of Transports, Welsh Office, UK “Calculation of Road Traffic Noise” 1988.

[5] Environmental Protection Department, Practice Note for Professional Persons, “Streamlined Approach for the Planning of Residential Developments Against Road Traffic Noise”, PN 1/97, October 1997.

[6] Environmental Protection Department "Technical memorandum on noise from construction work other percussive piling", July 1991 (GW - TM).

[7] “Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin: Environmental Impact Assessment” by ERM Hong Kong Ltd, May 1996.

[8] “Comprehensive Development and Wetland Protection near Yau Mei San Tsuen: Environmental Impact Assessment” by Environ, March 2015.

5. WATER QUALITY

5.1 Introduction

This Chapter presents an assessment of the potential water quality impact that may arise from construction and operation of the Project. The assessment has been carried out in accordance with the requirements given in Clause 3.9.3 of the EIA Study Brief and the criteria and guidelines as stated in Annexes 6 and 14 of the EIAO-TM respectively.

The assessment area for the water quality impact assessment is defined by a distance of 500m from the boundary of the Project Site as per the EIA Study Brief. Potential impacts to surrounding areas in the larger Deep Bay Catchment Area of the Deep Bay Water Control Zone (WCZ) are also addressed.

The proposed Project is for low-rise and low-density residential development and associated ancillary facilities. Detailed elements of the proposed development are discussed in Section 1.6, which are also illustrated in the MLP (Figure 2-1) and the Landscape Master Plan (Figure 11-11-1).

5.2 Environmental Legislation, Standards, Guidelines and Criteria

The relevant legislations, standards and guidelines applicable to the present study for the assessment of water quality impacts include:

- Water Pollution Control Ordinance (WPCO) CAP 358;
- Technical Memorandum on “Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters” (TM-Effluents);
- Environmental Impact Assessment Ordinance (EIAO) (CAP. 499), and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM);
- No Net Increase in Pollution Loads Requirement in Deep Bay under the approved Mai Po and Fairview Park Outline Zoning Plan No. S/YL-MP/6 ;
- Hong Kong Planning Standards and Guidelines; and
- ProPECC PN 1/94 “Construction Site Drainage”.

5.2.1 Water Pollution Control Ordinance

The Water Pollution Control Ordinance (WPCO) (Cap. 358) enacted in 1980 is the principal legislation controlling water quality in Hong Kong. Under the WPCO, Hong Kong waters are classified into 10 Water Control Zones (WCZ). The Project Site is situated within the catchment area of the Deep Bay WCZ.

Statutory Water Quality Objectives (WQOs) are specified for each WCZ. The WQOs for any particular waters, as defined in the WPCO, shall be the quality, which should be achieved and maintained in order to promote conservation and best use of those waters in the public interest.

5.2.2 Technical Memorandum on “Standards for Effluent Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters”

The TM-Effluents issued under Section 21 of the WPCO defines acceptable discharge limits of effluent to different types of receiving waters. Under the Ordinance, any discharge into the WCZ requires licensing and must comply with the terms and conditions specified in the licence, except for domestic sewage discharged into public foul sewers, and unpolluted water into storm water drains and river courses.

The discharge from the Project Site shall comply with the standards for effluent discharge into inland waters. Group D and C inland effluent standards are adopted, which are also provided in **Table 5-1** and **Table 5-2** respectively.

Table 5-1 Standards for effluent discharged into Group D inland waters

(All units in mg/L unless otherwise stated; all figures are upper limits unless otherwise indicated)

Flow Rate (m^3/day) / Determinand	≤ 200	> 200 and ≤ 400	> 400 and ≤ 600	> 600 and ≤ 800	> 800 and ≤ 1000	> 1000 and ≤ 1500	> 1500 and ≤ 2000	> 2000 and ≤ 3000
pH (pH units)	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
Temperature (°C)	30	30	30	30	30	30	30	30
Colour (lovibond units) (25mm cell length)	1	1	1	1	1	1	1	1
Suspended solids	30	30	30	30	30	30	30	30
BOD	20	20	20	20	20	20	20	20
COD	80	80	80	80	80	80	80	80
Oil & Grease	10	10	10	10	10	10	10	10
Iron	10	8	7	5	4	2.7	2	1.3
Boron	5	4	3.5	2.5	2	1.5	1	0.7
Barium	5	4	3.5	2.5	2	1.5	1	0.7
Mercury	0.1	0.05	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.05	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	1	1	0.8	0.8	0.5	0.5	0.2	0.2
Total toxic metals	2	2	1.6	1.6	1	1	0.5	0.4
Cyanide	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.05
Phenols	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Sulphide	1	1	1	1	1	1	1	1
Sulphate	800	600	600	600	600	400	400	400
Chloride	1000	800	800	800	600	600	400	400
Fluoride	10	8	8	8	5	5	3	3
Total phosphorus	10	10	10	8	8	8	5	5
Ammonia nitrogen	20	20	20	20	20	20	20	10
Nitrate + nitrite nitrogen	50	50	50	30	30	30	30	20
Surfactants (total)	15	15	15	15	15	15	15	15
E. coli (count/100 ml)	1000	1000	1000	1000	1000	1000	1000	1000

Table 5-2 Standards for Effluent Discharged into Group C Inland Waters

(All units in mg/L unless otherwise stated; all figures are upper limits unless otherwise indicated)

Flow Rate (m^3/day) / Determinand	≤ 100	> 100 and ≤ 500	> 500 and ≤ 1000	> 1000 and ≤ 2000
pH (pH units)	6-9	6-9	6-9	6-9
Temperature (°C)	30	30	30	30
Colour (lovibond units) (25 mm cell length)	1	1	1	1
Suspended solids	20	10	10	5
BOD	20	15	10	5
COD	80	60	40	20
Oil & Grease	1	1	1	1
Boron	10	5	4	2
Barium	1	1	1	0.5
Iron	0.5	0.4	0.3	0.2
Mercury	0.001	0.001	0.001	0.001
Cadmium	0.001	0.001	0.001	0.001
Silver	0.1	0.1	0.1	0.1
Copper	0.1	0.1	0.05	0.05
Selenium	0.1	0.1	0.05	0.05
Lead	0.2	0.2	0.2	0.1
Nickel	0.2	0.2	0.2	0.1
Other toxic metals individually	0.5	0.4	0.3	0.2
Total toxic metals	0.5	0.4	0.3	0.2
Cyanide	0.05	0.05	0.05	0.01
Phenols	0.1	0.1	0.1	0.1
Sulphide	0.2	0.2	0.2	0.1
Fluoride	10	7	5	4
Sulphate	800	600	400	200
Chloride	1000	1000	1000	1000
Total phosphorus	10	10	8	8
Ammonia nitrogen	2	2	2	1
Nitrate + nitrite nitrogen	30	30	20	20
Surfactants (total)	2	2	2	1
E. coli (count/100 ml)	1000	1000	1000	1000

Asides from the above, the applicable key WQOs designated for inland waters in Deep Bay WCZ is also provided in **Table 5-3**.

Table 5-3 Key Water Quality Objectives for Inland Waters in Deep Bay Water Control Zone

Parameter	WQOs
pH range	6.0 - 9.0
Maximum 5-Day Biochemical Oxygen Demand, mg/L	5
Maximum Chemical Oxygen Demand, mg/L	30
Maximum Annual Median Suspended Solids, mg/L	20
Minimum Dissolved Oxygen, mg/L	4
Unionised Ammonia (annual mean), mg/L	0.021
E. coli (median), count/100 mL	1000

Remark: Refers to Key WQOs for river monitoring stations in the Northwestern New Territories, River Water Quality in Hong Kong in 2014 published by EPD and Statement of WQOs (Deep Bay Control Zone), Schedule of Cap 358R.

5.2.3 EIAO-TM

The general criteria and guidelines for evaluating and assessing water quality impacts are listed in Annexes 6 and 14 of the EIAO-TM.

5.2.4 No Net Increase in Pollution Loads Requirement in Deep Bay

The 'No Net Increase in Pollution Loads Requirement' aims to provide protection to the inland and marine water quality of the Deep Bay WCZ. According to Clause 3.9.3.4(x) and (xiii) of the EIA Study Brief and approved Mai Po and Fairview Park Outline Zoning Plan No. S/YL-MP/6, no net increase in pollution load to Deep Bay will be required for this Project.

5.2.5 Hong Kong Planning Standards and Guidelines

Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG) outlines environmental requirements that need to be considered in land use planning of both public and private developments. It also lists out environmental factors influencing land use planning and recommends buffer distances for land uses.

5.2.6 ProPECC PN 1/94 "Construction Site Drainage"

The Practice Note for Professional Persons (ProPECC Note PN1/94) on Construction Site Drainage provides guidelines on good practice for dealing with discharges from construction sites. It is applicable to this study for control of site runoff and wastewater generated during the construction phase.

5.3 Baseline Conditions and Sensitive Receivers

5.3.1 Existing Environment within and in Adjacent to the Project Site

Within Project Site

The Project Site is generally low-lying in terrain and the geographical characteristic of the Project Site is relatively flat. At present, the northern part of the Project Site is partially vacant with paved car parking. In its southern part, it is also an existing paved car parking area. An existing abandoned pond is located at the south-eastern corner of the Project Site.

Sediment-laden surface runoff may flow from the Project Site and discharge directly into the nearby existing drainage channels without any treatment. Currently, during heavy rainfall, water in the abandoned ponds may flow over the bunds to nearby drainage channels then discharge into the Ngau Tam Mei Drainage Channel (NTMDC) and then Inner Deep Bay.

Outside Project Site

The Project Site is surrounded by existing Kam Pok Road to its immediate west; Fung Chuk Road to the immediate north; Ha Chuk Yuen Road to the immediate east; and Ha San Wai Road to the immediate south, respectively. The NTMDC and Fairview Park development are also situated to the further west. Across Fung Chuk Road to the north, there is an existing DSD's Chuk Yuen Floodwater Pumping Station, which stores collected surface runoff during heavy rainfall before discharge into the NTMDC.

The Project Site is currently surrounded by existing u-channels. The existing drainage channel, NTMDC, is located to the west; and existing drainage ditches along roadside of Ha San Wai Road to the south; and along Ha Chuk Yuen Road to the east. Surface runoff from the Project Site is discharged into the existing u-channels, then into the nearby drainage channels.

The NTMDC is an engineered channel which is divided into upstream section (Section B – upstream of San Tin Highway) and downstream section (Section A – between San Tin Highway and Kam Tin River). The river training works for Section B and Section A were completed in 2003 and early 2005 respectively under the project "Construction of Main Drainage Channels for Ngau Tam Mei" by DSD. The NTMDC is located about 10m to the west of the Project Site with Kam Pok Road situated between the Ngau Tam Mei Channel and the Project Site.

Currently, the Project Site and the surrounding areas are not equipped with any public sewerage system, but there is approved public sewerage system nearby.

5.3.2 Identification of Water Quality Sensitive Receivers (WSRs)

Water sensitive receivers within the 500m radius of Assessment Area are identified in accordance with the Project EIA Study Brief. Information such as relevant plans[4] , current Outline Zoning Plan No. S/YL-MP/6, and Town Planning Board (TPB) records have been reviewed in order to identify potential planned/ committed WSRs. The registry of EIAO projects was also reviewed for EIA projects. Based on information reviewed, there are a few planned development projects in the vicinity of the proposed development site (Section 1.8 refers). These development projects are also classified as designated projects under the EIAO; as such they have to go through the EIAO process.

4 According to information available on Planning Department's website (available at: http://www.pland.gov.hk/pland_en/info_serv/tp_plan/index.html), the Project Site is not covered by existing Development Permission Area Plans. Instead, it is currently covered by the Outline Zoning Plan (OZP) No. S/YL-MP/6. Records of both the adopted and draft departmental plans in the area were obtained from Planning Department. According to the records obtained, relevant plans were reviewed such as the "L/YL-FP/1C Residential Layout - Fairview Park Access Road, Yuen Long" adopted in year 1982; as well as the draft departmental plan "DP/NWNT/1C North West New Territories - Development Plan" approved in year 1984. As all of these plans were prepared in 1980s', planned uses indicated in these plans are outdated and are superceded by the exsiting OZP. As advised by Planning Department, the existing OZP is the latest version regarding planned land uses in the area.

5.3.2.1 Within Project Site

Currently, collected surface runoff within the Project Site will be discharged into NTMDC. There is an existing abandoned water pond located at the south-eastern corner of the Project Site where proposed development is located. The concerned pond will be filled during construction, and will be part of the construction site during construction stage. Thus, it is not considered as a water quality sensitive receiver of this Project. Please refer to Section 5.5 for construction phase impact assessment.

5.3.2.2 Outside Project Site

Existing WSRs

Existing WSRs of this Project have been identified and described below. The Project Site is currently surrounded by open U-channels, which connect to the existing drainage systems (i.e. those along Ha Chuk Yuen Road and Ha San Wai Road, and the NTMDC). The collected surface runoff within and in adjacent to the Project Site will eventually be discharged into NTMDC. Thus, the drainage channels and NTMDC (also Kam Tin River further downstream) are considered as existing WSRs of this Project.

There is also an existing water storage pond at the existing Chuk Yuen Floodwater Pumping Station managed by the Drainage Services Department (DSD) of the HKSAR Government. The concerned pumping station is for temporary storage of stormwater collected from the nearby existing drainage ditches along Ha Chuk Yuen Road before discharge into NTMDC under heavy rainfall. As the water storage pond of this pumping station is physically separated from the Project Site by the existing Fung Chuk Road and existing u-channels along the northern site boundary of the Project Site, it is considered as an indirect water sensitive receiver. See **Figure 5-1** for the locations of the above WSRs.

Within the 500m Assessment Area, there are several stream courses and water bodies at off-site locations which are considered as potential WSRs, such as Fairview Park Nullah at Fairview Park, existing abandoned water ponds within the planned “REC site”, existing water ponds near Hang Fook Garden to the further east of the Project Site as well as water ponds to the further south of Fairview Park Boulevard near Man Yuen Chuen. Please refer to **Figure 5-1** for the detailed locations. However, the above-mentioned sensitive receivers are either located at the upstream of the Project or are physically separated from the Project Site by existing development such as Fairview Park; existing residential developments along Fairview Park Boulevard; adjacent village development sites; as well as existing NTMDC. Since these sensitive receivers are unlikely to be affected by the Project, they are not regarded as WSRs of this Project and are not assessed further.

Beyond the 500m Assessment Area and further downstream, Inner Deep Bay SSSI, Ramsar Site, Mai Po Nature Reserve, and Ma Po Marshes SSSI are further away from Project Site. Their locations are shown in **Figure 5-1A**. These sensitive receivers are distant away from the Project Site (over 1.2km away) and there will be no direct discharge to these areas, thus they are unlikely affected by this Project. As such, these sensitive receivers are not identified as WSRs of this Project and are not considered further.

Planned WSRs

As discussed in Section 1.8, there are a few planned development sites nearby. As per the approved EIA report of two Government projects (i.e. the public sewerage project and the cycle track project), there will be no planned WSRs arising from these projects.

There is a planned landscape pond to the north-west of this Project Site, which is within the approved “REC Site” (AEIAR-182/2014 refers). This planned landscape pond is shown in

Figure 5-1. However, the planned pond is physically located on the opposite side of NTMDC, thus it is unlikely be affected by this Project.

For the Planned "RD Site", landscape pond is also proposed based on the approved planning application no. A/YL-MP/205. The concerned pond is further away from Project Site and is physically separated by the DSD's existing Chuk Yuen pumping station as well as the roadside u-channels surrounding this Project Site, thus they are unlikely affected by this Project.

As for the approved "Yau Mei Site", a low-rise residential development is proposed with provision of Wetland Restoration Area at the northern portion of the site as per its approved EIA report (AEIAR-189/2015). Nevertheless, the planned "Yau Mei Site" is distant away from this Project Site, and is physically located on the opposite side of NTMDC upstream of this Project, thus any planned WSRs within that project will unlikely be affected.

Asides from the above, there are no other known planned WSRs in adjacent that would be affected by this Project.

5.3.2.3 WSRs Potentially Affected by this Project

The identified WSRs which may potentially be affected by this Project (based on the above discussion), are summarised below:

Table 5-4 – Summary of Identified WSRs of this Project

ID	Location	Is it WSR of this Project? ("✓" denotes Yes; "×" denotes No)	
		Construction Phase	Operational Phase
WSRs which may potentially be affected:			
WSR1	Existing open u-channels surrounding the Project Site	✓	✓
WSR2	Nearby existing drainage ditches (along Ha Chuk Yuen Road and Ha San Wai Road)	✓	✓
WSR3	NTMDC (Kam Tin River further downstream)	✓	✓
WSR4	Existing water storage pond at the existing Chuk Yuen Floodwater Pumping Station	✓	✓
WSRs which may NOT be Affected or Beyond the Assessment Area:			
-	Fairview Park Nullah	×	×
-	Water ponds near Hang Fook Garden, and abandoned pond within planned "REC" Site	×	×
-	Water ponds to the further south of Fairview Park Boulevard near Man Yuen Chuen	×	×
-	Planned landscape pond within the approved "REC Site"	×	×
-	Planned landscape pond within the approved "RD Site"	×	×

ID	Location	Is it WSR of this Project? ("✓" denotes Yes; "×" denotes No)	
		Construction Phase	Operational Phase
-	Planned WSRs within the approved "Yau Mei Site"	×	×
-	Inner Deep Bay SSSI, Ramsar Site, Mai Po Nature Reserve, and Ma Po Marshes SSSI	×	×

5.3.3 Baseline Water Quality Survey

5.3.3.1 Background Water Quality Information at Fairview Park Nullah

There is also an EPD's river water quality monitoring station at Fairview Park Nullah. The Fairview Park Nullah is an engineering channel within the Fairview Park residential development to the west of the Project Site. Data of key water quality parameters measured at that station between year 2009 and year 2014 by EPD[5] was also summarised in Table 5-5 for reference.

Table 5-5 Summary of River Water Quality at Nearby Fairview Park Nullah in the Deep Bay Water Control Zone between 2009 and 2014

Parameters	*WQO	2009	2010	2011	2012	2013	2014
pH	6.0-9.0	7.8 (7.3-8.9)	7.8 (7.2–9.0)	7.8 (7.1-8.9)	7.5 (7.3-8.5)	7.6 (7.2-8.3)	8.0 (7.1-8.8)
BOD_5 (mg/L)	≤ 5	**8** (4 – **26**)	**11** (3 - **37**)	**11** (4 - **20**)	5 (3 - **14**)	**6** (2 - **18**)	**8** (3 - **23**)
COD (mg/L)	≤ 30	**33** (18 – **87**)	28 (16 – **61**)	30 (13-**46**)	22 (12-**54**)	26 (14-**50**)	26 (10-**39**)
SS (mg/L)	≤ 20	**36** (14-**64**)	**40** (11–**150**)	**29** (6-**49**)	**26** (11-**56**)	15 (6-**41**)	**22** (4-**590**)
DO (mg/L)	≥ 4 (Median)	7.3 (2.1-18.6)	7.5 (3.5-15.1)	9.2 (3.9-17.2)	5.5 (3.8-11.7)	5.7 (2.9-10.1)	6.5 (4.8-10.5)
E. coli (cfu/100 mL)	≤ 1000	**23,000 (4,400-1,000,000)**	**31,000 (4,600-220,000)**	**18,000 (4,200-97,000)**	**16,000 (2,800-330,000)**	**55,000 (3,500-2,500,000)**	**28,000 (1,900-210,000)**
Ammonia-nitrogen (mg/L)	-	2.90 (0.80-7.20)	4.30 (1.40-6.70)	4.55 (0.74-5.60)	4.15 (2.30-6.60)	3.95 (0.71-5.50)	0.94 (0.45-6.90)
Nitrate-nitrogen (mg/L)	-	0.45 (<0.01-1.20)	0.52 (0.31-0.89)	0.56 (0.10-1.00)	0.96 (0.35-1.30)	0.82 (<0.01-1.2)	0.39 (0.11-1.10)
Total Kjeldahl nitrogen (mg/L)	-	5.70 (1.80-8.30)	6.10 (5.10-8.80)	6.15 (4.00-11.00)	5.85 (3.30-7.80)	5.10 (2.50-7.80)	2.35 (1.10-9.80)

5 River Water Quality In Hong Kong (various years), Environmental Protection Department of the HKSAR Government.

Parameters	*WQO	2009	2010	2011	2012	2013	2014
Oil & grease (mg/L)	-	<0.5 (<0.5-0.9)	<0.5 (<0.5-2.4)	0.7 (<0.5-2.0)	<0.5 (<0.5-0.7)	<0.5 (<0.5-1.4)	<0.5 (<0.5-<0.5)
Aluminium (µg/L)	Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment.	255 (160-610)	285 (100-750)	170 (60-400)	240 (110-470)	185 (110-390)	180 (98-3,147)
Cadmium (µg/L)		<0.1 (<0.1-0.1)	<0.1 (<0.1-0.3)	<0.1 (<0.1-<0.1)	<0.1 (<0.1-<0.1)	<0.1 (<0.1-1.0)	<0.1 (<0.1-0.9)
Chromium (µg/L)		<1 (<1-2)	1 (<1-3)	<1 (<1-2)	1 (<1-3)	<1 (<1-2)	1 (<1-7)
Copper (µg/L)		4 (3-8)	5 (2-17)	3 (2-5)	3 (2-7)	3 (1-5)	5 (2-73)
Lead (µg/L)		4 (2-5)	4 (1-14)	2 (<1-4)	2 (1-7)	2 (1-4)	3 (<1-86)
Zinc (µg/L)		45 (20-100)	35 (20-110)	35 (20-170)	30 (10-120)	50 (20-138)	35 (17-436)

Remark: Data presented is based on River Water Quality in Hong Kong (various years), published by EPD.

Data presented are in annual medians of monthly samples; except those for E. coli which are in annual geometric means.

Figures in bold denote non-compliance to WQOs.

Figures in brackets are annual ranges.

E. coli stands for Escherichia coli and cfu stands for colony forming unit.

Table 5-6 Water Quality Index (WQI) Gradings and WQO Compliance Rates of Fairview Park Nullah (station FVR1) between 2009 and 2014

Year	WQI Gradings	Compliance %					
		pH	BOD_5	COD	DO	SS	Overall
2009	Fair	100	8	50	83	0	48
2010	Bad	100	17	67	92	0	55
2011	Bad	100	8	50	92	0	50
2012	Fair	100	50	75	83	0	62
2013	Fair	100	42	58	83	100	77
2014	Fair	100	33	58	100	0	58

Remark: Data presented is based on River Water Quality in Hong Kong (various years), published by EPD.

From Table 5-5 and Table 5-6, it is noted that the water quality of Fairview Park Nullah was generally fair or bad while the concentration of BOD_5, COD, SS, Ammonia-nitrogen, and *E.coli*

at the Fairview Park Nullah were generally high. A gradual improvement on water quality has been observed in the past few years at the Fairview Park Nullah.

5.3.3.2 Baseline Water Quality Survey

Baseline Survey in Year 2009

A baseline water quality sampling has been conducted in August 2009 at the Project Site and its vicinity waterbodies. Water samples were collected and tested by a HOKLAS accredited laboratory. Water samples were collected from key water sensitive receivers such as the abandoned water pond within the Project Site, NTMDC, Fairview Park Nullah, and the water storage pond within DSD's Chuk Yuen Floodwater Pumping Station, respectively. The water quality sampling locations are shown in **Figure 5-1**, and the results of water quality survey are also provided in **Table 5-7**.

Table 5-7 Baseline Water Quality Monitoring Results in Year 2009

Parameters	NTMDC			Fairview Park Nullah	Abandoned Water Pond Within Project Site	Water Storage Pond in DSD's Chuk Yuen Floodwater Pumping Station
	W1	W3	W4	WK6	WK4	WK3A
Salinity (ppt)	0.7	1.8	2.1	0.5	0.2	0.7
Water flow (L/s)	0.02	0.03	0.02	0.06	0.01	0.04
Water depth (m)	1.80	1.90	1.85	1.05	1.02	0.19
Water Temperature (°C)	29.19	30.74	31.82	33.96	35.03	35.78
pH Value	7.07	7.40	7.67	7.53	8.97	8.90
Dissolved Oxygen (mg/L)	4.56	4.07	2.27	1.21	2.61	3.97
Dissolved Oxygen Saturation (%)	59.60	55.10	31.25	17.10	37.55	58.05
Turbidity (NTU)	13.50	16.05	16.00	15.20	10.45	24.80
BOD_5 (mg/L)	2	3	3	26	6	16
COD (mg/L)	16	20	24	68	50	68
Total Phosphorus (mg/L)	0.5	0.5	0.5	2.6	<0.1	0.6
Reactive Phosphorus (mg/L)	0.41	0.37	0.40	2.24	0.02	0.15
Oil and Grease (mg/L)	<5	<5	<5	<5	<5	<5
Conductivity (mS/cm)	1,310	3,240	3,670	929	424	1,310
Suspended Solids (mg/L)	14	18	19	15	13	39
Total Kjeldahl Nitrogen (mg/L)	3.9	4.8	5.1	7.5	2.4	7.0
Ammonia as N (mg/L)	2.68	3.52	3.80	3.85	0.03	2.79
E. coli (cfu/100 mL)	5,400	7,200	6,200	45,000	110	7,500
Faecal coliforms (cfu/100 mL)	15,000	13,000	8,800	62,000	210	9,600
Aluminium (mg/L)	0.25	0.37	0.30	0.04	0.18	0.17
Copper (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Parameters	NTMDC			Fairview Park Nullah	Abandoned Water Pond Within Project Site	Water Storage Pond in DSD's Chuk Yuen Floodwater Pumping Station
	W1	W3	W4	WK6	WK4	WK3A
Lead (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (mg/L)	0.06	0.02	0.03	<0.01	<0.01	0.02
Cadmium (mg/L)	0.004	<0.002	<0.002	<0.002	<0.002	<0.002
Sulphide as S^{2-} (mg/L)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nitrate as N (mg/L)	0.47	0.34	0.29	<0.01	<0.01	0.24
Nitrite as N (mg/L)	0.17	0.17	0.16	<0.01	<0.01	0.11

Remark: All sampling and measurements were undertaken by the laboratory, ALS Technichem (HK) Pty Ltd. on 21 August 2009. Parameters such as Water Depth, Water Flow Rate, Salinity, Water Temperature, pH Value, Dissolved Oxygen, Dissolved Oxygen Saturation and Turbidity were measured in-situ by using portable meters by the same laboratory.

No measurement on water flow rate in L/s was undertaken during the survey.

E.coli stands for Escherichia coli.

Additional Wet Season/ Dry Season Surveys in Year 2012/ 2013 and Year 2015

In order to better establish the baseline water quality at the WSRs to taking into account natural and seasonal variation, further water samplings were carried out during the wet season between September 2012 and October 2012, and between August 2013 and September 2013. Water samplings were also carried out during the dry season in December 2012 and January 2013, as well as between March 2015 and April 2015 (see **Appendix 5-1** for details).

Water samples were collected from the identified WSRs of this Project (Section 5.3.2 refers) at the existing drainage ditches along Ha Chuk Yuen Road and Ha San Wai Road and NTMDC. Since the storage pond within DSD's Chuk Yuen Floodwater Pumping Station was not accessible, water samples were collected from its water inlet point near Ha Chuk Yuen Road instead. In addition, the abandoned water pond within the Project Site was also sampled for reference. The water sampling locations are shown in **Figure 5-2** and the raw test results are provided in **Appendix 5-1**. During wet season surveys in year 2012, water samples were collected from the sampling locations three times per week and for four consecutive weeks. The water sampling and testing were performed by a HOKLAS accredited laboratory.

According to the test results, water quality at the water sampling locations was found to be in poor condition. It was found that there were lower levels of Dissolved Oxygen (DO), and higher concentrations of ammonia-nitrogen content, SS, BOD_5, COD, and *E. coli* at most of the sampling locations during the wet season surveys between September 2012 and October 2012. Other parameters tested were either within the water quality criteria or below the reporting limit.

Thus, the above-mentioned parameters were selected for a close monitoring during the subsequent water sampling and testing in the dry season in December 2012 and in January 2013, as well as the wet season between August 2013 and September 2013. Testing on the key WQO parameters stated in Table 5-3 were also carried out. As no particular patterns of water quality were observed during the wet season surveys conducted in year 2012, water samples in the dry season were collected once per week and for four consecutive weeks. The dry season water quality survey results were found to be similar to that in wet season (i.e. low in DO, but high in ammonia-nitrogen content, SS, BOD_5, COD, and *E. coli).* No specific pattern of natural or seasonal variation was observed.

Asides from the above, an update on the dry season water quality survey was also carried out between March 2015 and April 2015 to facilitate the sewerage impact assessment of this

Project. This updated baseline water quality survey results were also incorporated in **Appendix 5-1**. The water quality in this survey was found to be similar to that of the previous survey (i.e. low in DO, but high in ammonia-nitrogen content, SS, BOD_5, COD, and *E. coli).* **Table 5-8** and **Table 5-9** summarise this additional baseline water quality survey results during both the wet season and dry season, while the raw data is also provided in the **Appendix 5-1**.

Summary of Baseline Water Quality Survey Results

The above baseline monitoring results are generally in line with EPD's monitoring data at Fairview Park Nullah. No specific pattern of natural or seasonal variation was observed during the baseline water quality survey. Baseline results revealed that the water quality of nearby drainage channels was in poor condition with exceedances of WQOs. The possible sources of pollution may arise from the livestock farms, small industrial establishments or septic tank/soakaway systems of village houses without adequate maintenance located upstream of the Project Site.

Based on the test results of Stations W2, W3 and W4, water quality at NTMDC was generally poor. Although the water flow of NTMDC was high, lower levels of Dissolved Oxygen (DO), and higher concentrations of ammonia-nitrogen content, SS, BOD_5, COD, and *E. coli* were detected at the sampling stations at NTMDC. Nevertheless, increasing trend in concentration of various pollutants have been observed as water flows along the channel from Stations W2 to W3 and from W3 to W4, which suggests the addition of pollutants from drainage channels along Ha San Wai Road and Ha Chuk Yuen Road.

The monitoring results of Stations WK1, WK2 and WK3 are generally rich in phosphorus and nitrogen content with high BOD and COD. Oil and grease contents with high BOD and COD were also detected at station WK5.

The dry season survey results were found to be similar to that in wet season (i.e. low in DO, but high in ammonia-nitrogen content, SS, BOD_5, COD, and *E. coli).*

Overall, water quality at the water sampling locations was poor. However, there is gradual improvement on river water quality (e.g. Fairview Park Nullah) according to EPD's regular monitoring results. (**Table 5-6** refers)

Table 5-8 Summary of Baseline Water Quality Monitoring Results for Wet Season between September 2012 and October 2012, and Between August 2013 and September 2013

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Salinity (ppt)	-	-	2.8 / 0.4	3.1 / 0.5	3.3 / 1.2	<0.1 * / <0.1 *	0.4 / 0.2	1.9 / 0.3	0.5 / 0.5	2.1 / 0.3
Water flow (L/s)	-	-	153.2 / 79.0	110.5 / 73.5	98.5 / 69.0	- / -	2.5 / 1.0	2.4 / 1.0	<1.0 * / <1.0 *	5.0 / 3.0
Water depth (m)	-	-	1.3 / 1.4	1.4 / 1.3	1.3 / 1.5	0.3 / 0.3	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1	0.1 / 0.1
Water Temperature (°C)	30	-	28.4 / 28.1	28.0 / 27.6	27.6 / 27.4	29.0 / 28.8	26.3 / 26.4	27.8 / 27.6	26.9 / 27.3	27.9 / 27.7
pH Value	6-10	6-9	7.4 / 7.4	7.3 / 7.3	7.3 / 7.3	8.6 / 8.7	7.5 / 7.5	7.4 / 7.4	7.6 / 7.8	7.4 / 7.4
Dissolved Oxygen (mg/L)	-	4 (Minimum)	5.0 / 5.0	3.6 / 3.6	3.1 / 2.9	7.2 / 7.6	5.4 / 6.2	4.0 / 4.1	3.7 / 2.9	3.7 / 3.9
Dissolved Oxygen Saturation (%)	-	-	64.7 / 65.5	46.6 / 45.0	40.9 / 37.0	93.7 / 95.1	67.5 / 75.0	51.8 / 52.7	47.5 / 36.4	47.0 / 49.9
Turbidity (NTU)	-	-	80 / 64	110 / 68	170 / 76	26 / 26	28 / 20	34 / 31	25 / 15	34 / 31
BOD_5 (mg/L)	20	5 (Maximum)	4 / 4	4 / 4	5 / 4	4 / 4	8 / 6	15 / 12	5 / 4	14 / 11
COD (mg/L)	80	30 (Maximum)	23 / 24	25 / 21	28 / 24	46 / 39	26 / 25	41 / 37	34 / 33	42 / 38
Total Phosphorus (mg/L)	5-10	-	0.7 / 0.8	0.8 / 0.9	1.1 / 0.9	0.2 / 0.1	1.3 / 1.3	0.9 / 0.9	4.1 / 3.5	0.9 / 0.8
Reactive-Phosphorus (mg/L)	-	-	0.39 / 0.30	0.45 / 0.37	0.46 / 0.46	0.01 / 0.01	1.10 / 1.18	0.58 / 0.56	3.55 / 2.88	0.57 / 0.54
Oil and Grease (mg/L)	10	-	<5 * / <5 *	<5 * / <5 *	5.2 / 5.0	<5 * / <5 *	5.8 / 5.0	5.1 / 5.0	<5 * / <5 *	<5 * / <5 *
Conductivity (mS/cm)	-	-	8099 / 7440	9003 / 9520	9347 / 9915	239 / 237	1119 / 386	5617 / 2955	846 / 805	5593 / 2545

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Suspended Solids (mg/L)	30	20 (Maximum Annual Median)	60 / 49	67 / 48	68 / 54	21 / 24	21 / 14	40 / 29	20 / 9	27 / 28
Total Kjeldahl Nitrogen as N (mg/L)	-	-	3.6 / 2.7	4.2 / 3.9	4.4 / 4.6	2.3 / 1.9	8.1 / 6.2	9.4 / 9.9	9.3 / 10.1	9.2 / 9.2
Ammonia as N (mg/L)	10-20		2.30 / 1.87	2.69 / 2.51	2.91 / 2.71	0.09 / 0.07	6.40 / 4.57	7.02 / 6.73	7.40 / 7.80	6.82 / 6.79
E. coli (cfu/100 mL)	1,000	1,000 (Median)	8705 / 8100	18363 / 20000	26687 / 22500	244 / 295	42596 / 43500	284552 / 275000	6854 / 7550	249090 / 175000
Faecal coliforms (cfu/100 mL)	-	-	11380 / 14400	19209 / 18500	24608 / 28000	741 / 560	49287 / 52500	127670 / 104000	4715 / 3650	113595 / 120000
Aluminium (mg/L)	-	##	1.31 / 0.81	2.43 / 0.69	4.70 / 0.87	0.12 / 0.12	0.17 / 0.14	0.37 / 0.40	0.05 / 0.04	0.38 / 0.35
Copper (mg/L)	-		0.008 / 0.007	0.012 / 0.005	0.023 / 0.007	0.002 / 0.002	0.004 / 0.004	0.005 / 0.005	0.004 / 0.003	0.005 / 0.004
Chromium (mg/L)	-		<0.01 * / <0.01 *	0.01 / 0.01	0.02 / 0.01	<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *
Lead (mg/L)	-	##	0.006 / 0.004	0.009 / 0.003	0.017 / 0.003	0.003 / 0.003	0.002 / 0.002	0.003 / 0.003	0.001 / 0.001	0.003 / 0.002
Zinc (mg/L)	-		0.11 / 0.08	0.15 / 0.10	0.24 / 0.11	0.01 / 0.01	0.04 / 0.02	0.14 / 0.06	0.03 / 0.02	0.13 / 0.04
Cadmium (mg/L)	0.001-0.1		0.0002 / 0.0002	0.0002 / 0.0002	0.0003 / 0.0002	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Sulphide as S^{2-} (mg/L)	1	-	<0.1 * / <0.1 *	<0.1 * / <0.1 *	<0.1 * / <0.1 *	<0.1 * / <0.1 *	<0.1 * / <0.1 *	0.1 / 0.1	0.1 / 0.1	0.2 / 0.1
Nitrate as N (mg/L)	-	-	1.16 / 1.07	1.05 / 1.03	1.12 / 1.08	0.02 / 0.01	1.39 / 1.35	0.87 / 0.76	0.66 / 0.42	0.89 / 0.82
Nitrite as N (mg/L)	-	-	0.21 / 0.18	0.23 / 0.21	0.26 / 0.26	0.01 / 0.01	0.18 / 0.18	0.18 / 0.16	0.34 / 0.19	0.17 / 0.14
Nitrate + nitrite nitrogen	20-50	-	1.37 / 1.33	1.29 / 1.20	1.38 / 1.31	0.03 / 0.02	1.57 / 1.49	1.05 / 1.08	1.01 / 0.64	1.06 / 1.10
Unionized ammonia-nitrogen	-	0.021	0.039 / 0.032	0.036 / 0.033	0.036 / 0.030	0.020 / 0.015	0.186 / 0.096	0.123 / 0.088	0.190 / 0.140	0.120 / 0.077

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are Arithemetric Means / Medians, except for E. coli and Faecal Coliforms which are Geometric Means / Medians

"E.coli" stands for Escherichia coli.

All sampling and measurements were undertaken by the laboratory, ALS Technichem (HK) Pty Ltd. on 23 Sep., 2012, 26 Sep., 2012, 29 Sep., 2012, 02 Oct., 2012, 04 Oct., 2012, 06 Oct., 2012, 08 Oct., 2012, 10 Oct., 2012, 12 Oct., 2012, 15 Oct., 2012, 17 Oct., 2012, 19 Oct., 2012, 19 Aug., 2013, 21 Aug., 2013, 23 Aug., 2013, 26 Aug., 2013, 28 Aug., 2013**,** 30 Aug., 2013, 02 Sep., 2013, 04 Sep., 2013, 06 Sep., 2013, 09 Sep., 2013, 11 Sep., 2013, 13 Sep., 2013.

* denotes that the measured concentration is below the laboratory's detection limit. Values at or below reporting limits are calculated as report limits.

\# According to the standards stated in Section 5.2.2.

Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH_3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
- K.H. Khoo, C.H. Culberson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

Table 5-9 Summary of Baseline Water Quality Monitoring Results for Dry Season between December 2012 and January 2013, and between March 2015 and April 2015

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Salinity (ppt)	-	-	3.2 / 3.5	4.8 / 4.6	5.5 / 5.3	0.2 / 0.2	0.4 / 0.2	2.5 / 1.9	0.6 / 0.6	1.7 / 1.4
Water flow (L/s)	-	-	156.6 / 170.0	215.7 / 215.0	210.3 / 205.0	- / -	30.0 / 18.0	25.3 / 23.0	<1.0 * / <1.0 *	26.2 / 23.0
Water depth (m)	-	-	1.5 / 1.7	1.6 / 1.7	1.6 / 1.8	0.4 / 0.4	0.5 / 0.5	0.3 / 0.2	0.3 / 0.3	0.3 / 0.2
Water Temperature (°C)	30	-	21.5 / 21.6	21.4 / 21.8	21.1 / 21.6	22.1 / 23.3	20.7 / 21.2	21.5 / 22.0	21.1 / 21.0	21.3 / 21.5
pH Value	6-10	6-9	7.3 / 7.4	7.4 / 7.4	7.3 / 7.3	8.2 / 8.2	7.5 / 7.4	7.3 / 7.4	7.8 / 7.7	7.4 / 7.4
Dissolved Oxygen (mg/L)	-	4 (Minimum)	2.2 / 2.0	2.7 / 2.3	2.4 / 2.2	6.9 / 6.9	4.1 / 4.6	2.9 / 2.5	3.4 / 3.2	3.0 / 2.9
Dissolved Oxygen Saturation (%)	-	-	24.6 / 23.0	31.0 / 25.3	27.7 / 27.2	79.5 / 80.9	44.9 / 50.3	31.6 / 25.6	37.4 / 35.0	33.1 / 33.1
Turbidity (NTU)	-	-	75 / 33	68 / 39	180 / 41	21 / 19	23 / 17	35 / 28	17 / 15	36 / 27
BOD_5 (mg/L)	20	5 (Maximum)	7 / 6	6 / 6	8 / 7	5 / 5	22 / 15	15 / 13	9 / 8	15 / 13
COD (mg/L)	80	30 (Maximum)	35 / 33	37 / 31	49 / 43	47 / 45	53 / 39	41 / 40	54 / 43	44 / 42
Total Phosphorus (mg/L)	5-10	-	1.1 / 1.1	1.0 / 1.0	1.0 / 1.0	0.1 / 0.1	1.7 / 1.8	1.1 / 1.1	2.6 / 2.6	1.1 / 1.1
Reactive-Phosphorus (mg/L)	-	-	0.70 / 0.73	0.67 / 0.73	0.67 / 0.70	0.01 / 0.01	1.28 / 1.27	0.72 / 0.72	1.93 / 2.06	0.69 / 0.68
Oil and Grease (mg/L)	10	-	<5 * / <5 *	<5 * / <5 *	<5 * / <5 *	<5 * / <5 *	8.4 / 5.0	<5 * / <5 *	<5 * / <5 *	<5 * / <5 *

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Conductivity (mS/cm)	-	-	5971 / 6195	8011 / 8030	9567 / 9440	320 / 323	1162 / 441	8010 / 4455	1076 / 1030	4155 / 4280
Suspended Solids (mg/L)	30	20 (Maximum Annual Median)	50 / 32	59 / 34	91 / 35	16 / 13	33 / 21	32 / 28	17 / 16	37 / 29
Total Kjeldahl Nitrogen as N (mg/L)	-	-	6.7 / 7.0	7.4 / 7.9	7.9 / 7.7	1.9 / 1.7	17.7 / 16.1	9.4 / 9.5	24.9 / 25.9	9.3 / 9.8
Ammonia as N (mg/L)	10-20		4.95 / 5.43	5.42 / 5.64	5.65 / 5.65	0.07 / 0.05	15.79 / 15.20	6.93 / 6.63	21.89 / 21.40	6.84 / 6.73
E. coli (cfu/100 mL)	1,000	1,000 (Median)	14368 / 18000	26828 / 27500	32500 / 32500	1379 / 1100	135853 / 155000	217190 / 250000	6827 / 5500	300124 / 295000
Faecal coliforms (cfu/100 mL)	-	-	15748 / 12500	26290 / 22500	34941 / 28500	2097 / 1450	296348 / 460000	283708 / 410000	12388 / 13400	393159 / 380000
Aluminium (mg/L)	-	##	0.45 / 0.37	0.50 / 0.46	0.53 / 0.47	0.06 / 0.06	0.66 / 0.11	0.22 / 0.21	0.11 / 0.08	0.47 / 0.24
Copper (mg/L)	-		0.004 / 0.003	0.006 / 0.004	0.005 / 0.004	0.001 / 0.001	0.009 / 0.005	0.003 / 0.003	0.004 / 0.004	0.005 / 0.003
Chromium (mg/L)	-		<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *	0.01 / 0.01	<0.01 * / <0.01 *	<0.01 * / <0.01 *	<0.01 * / <0.01 *
Lead (mg/L)	-	##	0.002 / 0.001	0.002 / 0.002	0.002 / 0.002	0.001 / 0.001	0.005 / 0.002	0.001 / 0.001	0.003 / 0.003	0.003 / 0.002
Zinc (mg/L)	-		0.05 / 0.04	0.12 / 0.06	0.13 / 0.08	0.05 / 0.02	0.06 / 0.03	0.04 / 0.04	0.04 / 0.03	0.05 / 0.04
Cadmium (mg/L)	0.001-0.1		<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	0.0002 / 0.0002	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *	<0.0002 * / <0.0002 *

Parameters	Effluent Discharge Std. #	WQO	Ngau Tam Mei Drainage Channel			Abandoned Water Pond Within Project Site	Drainage Channel along Ha San Wai Road	Drainage Channel along Ha Chuk Yuen Road		Inlet of DSD's Chuk Yuen Floodwater Pumping Station
			W2	W3	W4	WK4	WK5	WK1	WK2	WK3
Sulphide as S^{2-} (mg/L)	1	-	<0.1 * / <0.1 *	<0.1 * / <0.1 *	<0.1 * / <0.1 *	<0.1 * / <0.1 *	0.1 / 0.1	0.2 / 0.1	0.1 / 0.1	0.2 / 0.2
Nitrate as N (mg/L)	-	-	1.07 / 0.88	1.01 / 0.94	1.08 / 0.95	0.01 / 0.01	0.89 / 0.32	0.70 / 0.60	0.41 / 0.27	0.74 / 0.70
Nitrite as N (mg/L)	-	-	0.26 / 0.25	0.27 / 0.28	0.30 / 0.31	<0.01* / <0.01 *	0.20 / 0.10	0.21 / 0.18	0.32 / 0.29	0.19 / 0.18
Nitrate + nitrite nitrogen	20-50	-	1.33 / 1.09	1.29 / 1.20	1.37 / 1.19	1.25 / 0.02	1.09 / 0.44	0.91 / 0.81	0.73 / 0.62	0.93 / 0.88
Unionized ammonia-nitrogen	-	0.021	0.018 / 0.016	0.020 / 0.017	0.017 / 0.017	0.003 / 0.001	0.084 / 0.044	0.027 / 0.020	0.278 / 0.165	0.028 / 0.023

Remark: Values at or below laboratory reporting limits are calculated as laboratory report limits.

Bold numbers indicate exceedance of the relevant water quality criteria/ standard.

Data presented are Arithemetric Means / Medians, except for E. coli and Faecal Coliforms which are Geometric Means / Medians.

"E.coli" stands for Escherichia coli.

All sampling and measurements were undertaken by the laboratory, ALS Technichem (HK) Pty Ltd. on 28 Dec., 2012, 03 Jan., 2013, 10 Jan., 2013, 17 Jan., 2013, 25 Mar., 2015, 27 Mar., 2015, 30 Mar., 2015, 01 Apr., 2015, 08 Apr., 2015, 10 Apr., 2015, 13 Apr., 2015, 15 Apr., 2015, 17 Apr., 2015, 20 Apr., 2015, 22 Apr., 2015, 24 Apr., 2015.

* denotes that the measured concentration is below the laboratory's detection limit. Values at or below reporting limits are calculated as report limits.

\# According to the standards stated in Section 5.2.2.

Waste discharges shall not cause the toxins in water to attain such levels as to produce significant toxic carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chain and to toxicant interactions with each other. Waste discharges shall not cause a risk to any beneficial uses of the aquatic environment.

@@ Calculated by summation of the concentration of Nitrate as N and Nitrite as N

@@@ The concentration of unionized ammonia (UIA) are calculated from analysed NH_3-N from water samples taken and in-situ measurement of temperature, pH and salinity. References are shown as below:

- Bower C.E. and Bidwell J.P. (1978), Ionization of ammonia in seawater: Effect of temperature, pH and salinity. J. Fish. Res. Board Can. Vol.35, pp.1012-1016;
- K., Russo R.C. & et. al. (1975), Aqueous ammonia equilibrium calculations: effect of pH and temperature. J. Fish. Res. Board Can. Vol.32, pp.2379-2383;
- K.H. Khoo, C.H. Culberson, and R.G. Bates, Thermodynamics of the dissociation of ammonium ion in seawater from 5 to 40°C, Journal of Solution Chemistry, 6:281-290, 1977.

5.4 Identification and Evaluation of Impacts

5.4.1 Existing Activities

Currently, the Project Site is partially vacant with paved car parking operation at the Project Site. During heavy rainfall, surface runoff from the Project Site and the nearby areas would flow to the nearby u-channels and eventually into the NTMDC without treatment. Overflow of the nearby drainage channels and sediment-laden surface runoff could occur.

Livestock farms and unsewered villages upstream of Ngau Tam Mei Drainage Channel would also generate particulates, BOD_5 and other pollutants, which may result in poor water quality.

5.4.2 Project Construction Phase

5.4.2.1 Construction Site Runoff

The Project Site is generally low-lying in terrain and the geographical characteristic of the Project Site is relatively flat. The existing ground level at the northern portion of the Project Site where proposed houses are located, is about +6.5mPD, while the mPD level for southern portion is about +4.8mPD in average.

Construction of the Project mainly includes site formation, ground excavation, foundation and superstructure works, landscaping works, and construction of associated facilities for the residential development and club house within the Project Site.

If not properly controlled, construction site runoff generated from the Project Site may bring along pollutants (e.g. sediment-laden surface runoff) and pollute the nearby water bodies depending upon the topography. Superstructure works are typical of many building construction works, which would generate insignificant impact on water quality.

During the course of construction of the project, construction site runoff may be generated from the following activities: erosion from site surfaces and stockpiles; wash water from wheel washing facilities; and fuel, oil, solvents and lubricants from maintenance of construction machinery and equipment. Pollutants can flow into nearby water bodies as non-point source discharge if not properly controlled.

According to the estimation, the surface runoff flow rate due to the construction activities would be slightly decreased by 0.97m^3/s in a 1 in 10 years event [6], because the site surface would all become unpaved during construction as compared to the current partially paved condition before the construction. The concerned amount is negligible when compared with the design capacity of the Ngau Tam Mei Drainage Channel (500m^3/s). Thus, there will be no adverse water quality impact as long as the mitigation measures proposed in Section 5.5 will be implemented.

Appropriate site drainage such as sedimentation basins, sand traps and similar facilities will be provided on site to properly direct stormwater to silt removal facilities. Good site practices stipulated in ProPECC Note PN 1/94, listed in Sections 5.5.1 and 5.5.2, will be adopted in order to avoid any uncontrolled discharge and potential impacts on the nearby WSRs. Treated construction site runoff will be discharged into nearby existing stormwater drains and

6 The estimated surface runoff discharge flow rate before the construction (taking into account the current partially paved site condition) is about 1.33 m^3/s, while the surface runoff during construction (for a 100% unpaved area) is about 0.36 m^3/s in a 1 in 10 years storm event. Thus, the decrease in surface runoff flow rate is about 0.97 m^3/s.

eventually discharged into NTMDC. **Figure 5-3** shows the indicative design of drainage system during construction phase.

5.4.2.2 Pond Filling Activities

There is an abandoned water pond at the south-eastern corner of the Project Site (**Figure 5-1** refers), which has a size of about 0.33 ha. The average water depth of the pond is about 0.3m. Sediment at the pond is intended to be left in place and not to be disturbed as far as possible. As the abandoned pond will be filled up to the proposed site formation level, remaining water in the pond will be absorbed by soakaway mechanism and no discharge to off-site location is expected. During pond filling within the Project Site, additional site drainage will also be provided around the existing abandoned pond to divert surface runoff away from this pond (**Figure 5-3**). Draining of pond water and discharge to surrounding area should be avoided by implementing the mitigation measures proposed in Section 5.5.2.3. Good site practices to be adopted during construction phase are provided in Section 5.5.2. With these measures in place, significant water quality impact on nearby water bodies is not anticipated.

5.4.2.3 Groundwater from Contaminated Area

As discussed in Section 7.3, there is no historic and / or existing land uses at the Project Site that would result in potential contamination of soil and underground water, thus land contamination at the Project Site is not expected. As such, contaminated underground water is not anticipated at the Project Site.

5.4.2.4 Sewage from Workforce

Water pollution due to temporary site facilities e.g. toilets could be a source of pollution if appropriate measures are not implemented properly in respect of storage and discharge. Since portable chemical toilets will be provided, no adverse water quality impact is anticipated.

5.4.2.5 Alternation of Water Systems Arising from the Project

There will be no alternation of any natural watercourse/ stream/ drainage system arising from implementation of the Project.

The proposed drainage system will follow the existing flow regime after passing through screening facilities. Therefore, there will be no adverse water quality impact due to the Project.

5.4.3 Project Operational Phase

5.4.3.1 Sewage Discharge

Permanent Sewage Disposal

Currently, the Project Site and the surrounding areas are not equipped with any public sewerage system. Sewage from the proposed development may cause pollution to the surrounding waterbodies if there is uncontrolled discharge and lack of treatment.

Domestic wastewater will be a point-source of pollution. During the operational stage, potential impacts will be the discharge of wastewater from the proposed development (residential development, club house and swimming pool, etc.). All domestic wastewater will be discharged to the planned public sewerage system when it is in operation via a proposed rising main from the Project Site (Section 6.5 refers), thus there will be no adverse water quality impact during operation phase.

Interim Sewage Disposal

Since there is a possibility that there will be no public sewer available at the time of occupation, an interim sewage treatment plant (STP) will be provided (Sections 6.6 and 6.7 refer). The operation of the interim STP will cease once connection to the public sewer is completed. The interim STP will comprise a system of combination of biological treatment, membrane filtration and Reverse Osmosis processes. The discharge requirement of the Project and the capacity of the interim STP have been evaluated in Section 6.7.

As the Project Site is located in Deep Bay area, treated effluent from the proposed interim STP will need to follow the requirement of no net increase of pollution loading. The estimated existing pollution loading from the Project Site and that due to the proposed development are provided in Table 6-9 in Chapter 6, which shows compliance with the no net increase in pollution load requirement.

Treated effluent from the interim STP will be discharged to the adjacent NTMDC, which is the engineered trained main drainage channel for the area. The concerned quantity of treated effluent discharge is estimated to be about 4.4 L/s (peak design flow), according to the estimation provided in Section 6.4, which is negligible when compared with the capacity of the NTMDC (over 500m^3/s without overtopping the channel embankment under 1 in 200 year rainfall). Therefore, adverse impacts on NTMDC is not anticipated in terms of both flow regime and water quality. To the further downstream, the existing Kam Tin River is also an engineered trained drainage channel with a width of about 130m (i.e. with a greater capacity than NTMDC, which is about 44m wide), thus the discharge from this Project will be negligible when compared with its capacity. As such, no adverse water quality impact to the downstream water body is therefore expected.

Precautionary measures have also been proposed in Sections 6.6, 6.11 and 6.12 to address potential adverse water quality impact due to decommissioning of the interim sewage treatment plant; sewage overflow; emergency discharge; and change in flow regime. Equalization tank will be provided for the STP for temporary storage of sewage in case of outage of the interim STP, and tanker away will be provided for proper disposal at designated sewage treatment works to be assigned by DSD. With the proposed precautionary measures in place, sewage overflow, discharge of sewage to the nearby environmental during decommissioning and emergency discharge would be very unlikely and no adverse water quality impact is expected.

In addition, the wastewater discharge from the Project Site will be required to apply for a discharge licence under the WPCO, and the discharge shall comply with the terms and conditions of the licence and the discharge standards for effluent specified in the licence as well as the conditions specified in the Environmental Permit of this Project under the EIAO.

5.4.3.2 Storm Water Discharge

During operational phase, potential water quality impact would be the surface runoff during rainfall events which is known as non-point source of pollution. Substances such as vehicle dust, scraps and oil may be deposited on paved road surface. Fallen leaves, particles, litter from open areas/ landscape areas, which is a source of organic and nutrient pollutants, can be washed into the drainage system during heavy rainfall if it is not properly controlled. No fertilizers and pesticides will be routinely used for vegetation management. Pollutants contributed by non-point source are often bound or adsorbed onto particles, thus an effective stormwater management system will be the removal of pollution sources prior to rainstorm and the provision of degritting/ screening facilities that collect debris or sediment.

The main concern of operational surface runoff would be the first flush flow which carries most of the pollutants. Under normal condition of operational phase, runoff will not be generated in low rainfall intensity. Thus, prevention of “first flush” pollution in stormwater runoff will be an effective way in controlling pollution at source and to abate pollutants.

The proposed development will be constructed on existing formed land. It is expected that the volume of surface runoff will increase in the developable area due to increase in paved areas. Drainage system will be provided for the formed and paved road/areas in the proposed development to collect stormwater surface runoff. Collected surface runoff from the development site will be discharged into the NTMDC after passing through screening facilities. Given the scale of this Project (for small house development), the increase in surface runoff generated from the developable area after development should be insignificant (about 14.7m^3/day (or 0.17L/s) (Appendix 5-2 refers) when compared with the capacity of the trained downstream Ngau Tam Mei Drainage Channel (over 500m^3/s). Given the design capacity of the NTMDC and the small amount of surface runoff from this Project, there will be no adverse water quality impact on the NTMDC and its downstream locations in terms of both the flow regime and water quality. Moreover, the NTMDC has been designed to convey flows due to urbanization/ development inclusive of all its catchment areas. In addition, the existing roadside channel along Kam Pok Road will be retained to maintain the original flow path. Therefore, there will be no flooding or hydrology issue arising from the proposed development, and no adverse water quality impact on nearby water bodies during operation of the Project is anticipated.

Estimation on the potential pollution loading due to the surface runoff from the developable area is provided in **Appendix 5-2**, which is found to be a minor source and can be controlled with implementation of Best Management Practices (BMPs) described below as well as in Section 5.6.2.

5.4.3.3 BMPs for Storm Water Discharge

Surface runoff can be controlled by good drainage design and implementation of BMPs. The proposed development has adopted the following BMPs, which are also listed in Section 5.6.2.

Erosion Control

If uncontrolled, exposed surfaces may contribute to sediment-laden surface runoff during rainstorm and cause water pollution. The proposed development site is either hard paved or covered by landscaping area with appropriate planting species in order to eliminate any exposed surface.

The landscaped open area will be managed and maintained by the property management company (and its contractor) during operation.

Runoff Control

In the proposed layout of the development, the area of internal access road (i.e. hard paved area) has been minimised by a simpler and more effective layout, at which proposed houses are allocated on both sides of the road. The hard paved area is therefore minimised and hence providing more space for landscaping area which has a lower runoff coefficient. As a result, the overall amount of surface runoff is minimised.

The existing roadside channel surrounding the Project Site will be retained to maintain the original flow path. The drainage system will be designed to avoid flooding.

In addition, appropriate drainage system will be constructed for the proposed development in order to control its surface runoff. Drainage system of the development has been designed in such way that surface runoff from the residential area will be directed towards the internal access road, where appropriate drainage system with control facilities have been proposed. Additional concreted U-channels with screening facilities are also provided along site boundary to avoid uncontrolled spillage of runoff. **Figure 5-4** shows the indicative site drainage during operational phase.

Prevention of "First Flush" Pollution

As discussed above, prevention of "first flush" pollution will be an effective way in controlling pollution. This can be done by prevention of pollutants from entering the drainage system and by removal of pollutants by installation of appropriate devices as well as management measures.

Prevention of Pollution at Source

Tree planting has been introduced along the roadside of internal access road, which helps to reduce soil erosion and as a buffer zone between the residential area and the drainage system along roadside. With this planting area, it can help minimize the amount of direct flushing of substances such as fallen leaves, soil particles, and rubbish into the drainage system.

Broadleaf and evergreen species, which in general generate relatively smaller amount of fallen leaves, should be considered to be utilized in the landscape berm at the periphery of the site so as to minimize the amount which may enter the drainage system during heavy rainfall.

Fertilizer, which is a source of nutrient, will only be applied when needed. According to the "General Specification for Building (2012 edition)" published by Architectural Services Department, HKSAR Government, fertilizer is generally applied twice a year. If required, the fertilizer should be applied in early Spring and in late summer in order to avoid major rainy season as far as possible. Slow release fertilizer should be selected as far as possible to minimize the amount of nutrient to be washed out by rain. Application of fertilizer should not be arranged before forecasted heavy rainfall, and over dosing should be avoided. Particles flushing out by rainfall (which may carry nutrient) would be removed by provisions of sand traps in the drainage system. Application of fertilizer should be managed by an experienced contractor through the property management company during operation.

Regular cleaning and sweeping of road surface/ open areas is suggested so as to minimize exposure of pollutants to stormwater. The road surface/ open area cleaning should also be carried out prior to occurrence of rainstorm.

With the above measures, the amount of pollutants at source has been largely reduced/ avoided as far as possible.

Devices for Removal of Pollutants

In addition to the above, screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system as well as at upstream location of the u-channels. It is expected that most of the large substances in stormwater runoff would be removed with such devices so as to prevent it from entering the drainage system. Road gullies with standard design and silt traps and oil interceptors should be incorporated during the detailed design to remove particles and grease present in stormwater runoff. General speaking, device such as sand trap may achieve about 20% of removal efficiency as reported in other studies[7]. **Figure 5-4** shows the indicative site drainage conceptual layout during operational phase.

Drainage outlet of any covered car park should be connected to foul sewers via petrol interceptors or similar facilities.

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7 According to Appendix 5-2, in approved EIA report for "Agreement No. CE 61/2007 (CE) North East New Territories New Development Areas Planning and Engineering Study - Investigation".

In the event of emergency (e.g. car accident) where there is a major spillage of oil, chemical or fuel, dispersants or firefighting foam, etc., a system of contaminant bunding will be implemented as appropriate.

Management Measures

Good management measures such as regular cleaning and sweeping of road surface/ open areas is suggested. The road surface/ open area cleaning should also be carried out prior to occurrence of rainstorm.

Stormwater gullies and ditches provided among the residential development will be regularly inspected and cleaned by the property management company.

With the removal of pollutants, the pollution levels from stormwater would be much reduced, and given the stochastic nature of non-point source pollution and the proposed management measures, there will be no significant impact expected.

5.5 Recommended Mitigation Measures During Construction Phase

Control of potential water quality impact arising from the construction works should be based on the following principles:

- Minimisation of runoff;
- Prevention or minimisation of the likelihood of the identified pollutants being in contact with rainfall or runoff; and
- Measures to abate pollutants in the stormwater runoff.

The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence.

Construction Phase Drainage Management Plan

Contractor(s) of this Project is required to submit a Construction Phase Drainage Management Plan with details such as design of the temporary site drainage system; wastewater treatment facilities; and maintenance of drainage system for the approval of the Engineers Representative (ER) and the Environmental Team in order to ensure that the mitigation measures are in place. The concerned drainage management plan should include recommended mitigation measures as well as best practices identified in Sections 5.5.1 and 5.5.2 of this EIA study. .

The Drainage Management Plan and recommended mitigation measures and best practices shall be implemented by the Contractor(s) and inspections shall be carried out regular (e.g. weekly) by the Engineer's Representative (ER), and Environmental Team (ET) in order to ensure all mitigation measures are effectively implemented, in particular to ensure that no off-site spillage of runoff from the project site. Any deficiencies identified shall be timely rectified by the Contractor(s).

5.5.1 General Requirements

5.5.1.1 Best Management Practices (BMPs)

The BMPs given in the ProPECC PN 1/94 shall be implemented in controlling water pollution during the whole construction phase. The main practices provided in the above-mentioned document (i.e. ProPECC PN 1/94) are also summarized in the following paragraphs which should be implemented by the contractor during the construction phase, where practicable:

- High loading of suspended solids (SS) in construction site runoff shall be prevented through proper site management by the contractor;
- The boundary of critical work areas shall be surrounded by ditches or embankment. Accidental release of soil or refuse into the adjoining land should be prevented by the provision of site hoarding or earth bunds, etc. at the site boundary. These facilities should be constructed in advance of site formation works and roadworks;
- Consideration should be given to plan construction activities to allow the use of natural topography of the Project Site as a barrier to minimise uncontrolled non-point source discharge of construction site runoff;
- Temporary ditches, earth bunds should be provided to facilitate directed and controlled discharge of runoff into storm drains via sand/ silt removal facilities such as sand traps and sedimentation basins. Oil and grease removal facilities should also be provided where appropriate, for example, in area near plant workshop/ maintenance areas;
- Sedimentation basins and sand traps designed in accordance with the requirements of ProPECC Note PN 1/94 should be installed at the construction site for collecting surface runoff;
- Sand and silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly by the contractor, and at the onset of and after each rainstorm to ensure that these facilities are functioning properly;
- Slope exposure should be minimised where practicable especially during the wet season. Exposed soil surfaces should be protected from rainfall through covering the temporary exposed slope surfaces or stockpiles with tarpaulin or the like;
- Haul roads should be protected by crushed rock, gravel or other granular materials to minimise discharge of contaminated runoff;
- Slow down water run-off flowing across exposed soil surfaces;
- Plant workshop/ maintenance areas should be bunded and constructed on a hard standing. Sediment traps and oil interceptors should be provided at appropriate locations;
- Manholes (including newly constructed ones) should be adequately covered or temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system;
- Construction works should be programmed to minimise soil excavation works where practicable during rainy conditions;
- Chemical stores should be contained (bunded) to prevent any spills from contact with water bodies. All fuel tanks and/ or storage areas should provide with locks and be sited on hard surface;
- Chemical waste arising from the Project Site should be properly stored, handled, treated and disposed of in compliance with the requirements stipulated under the Waste Disposal (Chemical Waste) (General) Regulation;
- Drainage facilities must be adequate for the controlled release of storm flows;
- Vehicle wheel washing facilities should be provided at the site exit such that mud, debris, etc. attached to the vehicle wheels or body can be washed off before vehicles leave the work site;

- Section of the road between the wheel washing bay and the public road will be paved to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains;

- Bentonite slurries, if any to be generated, shall be reconditioned and reused as far as practicable. Spent bentonite should be kept in a separate slurry collection system for disposal at a marine spoil grounds subject to obtaining a marine dumping licence from EPD. If used bentonite slurry is to be disposed of through public drainage system, it should be treated to meet the respective applicable effluent standards for discharges into sewers, storm drains or the receiving waters;

- Appropriate peripheral drainage system shall be constructed along the Project Site boundary to divert away surface runoff in accordance with requirements stipulated in ProPECC PN 1/94 in order to collect surface runoff and discharge it into the nearby existing stormwater drains, and via which into the existing NTMDC; and

- Temporary drains, sedimentation basins, sand traps and similar facilities shall be provided during the construction works in accordance with the ProPECC PN 1/94.

5.5.1.2 Sewage from Workforce

- Sewage generated from the construction workforce should be contained in chemical toilets before connection to public foul sewer becomes available. Chemical toilets should be provided at a minimum rate of about 1 per 50 workers. The facility should be serviced and cleaned by a specialist contractor at regular intervals;

5.5.1.3 Oils and Solvents

Spillage of fuel oils or other polluting fluids should be prevented at source. It is recommended that all stocks should be stored inside proper containers and sited on sealed areas, preferably surrounded by bunds.

5.5.2 Site Specific Measures

5.5.2.1 General Construction Activities

During construction, temporary drains, peripheral site drainage comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities will be provided along the Site boundary to collect and treat construction site runoff. **Figure 5-3** shows the indicative site drainage during construction phase.

The construction of water extraction facility for interim STP should be carried out in dry season so that to avoid affecting water quality at the channel. Silt curtain or sand bags should be provided to carve out the working area so as to bypass the channel flow and to avoid any solids/materials arising from the construction activities from entering the channel during construction phase. The work sites at the NTMDC for construction of water abstraction facilities should be maintained in dry conditions. Regular visual inspections should also be carried out by the Environmental Team and Contractor to ensure there is no spillage into the channel.

5.5.2.2 Pond Filling

The existing abandoned pond will be filled up by imported fill materials. The pond sediment is intended to be left in place and not to be disturbed as far as possible. However, in case any

sediment is encountered during construction, preventative measures are proposed below. Temporary access roads of Project Site should be protected by crushed stone or gravel. Offsite disposal should be avoided and pond sediment should be re-used on-site. For the purpose of prevention of soil erosion, temporary exposed surfaces in interim should be covered by tarpaulin sheets to prevent materials from washing away. Appropriate site drainage should be provided, as part of the construction phase drainage system, to ensure surface runoff is properly collected and treated and there should be no spillage to offsite location.

In addition, intercepting channels should be provided along the edge of pond to divert surface runoff away from this pond and to prevent storm runoff from washing across exposed surfaces (**Figure 5-3** refers). Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.

5.5.2.3 Draining of Pond Water

As the concerned existing abandoned pond will be filled up to the proposed site formation level during construction, remaining water in the pond will be absorbed by soakaway mechanism and no discharge to off-site location is expected. During pond filling, site drainage should be provided around the existing pond to divert surface runoff away from this pond (**Figure 5-3** refers). Draining of pond water and discharge to surrounding area should be avoided as far as possible.

In case there is still surplus pond water, the pond water will be on-site re-used for the construction activities such as dust suppression and wheel washing facilities to minimize the water consumption of project as well as the volume of pond water that needs to be handled.

In case there is still a need for disposal, on-site treatment should be proposed by the Contractor(s) and the discharge of treated effluent will be subject to agreement with EPD and DSD, where necessary. The contractor(s) will be required to properly treat the water on-site with the quality of the treated water complying with the requirement of the discharge license to be issued by the EPD.

5.5.3 Emergency Response Plan During Inclement Weather and Emergencies

During construction period, in order to better control potential water pollution due to site runoff during inclement weather and emergencies, the Contractor(s) will be required to prepare and implement an Emergency Response Plan (ERP).

As a general indication, the ERP should include but not limited to the design of drainage facilities/ system; maintenance of drainage system; recommended measures and best practices identified in the EIA study; an event and action plan during inclement weather and emergencies condition; emergency procedures and emergency contact details; and responsibility of relevant parties and follow up actions.

In particular, the plan should provide details of procedure and actions required both before and after forecasted rainstorm such as checking/ inspection before onset of rainy season/ rainstorm that all drains are cleared from blockage and functioning properly; checking standby plant and equipment are ready for use; frequency of updating weather conditions; persons who will implement the measures and follow up actions; ensuring easily loose construction materials are well covered; more frequent inspection and cleansing preferably before and after every rainstorm event. In case of severe weather condition, upon the instruction from the Engineers' Representative (ER), to stop works for the sake of safety reasons.

The ERP shall be submitted for the approval of the ER, the Environmental Team (ET) and the Independent Checker (Environment) (IEC), which shall be implemented by the Contractor(s)

throughout the construction period. Its implementation will be monitored by the ER and the ET in order to ensure all measures are effectively implemented. Any deficiencies identified shall be timely rectified by the Contractor(s).

5.6 Recommended Mitigation Measures During Operational Phase

5.6.1 Sewage Discharge

Permanent Sewage Disposal

All domestic sewage generated will be discharged to the public sewerage system via a proposed rising main from the Project Site as described in Section 6.5. Thus, sewage discharge from the Project would present no adverse water quality impact.

The discharge from the club house and swimming pool shall apply for a discharge licence under the WPCO, and the discharge shall comply with the terms and conditions of a licence and the standards for effluents specified in the licence, as well as conditions in Environmental Permit of this Project under the EIAO.

Interim Sewage Disposal

An interim STP will be proposed with discharge of the treated effluent to the adjacent NTMDC in case the public sewerage is not available when the Project is in operation. The design of the interim STP will follow the requirement of no net increase of pollution loading. A discharge licence under the WPCO will be obtained for the interim STP and, and the discharge shall comply with the terms and conditions of the licence and the discharge standards for effluents specified in the licence as well as the conditions specified in the Environmental Permit of this Project. Samples of treated effluent will be taken regularly and tested according to the discharge licence under the WPCO and the conditions in the Environmental Permit to ensure compliance with discharge standards.

Precautionary measures in Sections 6.12 and 6.6 should be implemented, so that adverse water quality impact due to sewage overflow, emergency discharge, and change in flow regime is unlikely to occur. In addition, equalization tank will be provided in the STP for temporary storage of sewage in case of outage of the interim STP, and tank away will be provided for proper disposal at designated sewage treatment works to be assigned by DSD (Section 6.12 refers).

During Decommissioning of STP

The proposed interim sewerage system will be designed in such a way to facilitate the future connection to the planned Ngau Tam Mei sewerage system with the flow direction to be controlled by several flow control devices such as valves or stop-log, etc. The interim STP will be decommissioned and converted to a sewage pumping station once the trunk sewer becomes available for connection. Details of which provided in Section 6.6 should be implemented. Small amount of residual sewage left in the interim STP would be tankered away. No sewage will be discharged into the nearby water body during decommissioning of the interim STP and hence no adverse water quality impact is anticipated.

5.6.2 Storm Water Discharge

During operational stage, potential water quality impact due to storm water discharge is addressed in this EIA study. The control of water pollution will be through good drainage design and implementation of Best Management Practices, which have been recommended and listed out below.

5.6.2.1 Best Management Practices

Best Management Practices (BMPs) have been proposed for the development, which are summarised and grouped under the following categories:

Design Measures

- Exposed surface shall be avoided within the proposed development to minimize soil erosion. Development site shall be either hard paved or covered by landscaping area where possible.
- The landscaped open area should be managed and maintained by the property management company (and its contractor) during operation.
- Paved area of development has been minimized by a simpler and more effective internal road layout, at which proposed houses are allocated on both sides of the road. Thus hard paved area of internal access road as well as increase in surface runoff, can be minimized;
- The roadside channel surrounding the Project Site will be retained to maintain the original flow path. The drainage system will be designed to avoid flooding;
- **Figure 5-4** shows the indicative site drainage during operational phase. Drainage system of the development shall be designed in such a way that surface runoff from the residential area is directed towards the internal access road, where appropriate drainage system with control facilities have been proposed. Additional paved U-channels with screening facilities are also provided along site boundary to avoid uncontrolled spillage of runoff.
- Street level tree planting should be introduced along roadside of internal access road, which can help to reduce soil erosion and as a buffer zone between the residential area and the drainage system along roadside.
- Broadleaf and evergreen species, which in general generate relatively smaller amount of fallen leaves, should be selected where possible (e.g. at landscape berm at the periphery of the site).
- Fertilizer will only be applied on landscape area when needed. If required, the fertilizer should be applied in early Spring and in later summer in order to avoid major rainy season as far as possible. Slow release fertilizer should be selected as far as possible to minimize the amount of nutrient to be washed out by rain. Application of fertilizer should not be arranged before forecasted heavy rainfall, and over dosing should be avoided. Application of fertilizer should be managed by an experienced contractor through the property management company.

Devices/ Facilities to Control Pollution

In addition to the above, the following device/ facilities will be incorporated into the design:

- Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system as well as at upstream location of the u-channels.

- Road gullies with standard design and silt traps and oil interceptors should be incorporated during the detailed design to remove particles present in stormwater runoff.

- Drainage outlet of any covered car park should be connected to foul sewers via petrol interceptors or similar facilities.

In the event of emergency (e.g. car accident) where there is a major spillage of oil, chemical or fuel, dispersants or firefighting foam, etc., a system of contaminant bunding will be implemented as appropriate.

Administrative Measures

Good management measures such as regular cleaning and sweeping of road surface/ open areas is suggested. The road surface/ open area cleaning should also be carried out prior to occurrence of rainstorm.

Stormwater gullies and ditches provided among the residential development will be regularly inspected and cleaned (e.g. monthly) by the property management company. Additional inspection and cleansing should be carried out if heavy rain is forecasted.

The mitigation measures listed in Section 5.6.2 will be implemented by the Project Proponent, which will be managed and maintained by the property management company / Incorporated Owners during operational phase.

5.6.2.2 Emergency Response Plan and Emergencies

During operation, in order to control/ minimize water pollution during inclement weather and emergencies, an Emergency Response Plan should be established and implemented. As a general indication, the ERP should include but not limited to record plans of drainage facilities/ system; maintenance of drainage system; recommended measures and best practices identified in the EIA study; an event and action plan during inclement weather and emergencies condition; emergency procedures and emergency contact details; and responsibility of relevant parties and follow up actions.

In particular, the plan should provide details of procedure and actions required both before and after forecasted rainstorm such as checking/ inspection before onset of rainy season/ rainstorm that all drains are cleared from blockage and functioning properly; checking standby plant and equipment are ready for use; frequency of updating weather conditions; persons who will implement the measures and follow up actions; more frequent inspection and cleansing preferably before and after every rainstorm event [8].

The ERP shall be prepared by the Environmental Team (ET) and submitted to the Independent Environmental Checker (IEC) for approval prior to occupation of project. The ERP shall be implemented by the property management company and its sub-contractor during operational phase. Any deficiencies identified shall be timely rectified.

8 Advisory Note No. 3, "Protecting Your Premise from Flood Damages, an easy guide for reference of property managers and owners, published by HKSAR Gov. Drainage Services Department (available at: http://www.dsd.gov.hk/EN/Files/publications_publicity/publicity_materials/leaflets_booklets_factsheets/Urban_Flooding_Notes_EN.doc).

5.7 Cumulative Impacts

5.7.1 Identification of Cumulative Projects

As discussed in Section 1.8, a few works projects near the Project Site have been identified for cumulative impact assessment. Cumulative impacts of these projects are described in following paragraphs.

5.7.2 Evaluation of Cumulative Construction Phase Impacts

Yuen Long and Kam Tin Sewerage and Sewage Disposal Project

The location of the proposed Ngau Tam Mei sewage pumping station and the public sewers are also shown in **Figure 1-2**. According to its approved EIA report, namely the "EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal", a sewage pumping station (SPS) (San Tin No.1 SPS), has been proposed at an offsite location about 206m southeast of the Project Site. Under the same project (current PWP Item 4235DS), a gravity trunk sewer will be constructed along Castle Peak Road between Ngau Tam Mei and San Tin, and a section of alignment will be constructed along the Ngau Tam Mei Channel in adjacent to this development Project.

It is understood that there is currently no updated status of implementation of that Project (an interim STP is proposed for this Project as a result), thus concurrent works with that Project is unlikely to occur in near future.

According to the said EIA report (Section 10.6 of the concerned EIA report refers), potential water quality impacts of the sewerage works could arise as a result of sediment-laden surface runoff and water pollution due to site facilities such as toilets.

The EIA report has stated that all the construction works of that project will be carried out in small sections, and construction of each section will be lasted for a shorter period of time. It has also recommended in the same report that the construction works will be carried out in 50m segments (Section 8.5 of the same EIA report refers). Thus, the exposed surface at any one time will be much reduced and controllable during the construction phase. In addition, the construction programme of that project will also be arranged to minimize surface excavation during rainy seasons. Furthermore, various practicable mitigation measures have also been proposed in that EIA report to prevent the transportation of sediment away from the works area (section 10.6.2 of the same EIA report refers).

The contractor is also obliged to follow the procedures and requirements given in the Practice Notes for Professional Persons on "Construction Site Drainage" (*ProPECC* PN 1/94). Efficient silt removal facilities will be installed, and channels, earth bunds or sand bag barriers will be provided to divert stormwater to silt removal facilities. For sewage generated from construction workforce, portable chemical toilets or sewage holding tanks will be provided. With the proposed mitigation measures in place, adverse water quality impacts on the nearby water environment are not anticipated. Most importantly, respective project specific Environmental Monitoring and Audit (EM&A) programme will be implemented for the said sewerage project to ensure and review the effectiveness of the mitigation measures implemented.

Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River Project

A cycle track will be provided along the Castle Peak Road and the Yau Pok Road as part of the cycle track project between Tuen Mun and Sheung Shui under PWP Item 7259RS.

The section of concerned alignment of cycle track near the Project Site is along Yau Pok Road on the opposite side of NTMDC (Figure 1-2 refers). According to the concerned cycle track EIA report, the identified primary potential impacts to water quality of that project will be the pollutants from construction site run-off (suspended solids). Measures have been proposed in that EIA to control/ prevent impacts to the water sensitive receivers (e.g. Sections 6.5 and 6.6 of the cycle track EIA report). In particular, the contractor is also obliged to follow the procedures and requirements given in the *ProPECC* PN 1/94. Surface run-off from the construction sites will be directed into storm drains via adequately designed wastewater treatment facilities such as sand traps, silt traps and sediment settling basins. Wastewater from temporary site facilities (such as toilets) will be discharged to foul sewer or chemical toilets will be provided.

In addition, the cycle track project will be constructed in sections. Typically, the working area will be 40 m long by 4 m wide and no adjacent sections (200m between two neighbouring sections) will be constructed simultaneously. Thus, the exposed surface that may cause sediment laden runoff will be minimized and controlled during the construction phase. With the proposed control measures, stormwater runoff will be adequately controlled and the project will not cause unacceptable impact. Most importantly, the project specific EM&A programme will be implemented for that project to ensure the effectiveness of the proposed mitigation measures.

The Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD104, Yuen Long, N.T. (The "REC Site") (note: a rezoning application for the development site was agreed by TPB under the planning application no. Y/YL-MP/3. The exact new zoning of that site is still subject to Government's further review. However, it is noted that the submitted development scheme is the same as that approved under the EIAO)

According to the approved EIA report of that Project under AEIAR-182/2014, the planned development project is for land-based development. Identified water quality impacts will be sediment laden surface runoff and sewage generated from construction workforce during construction phase. With the implementation of the proposed mitigation measures of the EIA report, adverse impacts on water quality impact from the REC Site is not anticipated.

Based on the current construction programme, the site formation works of this Project (which is a major source of construction site runoff, will be undertaken between April 2017 and November 2017 (**Appendix 1-1** refers), which should avoid concurrent construction with the site formation works of the "REC Site" (the site formation for "REC Site" is to commence in November 2017 after the site formation works of this Project). Thus, cumulative impact due to concurrent construction has been avoided as far as possible.

Nevertheless, discharge of surface runoff due to the approved "REC Site" will be controlled through the implementation of mitigation measures as stated in its approved EIA report such as adaptation of best practices stipulated in ProPECC PN 1/94 and project-specific mitigation measures and proper design of drainage system, which will be monitored as part of its EM&A programme during its construction. According to its approved EIA report, with these measures in place, no adverse water impact is expected. As such, no adverse water quality impact is anticipated.

The Proposed Residential Development within "Residential (Group D)" zone at various lots in DD104, Yuen Long, N.T. (The "RD Site" Project)

According to the EIA Study Brief of this development project (ESB-204/2009) and its approved planning application (under planning application no. A/YL-MP/205), the planned development

site is also for land-based development. It is expected that potential water quality impacts of these Project will be similar to that identified in the approved "REC Site" project as described above.

The concerned "RD Site" development will be subject to an approval under the EIAO, and an EP will be obtained from EPD for its construction works. Given that there is currently no updated status of that project and the construction works of that project will require a prior approval under the EIAO, its construction works are unlikely to commence in near future. As a result, concurrent construction with this Project is considered unlikely to occur. Nevertheless, construction works of that project will be under control of the EIAO, and project-specific mitigation measures will be recommended in this respective EIA report to ensure there is no adverse water quality impact due to its construction activities. The implementation of these measures will need to be monitored as part of its EM&A programme to monitor its implementation and the effectiveness of proposed mitigation measures during the whole construction period. As such, no adverse water quality impact is anticipated.

The Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long (The "Yau Mei Site" Project)

According to the approved EIA Report of this development project (AEIAR-189/2015), the planned development sites are also for land-based development. It is therefore expected that potential water quality impacts of this Project will be similar to that identified in the approved "REC Site" project.

The major impacts during construction of the Project will be construction site surface runoff and soil erosion associated with exposed surfaces.

Standard best practices as well as site specific measures have been recommended in order to avoid and minimise potential impacts. Peripheral site drainage system comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities together with those good site practices stipulated in ProPECC Note PN 1/94, have been recommended. Construction site runoff will be collected, and treated effluent will be discharged into the NTMDC. EM&A programme will be in place to monitor the effectiveness of these mitigation measures. By adopting good site management practices and proposed mitigation measures, adverse water quality impact is not expected.

Evaluation of Cumulative Impacts

For the Yuen Long and Kam Tin Sewerage Project, the cycle track project, the REC Site project and Yau Mei Site Project, mitigation measures have been recommended in the EIA reports respectively. According to the approved EIA reports of these projects, construction activities will be controlled during its construction. With the proposed mitigation measures committed for those projects in place, adverse impact on water quality is considered as insignificant.

For the planned "RD Site", it is a designated project and mitigation measures will be recommended during EIA process. EM&A programme will also be proposed in order to ensure that the recommended mitigation measures and their effectiveness are properly implemented and monitored throughout the construction phase.

As discussed earlier, the construction programmes of the potential concurrent projects mentioned above will unlikely be overlapped with the Project. The construction works of these projects are land-based only. Provided that all mitigation measures as recommended in the EIA reports will be implemented properly, the potential water quality impacts from the projects are expected to be localized and kept to within the standards. In the rare case when the

construction programmes overlapped, the potential cumulative water quality impacts are expected to be insignificant.

For the current Project, BMPs and site-specific mitigation measures have been proposed. Peripheral site drainage systems have been proposed along the boundary of Project Site to divert away surface runoff, and treatment facilities such as sedimentation basins and sand traps are recommended in accordance with requirements stipulated in ProPECC PN 1/94. An EM&A programme have been proposed to monitor the implementation and the effectiveness of the proposed mitigation measures throughout the construction phase. As discussed above, based on current construction programme of this Project, concurrent works with nearby planned development sites have been avoided or are unlikely to occur. Nevertheless, construction site runoff will be controlled through the implementation of mitigation measures described in this report as well as those committed for other nearby projects.

Furthermore, regular site inspections have been recommended and routine water quality monitoring at nearby sensitive receivers as part of the EM&A programme will be undertaken by the Environmental Team of this Project throughout the construction period. An Event and Action Plan as detailed in the EM&A Manual will be implemented to make sure any deficiencies are timely rectified. With the above measures, it is considered that the cumulative impacts on water quality (in case of concurrent works with nearby development projects) will be insignificant.

5.7.3 Evaluation of Cumulative Operational Phase Impacts

Yuen Long and Kam Tin Sewerage and Sewage Disposal Project

The planned public sewerage project is to convey collected sewage to DSD's sewage treatment plant for treatment. As the sewer will be laid underneath existing road surface, there will be no additional surface runoff due to this project.

There will be no sewage discharge from that project, thus there will be no operational impact.

Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River Project

According to the EIA report of the planned cycle track (Section 6.1.2 of that EIA report refers), the proposed cycle track does not require any sewerage provisions. Thus, there will be no adverse water quality impacts during its operation.

No significant surface runoff is expected due to the cycle track during its operation.

The Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD104, Yuen Long, N.T. (The "REC Site")

Based on the approved EIA report of that project (Section 5.8.1 of the approved EIA report refers), the concerned development will not have population intake until the commissioning of the planned local public sewerage works. As the sewage generated from the development will be discharged into public sewerage system, there will be no adverse water quality impact due to that Project.

There is no estimation on the amount of surface runoff in the approved EIA report for the "REC Site" project. Since the proposed development is similar to this Project (i.e. land based development comprising small houses development), it is expected that the concerned surface runoff should not be in significant amount. With the proposed mitigation measures in its EIA report, no adverse impact is anticipated.

An estimation of surface runoff is presented in **Appendix 5-2B** and discussed in following paragraphs.

The Proposed Residential Development within "Residential (Group D)" zone at various lots in DD104, Yuen Long, N.T. (The "RD Site" Project)

Best available information has been referenced regarding this development project. It is found that similar to the planned "REC Site" project, the approved planning application of this planned development site under A/YL-MP/205 has assumed no population intake until the commissioning of the planned local public sewerage system. As such, there will be no adverse water quality impact due to sewage discharge of this Project.

There is no available information regarding the amount of surface runoff to be generated by this development project. Since the proposed development is similar to this Project (i.e. land based development comprising small houses development), it is expected that the concerned surface runoff should not be in significant amount. Mitigation measures would be recommended in its EIA report and controlled under the EIAO process, it is expected that there will be no adverse impact.

An estimation of surface runoff is presented in **Appendix 5-2B** and discussed in following paragraphs.

The Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long (The "Yau Mei Site" Project)

Information has been obtained from the Project Proponent of that Project as well as its approved EIA Report (application no. EIA-227/2015). Based on its approved EIA Report, an interim STP may be proposed for that Project and the estimated peak Average Dry Weather Flow (ADWF) of that project will be about 12 L/s. The development is also expected to comply with the no net increase in pollution loading requirement in Deep Bay.

Since the proposed development is similar to this Project (i.e. land based development comprising small houses development), the concerned surface runoff should not be in significant amount. Based on its approved EIA Report, the estimated increase in surface runoff due to that project is about 37 m^3/day (or 0.81 L/s). Mitigation measures would be recommended in its EIA report and controlled under the EIAO process, it is therefore expected that there will be no adverse impact.

Evaluation of Cumulative Impact

Sewage Discharge

As mentioned above, there will be no adverse water quality impact due to the approved EIA projects (i.e. Public Sewerage Project; Cycle Track Project; and "REC Site" Project) as well as planned "RD Site" project as there will be no direct sewage discharge from these projects. Thus, cumulative impact will be due to treated effluent discharge from the interim STP of "Yau Mei Site" as well as those from the interim STP of this Project.

According to Section 6.4 of this EIA report, the estimated peak flow from STP of this development Project is about 4.4 L/s. Thus, the cumulative total peak ADWF of the two projects (i.e. this Project and planned "Yau Mei Site" project) should be 16.4 L/s, which is negligible when compared with the capacity of the NTMDC (over 500m^3/s without overtopping the channel embankment under 1 in 200 year rainfall).

Given the effluent qualities from the interim STP of these projects are in compliance with the requirement of no net increase in pollution loading, cumulative impacts on water quality is no anticipated and no further mitigation measures will be required.

Stormwater Discharge

As discussed above, it is not expected that the approved public sewerage project as well as cycle track will contribute to any significant increase in surface runoff during its operation.

The estimated increase in surface runoff due to this Project is about 14.7 m^3/day (or 0.17 L/s) (Appendix 5-2A refers).

For planned "Yau Mei Site", the estimated increase in surface runoff due to developable area is about 37 m^3/day (or 0.81 L/s) (according to its approved EIA report (application no. EIA-227/2015)), which is based on the transformation from existing unpaved area into a hard-paved low-density and low-rise residential development.

For the remaining 2 private development sites (i.e. planned "RD Site" and "REC Site"), published information of these projects has been referenced. Reference has been made to the approved EIA report of the "REC Site", and the approved planning application documents of the planned "RD Site". According to the layout plans of these development projects, the approved "REC Site" is divided into two portions. The Southern Portion (about 50% of total site area) is proposed for residential development while the Northern Portion (remaining 50%) is proposed mainly for landscaping and recreational uses only. While for the planned "RD Site", it is proposed for residential development only. The planned "RD Site" is currently unpaved. Estimation on the possible increased in surface runoff due to these planned projects (changing from unpaved area to paved area), have been provided in the approved EIA report of the planned "Yau Mei Site" project (EIA-227/2015). Thus, relevant information is extracted and presented in **Appendix 5-2B**. The approved "Yau Mei Site" EIA report has also estimated possible increase in surface runoff due to this Project. However, it is considered that the figure is over estimated as the Project Site is currently partially paved (instead of unpaved as assumed in the "Yau Mei Site" EIA report).

According to the estimation, the estimated total increase in surface runoff due to the "Yau Mei Site", "REC Site", "RD site" and this project will be about 186 m^3/day (or 2.2 L/s)[9] (**Appendix 5-2B** refers), which is negligible when compared with the capacity of the NTMDC (over 500m^3/s).

It shall be noted that all these planned development projects will be required to comply with EIAO requirements. The concerned surface runoff will be controlled through committed mitigation measures described in the respective EIA reports of those projects as well as those recommended in this Project. It is therefore expected that there will be no adverse water quality impact during the operation.

5.8 Environmental Monitoring and Audit

The water quality assessment in the EIA indicated that there would be no adverse impact on water quality from the construction phase with proper implementation of the recommended

9 The concerned increase in surface runoff (i.e. 186m^3/day) is smaller than that presented in the approved EIA report of "Yau Mei Site" (i.e. 203 m^3/day in appendix 5-2B under application no. EIA-227/2015). This is due to the fact that the approved "Yau Mei Site" EIA report (which was submitted before the EIA report of this Project), has adopted a more conservative approach by assuming that all the site area of this Project is transformed from unpaved area into paved area, which is not the case based on the current proposed scheme.

environmental mitigation measures. However, in order to ensure proper implementation of mitigation measures, regular water quality monitoring and site auditing programme is proposed to ensure the effectiveness of the recommended mitigation measures. The monitoring and audit details are given in the EM&A Manual. For the EM&A requirements during operation of the proposed interim STP, please refer to Chapter 6.

5.9 Impact Summary and Conclusion

5.9.1 Summary of Impacts

Construction Phase

The major impact during construction works of this Project is surface runoff and soil erosion due to exposed surfaces. Peripheral site drainage system comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities together with those good site practices stipulated in ProPECC Note PN 1/94, have been recommended. Construction site runoff will be collected and treated effluent will be discharged into nearby existing stormwater drains, and via which into the NTMDC following the existing flow regime. A drainage management plan for the construction phase will be submitted, and its implementation will be monitored and audited. During construction, chemical toilets will be provided to contain sewage generated from the construction workforce, which will be services and cleaned by a specialist contractor at regular intervals. With the adoption of the recommended good practices on-site, adverse residual water quality impact is not expected. The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence.

Operational Phase

During the operation of the Project, sewage generated will be discharged into the planned public sewerage system under the permanent sewage disposal scheme, thus there will be no adverse water quality impact. An interim sewage treatment plant will be used for treatment of sewage generated from the proposed development site until the public sewerage system becomes available. The STP has been designed in such a way to comply with the no net increase in pollution loading requirement in Deep Bay. The effluent discharge issue has been addressed in Chapter 6 of the EIA report. Treated effluent from the interim STP will be discharged to the adjacent NTMDC. The discharge from the STP is also subject to a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence as well as the conditions specified in the Environmental Permit of this Project. Thus, no adverse water quality impact is expected.

Surface runoff from the development site will be discharged to the NTMDC. Pollutants, if any, will be treated and settled before discharge. It was estimated that the increase in surface runoff due to this Project is negligible when compared with the design capacity of the NTMDC. Best Management Practices have been proposed in order to abate first flush pollution in stormwater runoff such as design measures to minimize soil erosion; minimizing paved area; proper managed landscape area; proper site drainage design/ control; provision of devices/ facilities to control pollution and to remove pollution source; minimizing the use of fertilizers; and administrative measures for maintenance issues. Screening facilities such as gully grating, trash frille, and road gullies with silt traps and oil interceptors will be incorporated into the drainage design to control pollution. With the recommended measures, there will be no unacceptable impacts to the water quality in the Deep Bay.

It is also recommended that emergency response plans to deal with inclement weather and emergencies for both construction and operation phases will be developed.

5.9.2 Cumulative Impacts

Potential cumulative impacts due to concurrent construction with the nearby approved designated projects as well as planned development sites, have been assessed. Based on current information, concurrent works with nearby planned development sites have been avoided or are unlikely to occur. Nevertheless, all those projects will need to implement their own mitigation measures to ensure discharge from the construction sites can comply with the relevant WPCO as well as EIA requirements, it is expected that there will not be any unacceptable cumulative construction phase water quality impact.

With these measures in place, the discharge will be controlled through the implementation of committed measures described in the respective EIA reports of the planned EIA projects as well as those recommended in this Project. Further site inspections and regular water quality monitoring at nearby sensitive receivers are also recommended throughout the construction phase of this Project. Event and Action Plan will be implemented to rectify any deficiencies. It is therefore expected that there will not be any unacceptable cumulative construction phase water quality impact.

During operation, it is expected that the approved public sewerage project and the cycle track project will not contribute to significant increase in surface runoff. It is expected that the scale of nearby planned development will be similar to this Project which will be controlled through implementation of committed measures described in the respective EIA reports of those projects as well as those recommended in this Project. Thus, no adverse cumulative impact during operational phase is expected.

For sewage discharge, there will be no adverse water quality impact due to the approved public sewerage project as well as the approved cycle track project. The sewage generated from the nearby planned/ approved development projects will be discharged into future public sewerage system, thus no adverse impact is expected. In interim, these planned/ approved development projects will need to demonstrate compliance with the no net increase in pollution loading requirements and to proposed relevant mitigation measures in their respective planning application/ EIA studies, thus no adverse cumulative impact is anticipated.

5.9.3 Residual Impacts

With proper implementation of the recommended environmental mitigation measures, no adverse water quality impacts would be expected from the construction and operational phase. Thus, no adverse residual impact is anticipated during the construction and operation of the Project.

6. SEWERAGE AND SEWAGE TREATMENT

6.1 Introduction

The potential impacts of this Project will be the management of sewage generated by the development. Sewerage issue during construction phase of this Project is already addressed in Sections 5.4.2.4 and 5.5.1.2. Chemical toilets will be provided to contain sewage generated from the construction workforce, which will be serviced and cleaned at regular intervals. This Sewerage Impact Assessment (SIA) presented in following paragraphs is carried out to give a brief discussion on the current environmental legislation and standards; assess impact arising from the proposed residential development, and provide recommendations if there is any adverse effect induced by the proposed development in accordance with Section 6.5, Annex 14 of the EIAO-TM. In addition, this assessment will identify the alternative sewage disposal arrangement to temporarily handle the sewage to be generated from the Project during the interim period until the successful completion of planned Ngau Tam Mei trunk sewerage system.

The proposed development of this Project has been described in Section 1.6.

6.2 Existing and Planned Sewerage Infrastructures

The Project Site is located east of Kam Pok Road near Fairview Park at Yuen Long in the New Territories and is bounded by Kam Pok Road, Fung Chuk Road, Ha Chuk Yuen Road and Ha San Wai Road. The site currently falls within the Yuen Long / Kam Tin sewerage catchment area and is classified as an unsewered area under the Yuen Long / Kam Tin Sewerage Master Plan (YLKT SMP). According to the existing sewerage record, there is no public sewerage system serving the Site (Refer to **Figure 6-1**).

Two planned sewerage improvement projects are identified in the vicinity of the Site as shown in **Table 6-1**.

Table 6-1 Information of Planned Public Sewerage Project in the Vicinity of the Site

Project Title	Project ID	Scope of Works	Status	Tentative Completion Date
San Tin and Ngau Tam Mei Trunk Sewerage	PWP No. 4235DS	1) Laying of rising main along Kam Pok Road from San Tin No.1 Sewage Pumping Station to Nam Sang Wai Sewage Pumping Station 2) Laying of Gravity Trunk Sewer at Yau Pok Road 3) Construction of San Tin No.1 Sewage Pumping Station	Design and Consultation	No Definite Programme
Provision of Sewerage to unsewered Areas / Villages in Northwest New Territories	Village Sewer (Ha Chuk Yuen)	Laying of Gravity Village Sewer at Fairview Park Boulevard and Castle Peak Road – Tam Mei Section for eventual discharge to Ngau Tam Mei Pumping Station	Feasibility Study	No Definite Programme

Under PWP No. 4235DS for Yuen Long and Kam Tin Sewerage and Sewage Disposal project, a section of public sewer (Ngau Tam Mei trunk sewerage system) is proposed to be

constructed along Kam Pok Road. After commissioning, sewage generated from the Project Site can then be discharged into this public trunk sewer for subsequent centralized treatment in Yuen Long Sewage Treatment Works (YLSTW).

However, the proposed Ngau Tam Mei trunk sewerage under PWP No. 4235DS is still at design and consultation stage. The completion date of the proposed trunk sewerage is hinged on the support of local communities such as Rural Committee and the availability of funding such that it cannot be ascertained at this stage.

6.3 Assessment Methodology and Parameters

Capacity analysis of the sewage pipe, pumping station and sewage treatment plant is carried out to assess the adequacy of the proposed sewerage system. The design parameters and the basis are shown below.

Table 6-2 Design Parameters and Basis

Items	Values
Design Standard	DSD Sewerage Design Manual, Part 1 & 2
Flow Formula Used	Colebrook White Formula
Roughness Assumed, Ks	1.5 mm
Unit Flow Factor	EPD Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning (GESF) 0.37m^3/d/head (Domestic, Private R4) 0.28 m^3/d/head (Commercial, J11)

Details of assessment methodology and parameters for permanent scheme as well as interim sewage treatment plant scheme are provided in following paragraphs.

6.4 Estimation of Sewage Flow

The estimation of sewage flow (ADWF & peak flow) from the proposed development is shown in **Appendix 6-1** and summarized in **Table 6-3** below in accordance with the Guideline for Estimating Sewage Flows for Sewage Infrastructure Planning (GESF) published by EPD.

Table 6-3 Total Estimated Sewage Flow Generated from the Development

Items	Units	Resident	Employee	Swimming Pool	Total
ADWF	m^3/d	41.44	5.60	4.3	51.34
	L/s	0.48	0.065	0.05	0.60
Peak Flow (1)	m^3/d	331.52	44.80	4.3	380.62
	L/s	3.84	0.52	0.05	4.41

Note: (1) Peaking factor of 8 is applied for the flow from residents and employees.

According to the calculations from the above tables, the design ADWF and peak flow generated from the subject development are estimated to be 51 m^3/d (0.60 L/s) and 381 m^3/d (4.41 L/s) respectively.

6.5 Sewerage Impact Assessment for Ultimate Scenario

Under PWP No. 4235DS, the following sewerage components as shown in **Figure 6-1** are being designed and constructed:

- 600 mm dia. gravity sewer at Yau Pok Road to San Tin No.1 Sewage Pumping Station;
- San Tin No.1 Sewage Pumping Station and its associated rising main;
- 900 mm dia. gravity sewer connecting the rising main to Nam Sang Wai Sewage Pumping Station.

Under PWP No. 4215DS, Nam Sang Wai Sewage Pumping Station and its associated rising main to existing Yuen Long Sewage Treatment Works as shown in **Figure 6-1** will also be constructed.

With reference to the routing of the planned trunk sewerage in the vicinity, sewage from the Project Site is proposed to be discharged to the planned public gravity trunk sewer via a rising main to be constructed and maintained by the subject development for eventual discharge to the existing YLSTW. This sewage discharge arrangement is in line with the catchment boundary of the aforesaid Ngau Tam Mei Trunk Sewerage project.

The proposed rising main for conveying sewage from the Project Site to the future public sewer will be in the form of twin rising mains, so as to provide continued operation of the pumping system when one of the mains is damaged. The rising main will run underneath the internal roads within the Project Site and then northward along Kam Pok Road to a new sewage manhole at immediate upstream of San Tin No.1 Sewage Pumping Station. **Figure 6-2** shows the alignment of the proposed rising main. This rising main alignment running northward along Kam Pok Road is favourable because the rising main would not encroach onto the land at the junction of Kam Pok Road and Fairview Park Boulevard, which are the busy carriageways. Thus, disturbance to the traffic and public can be minimized.

The section of rising main within the development will be constructed before the occupation intake to minimize disruption to the residents. The construction programme of the remaining rising main along public road will be discussed with relevant departments at later stage to cope with the construction programme of the trunk sewerage project.

Agreements will be sought from all relevant authorities for the construction of the proposed sewerage, connection to the planned public sewerage system, and the associated future maintenance responsibility.

Table 6-4 summarises the capacity usage of the public sewerage system affected by the Project Site. Flow estimated for the Project Site as indicated in **Table 6-3** is adopted in the assessment.

Table 6-4 Summary of Projected Sewage Flow at Different Locations in Year 2030

Location	Design Capacity (l/s) [A]	Projected Peak Flow + Peak Flow from the Project Site (l/s)[(2)] [B]	% Usage [B]/[A] (%)
600 mm Dia. Gravity Sewer	262	208	80%
San Tin No.1 SPS	566	472	83%
900 mm Dia. Gravity Sewer	730	420	58%
Nam San Wai SPS	1476	953	65%

Location	Design Capacity (l/s) [A]	Projected Peak Flow + Peak Flow from the Project Site (l/s)(2) [B]	% Usage [B]/[A] (%)
Existing Yuen Long STW (1)	2431	1256	52%

Note:

(1) Existing Yuen Long STW may be upgraded to tertiary treatment and with expanded capacity in future.

(2) The projected sewage flow in the public sewerage is based on the population at year 2030 from the interim version of the HK2030 Planning Data (reference Scenario), the projected flow figures has been referenced from the approved EIA report "Comprehensive Development and Wetland Protection Near Yau Mei San Tsuen (March 2015)".

As the projected population in year 2030 is well beyond the population intake year of the project, this sewerage impact assessment is considered as a very conservative approach. As shown in **Table 6-4**, the overall sewage generated in year 2030 utilizes less than 83% capacity of the sewerage network therefore, capacity of proposed sewers, pumping stations and sewage treatment plant are adequate to handle additional sewage generated from the Project Area.

Yuen Long Sewage Treatment Works (YLSTW) locates at the most downstream of the sewerage system. The design dry weather flow (DWF) of the existing YLSTW is 70,000 m^3/day with design capacity at 3 x DWF = 210,000 m^3/day. The sewage generated by the proposed development of 51 m^3/day is only equivalent to 0.07% of the design DWF of the existing YLSTW.

It is anticipated that the capacity of YLSTW would be exceeded due to the development of Yuen Long and Kam Tin area. There is plan from EPD to upgrade the treatment level of YLSTW from secondary treatment to tertiary treatment with expanded capacity. The sewage to be generated by the proposed development of 51 m^3/day would therefore be equivalent to less than 0.07% of the design DWF of upgraded YLSTW. Therefore it is considered that sewage generated by the proposed development would not cause any significant impact to the YLSTW.

6.6 Needs of Interim Sewage Treatment Plant (STP)

In view of the programme gap between the provision of public sewerage and the occupation of the proposed development, it is necessary to consider the provision of STP as an interim measure to handle the sewage generated from the development before the availability of public sewerage for connection.

The interim STP will be provided by the Project Proponent while the operation and maintenance will be responsible by the management office of the development and its contractors. The Project Proponent will also be responsible for connecting the sewerage system of the development to the public sewerage system when it becomes available and the decommissioning of the interim STP.

It should also be pointed out that the on-site sewage treatment plant is for temporary use during the interim period only in case the planned public sewerage is not available at the time of occupation. The sewerage system within the development area will be designed to facilitate the future connection to the planned Ngau Tam Mei sewerage system with the flow direction to be controlled by several flow control devices such as valves or stop-log, etc. The interim STP will be decommissioned and converted to a sewage pumping station once the trunk sewer becomes available for connection. Small amount of residual sewage left in the interim STP would be tanked away. Therefore, there should be no sewage discharge into the nearby water body during decommissioning of the interim STP. To minimize disturbance to the residents,

all sewers within the development for connection to the public system in the future will also be constructed together with the construction of this Project.

6.7 Interim Scheme of Local Discharge after On-site Sewage Treatment, and Relevant Legislative Requirements

The estimated ADWF generated by the development is approximately 51 m^3/day. Previous experience revealed that the use of temporary sewage storage for tankering away the sewage generated from the development to YLSTW is not ideal.

It is therefore necessary to consider the provision of on-site sewage treatment plant as an interim scheme to handle the sewage generated from the Project. The STP will be designed to handle the average dry weather flow of 0.60 L/s (see **Section 6.4** for details).

The treated effluent will be discharged into the new drainage system within the development and conveyed to the adjacent Ngau Tam Mei Channel via existing twin cell box culvert. The effluent will then be conveyed into Kam Tin River and finally into the Deep Bay. The proposed alignment for conveying the treated effluent is showed in **Figure 6-3**.

According to Section 3.9.4 of the EIA Study Brief of this Project, any proposed sewerage system and/or STP should be designed to meet the current government standards and requirements.

Currently, the protection and control of water quality in Hong Kong is governed by the Water Pollution Control Ordinances (WPCO) (Cap.358). With reference of Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters under the WPCO, the effluent of the interim STP should comply with Standards for effluents discharged into Group C inland Waters, i.e. Table 5 of the Technical Memorandum. However, owing to the requirement of no net increase of pollution loading to the Deep Bay, the discharge standards to be imposed by the Authority in the future WPCO licence may be more stringent than the Standards for effluents discharged into Group C inland Waters. Therefore, a set of Target Effluent Quality as shown in **Table 6-6** is proposed, which will meet both the no net increase in pollution loads to Deep Bay requirement, as well as the Standards for effluents discharged into Group C inland Waters (**Table 6-5** refers).

The Target Effluent Quality is derived mainly from the requirement of no net increase of pollution loading to the Deep Bay, based on the water sampling data taken from wet season and dry season from Ngau Tam Mei Drainage Channel. As explained in Section 6.9, the proposed Target Effluent Quality would achieve the requirement of no net increase in total pollution loadings to Deep Bay WCZ as well as a pollutants loading reduction to the Deep Bay WCZ.

In addition, it is understood that nutrient and bacterial requirements are not specified under the current discharge license of YLSTW. The proposed effluent of the interim STP is anticipated to have better water quality than the effluent at YLSTW.

As stated in Section 6.9, the channel water will be co-treated in the interim STP with the sewage generated by the development. Considering the influent characteristic, the process of biological treatment, membrane filtration and Reverse Osmosis (such as MBR + RO), is proposed for the interim STP. The proposed process is proven capable to produce high-quality effluent in terms of low turbidity, BOD, TSS, nitrogen, and bacteria, as shown in **Table 6-5**. The schematic of process options are presented in **Figure 6-4**. Recent references on the proposed process are listed underneath **Table 6-5**.

The interim STP will adopt RO system after membrane filtration process to further polish the effluent quality in order to cover fluctuation of pollutants in Ngau Tam Mei Drainage Channel

water, to ensure that the Target Effluent Quality can be met. The effluent from the interim STP and Ngau Tam Mei Drainage Channel water will be sampled weekly under the same condition and approximately the same time, the pair of results will be compared to justify effluent from the STP will not exceed the total pollution loadings recorded during the year (52 sets of weekly samples). After successful operation of the interim STP for a period not less than one year, and the end of year result showing no net increase in pollution loading is confirmed, the operation frequency of the RO system will then be reviewed. It is known that high quality of RO permeate is at the cost of high energy consumption. Upon stable performance of the interim STP with effluent quality compliance with the targets parameters, the RO system may be bypassed to conserve energy and promote environmental conservation. Before reviewing the performance of the RO system, sufficient performance data including influent quality and effluent quality of the RO system should be collected. The RO system can be served as a backup process to further polish the upstream effluent and eliminate the residual pollution loads of the STP, competent personnel will be responsible to constantly review the effluent water quality and decide the need of the RO system as it is readily available for operation when upstream system experienced deficiency in handling the fluctuation of the influent.

Table 6-5 Table of Target Effluent Quality of the Interim STP, Typical Effluent Quality of Biological Treatment Combined with Filtration, Typical MBR Effluent Quality and Group C Inland Discharge Standards

	Pollutant Parameters (mg/L)	Target Effluent Quality of STP	Typical Effluent Quality of Biological Treatment combined with Filtration (1)	Typical MBR Effluent Quality (1)	Typical RO Permeate Quality	Group C Inland Discharge Standards (for flow of ≤100 m^3/d)
Key Parameters	BOD_5	3	1-5	<1-5	3	<20
	TN-N	4	2-5	<10	1	Not Specified
	TP	0.5	≤2 (6)	<0.3-5 (2)	<0.067 (1)	<10
Other Parameters	TSS	10	1-4	≤2	≤0.02 (5)	<20
	NH_3-N	2	1-2	1 (3)	0.2	<2
	E. coli (no./100mL)	1,000	<10 (4)	<100	~0	<1,000

Note:

(1) Table 3-14 of Water Reuse - Issues, Technologies, and Applications, Metcalf & Eddy, AECOM (2007)
(2) Phosphorous are removed by MBR with chemical coagulant
(3) Table 8-30 of Wastewater Engineering – Treatment and Reuse, Metcalf & Eddy, 4th edition
(4) The original value of 10^4-10^5 is for general filtration process, such like depth filtration, instead of membrane filtration. For ultrafiltration, its removal efficiency of E.coli is 99.9% to 99.9999% as indicated in Table 8-21 of Water Reuse - Issues, Technologies, and Applications, Metcalf & Eddy, AECOM (2007). According to table 3-14 as mentioned in Footnote (1), the E.coli of biological treatment effluent is 10^4-10^5 no. /100mL, thus the E.coli in ultrafiltration effluent should be below 10 no./100mL.
(5) Strategies for Meeting Ultra-low Phosphorous Limits: State of the Art Technologies and Case Studies, Black & Veatch Corporation (2009)
(6) Chemical addition for TP removal will be required to meet target effluent quality for this project .

Table 6-6 Target Effluent Quality of the interim STP

	Pollutant (mg/L)	Target Effluent Quality
Key Parameters	BOD_5	3
	TN-N	4
	TP	0.5
Other Parameters	TSS	10
	NH3-N	2
	E. coli (no./100mL)	1000

6.8 Compliance with Town Planning Board Guidelines

In addition to the provision under the WPCO, it is noted that there are concerns regarding the disposal of effluent to Deep Bay. It is necessary to demonstrate that the interim sewage disposal scheme would not pose a net increase of pollution loads to the Deep Bay.

It should also be pointed out that the STP is for temporary use during the interim stage only. The sewerage system within the development area will be designed to facilitate the future connection to the planned San Tin and Ngau Tam Mei public sewerage system. Once the government public sewerage system becomes available, the STP will be decommissioned and converted to a sewage pumping station.

According to the approved North East New Territories New Development Areas Environmental Impact Assessment Report (EIA-213/2013), the three key pollutant parameters, namely biological oxygen demand (BOD_5), total nitrogen (TN) and total phosphorous (TP) are bounded by "no net increase in pollution load" requirement. According to the approved Comprehensive Development and Wetland Protection near Yau Mei San Tsuen Environmental Impact Assessment Report (EIA-227/2015), it is proposed to assess the net change of the suspended solids (SS), ammonia nitrogen (NH_3-N), and E.*coli* in addition to the three above-mentioned parameters under this project, in order to have a better understanding on the changes of solids, organic, nutrient, and bacterial loads to the Deep Bay WCZ due to the development.

6.9 Existing Pollution Loads from the Development Area

There is no existing sewage pollution load generated from the site. Any on-site sewage treatment discharge would then cause an increase of pollution load. In order to offset the additional pollution load, it is proposed to abstract water from Ngau Tam Mei Drainage Channel for co-treatment in the interim STP. The proposed rising main for abstracting water from channel to sewage treatment plant is showed in **Figure 6-3.** A diagram showing the envisaged arrangement of water abstraction facilities is shown in **Figure 6-5.** The arrangement of water abstraction facilities and associated equipment will be detailed in the design stage.

A total of 39 water samples were taken at the channel (Sampling ID W3 as shown in **Figure 6-3**) from September 2012 to September 2013 and from March 2015 to April 2015. Water samples taken between March 2015 and April 2015 confirm that the water quality at channel is similar to that taken between September 2012 and September 2013. The laboratory testing results of the water samples are summarised in **Appendix 6-2**. The sewage flow from the development is estimated to be 51 m^3/d. With a view to offset the pollution loads due to the development, it is proposed to use 200 m^3/d water from the nearby Ngau Tam Mei Drainage Channel for offsetting. Thus, the total sewage flow of 251 m^3/d (i.e. 51 + 200 = 251 m^3/d) will be treated in STP.

Minimum value of Wet Season Average and Dry Season Average of BOD_5, TN-N, TP, TSS, NH_3-N and E-Coli, i.e. 4 mg/L, 5.45 mg/L, 0.8 mg/L, 61 mg/L, 2.69 mg/L and 30,100 no./100ml respectively (**Appendix 6-2**), is used for offsetting calculation. Based on this pollutant concentration, the pollutant loading of 200 m^3 water abstracted from Ngau Tam Mei Drainage Channel are summarized in **Table 6-7**. It should be noted that most of the samples taken at W3 are identified of pollutant concentration higher than these figures, which means the channel water quality is consistently poor than concentration used for offsetting calculation. Therefore, the proposed pollutant concentration of channel water for offsetting calculation is considered conservative and could cater for the seasonal pollutant loading fluctuation of the channel water. The calculation is summarized in **Appendix 6-3.**

Moreover, the highest pollutant concentration of the channel water, instead of its average pollutant concentration is used for the design of the STP, which also introduces buffer for fluctuations of pollution loads in abstracted channel water.

Table 6-7 Pollution Loads from 200 m^3 Channel Water Before the Treatment

Item	Pollution Loads Generated by 200 m^3 channel water	
	Pollutant Concentration (mg/L)	Pollution Loads (kg/day)
BOD_5	4 mg/L	0.8 kg/day
TN-N	5.45 mg/L	1.09 kg/day
TP	0.8 mg/L	0.16 kg/day
TSS	61 mg/L	12.2 kg/day
NH_3-N	2.69 mg/L	0.54 kg/day
E.*coli.*	30,100 (no./100ml)	6 x 10^{12} (no./day)

Based on the target effluent concentration as listed in **Table 6-6** the residual BOD_5, TSS, NH_3-N, TN-N, *E. coli* and TP loads at the effluent of STP are estimated and tabulated in **Table 6-8**. The total pollution loads before and after the development is compared in **Table 6-9** to demonstrate that the objective of "No Net Increase in Pollution Loading to Deep Bay" could be achieved.

Table 6-8 Future Pollution Loads from Development after Treatment

Item	Target Effluent Concentration	Pollution Loads after the Development
BOD_5	3.0 mg/L	0.75 kg/day
TN-N	4.0 mg/L	1 kg/day
TP	0.5 mg/L	0.13 kg/day
TSS	10 mg/L	2.51 kg/day
NH_3-N	2 mg/L	0.5 kg/day
E.*coli.*	1000 no./100mL	2.5 $x10^9$ (no. day)

The target effluent concentration in the table above are annual average values, except NH3-N and E.coli marked with (*) are upper limits.

Table 6-9 Comparison of Pollution Loads from Site Before and After the Development

Item	Annual Pollution Loads from 200 m^3 channel water before the Development (from Table 6-7)	Annual Pollution Loads after the Development (from Table 6-8)	Annual Reduction of Pollution Loads at Deep Bay WCZ
BOD_5 (kg)	292	**274**	18
TN-N (kg)	398	**365**	33
TP (kg)	58	**47**	11
TSS (kg)	4,453	**916**	3,537
NH_3-N (kg)	197	**183**	14
E.coli (no.)	2.2 $x10^{13}$	**9.1 $x10^{11}$**	2.1 $x10^{13}$

The above **Table 6-9** indicates that BOD_5, TN-N, TP, TSS, NH_3-N and E.*coli.* loads to the Deep Bay WCZ will be reduced after the interim STP; and thus the requirement of no net increase in pollution loadings is met. The annual reduction of pollution loads in **Table 6-9** demonstrated a scenario using the historical water sampling information at Ngau Tam Mei Drainage Channel between September 2012 and April 2015, abstraction of 200m^3 channel water is used to co-treat the proposed development sewage. The extra pollution loads reduction is subject to the amount of pollution loads in the channel water, while pollution loads in channel water fluctuates, the amount of reduction will NOT be a constant. In fact, the extra pollution loads reduction are introduced to cater for the uncertainly of pollution loads in channel water, allowing buffer on the treatment process to always maintain no net increase in pollution loadings.

The amount of channel water abstraction will maintain at 200m^3/d, the abstraction amount will be reviewed after completion of a full year operation with sampling results to support any new

decisions. The annual pollution loads (kg) from the interim STP will be no more than the bolded figures in **Table 6-9**.

6.10 Water Quality Impact due to Abstraction of Water from Nearby Ngau Tam Mei Drainage Channel

As mentioned above, in order to offset the additional pollution load due to the development, it is proposed to abstract water from Ngau Tam Mei Drainage Channel for co-treatment in the interim STP (**Figure 6-3**). The water abstraction facility which is to be located within the application site, as shown in **Figure 6-5**, is subject to detailed design and relevant approval for construction access and government land matters. The construction of water abstraction facility should be carried out in dry season. Silt curtain or sand bags should be provided to carve out the working area so as to bypass the channel flow and to avoid any solids/materials arising from the construction activities from entering the channel during construction phase. The work sites at the NTMDC for construction of water abstraction facilities should be maintained in dry conditions. Regular visual inspections should also be carried out by the Environmental Team and Contractor to ensure there is no spillage into the channel. The water abstraction facilities should meet the prevailing government policies and legislation including but not be limited to drainage, safety, land matter, and structures issues prior to commencement of operation.

The concerned Ngau Tam Mei Drainage Channel is an existing engineering concrete channel. Only relatively small amount of water is to be abstracted (200 m^3/d when compared with 18,600 m^3/d of the average total flow rate of the channel) and after treatment, the discharge will go back to the same channel, therefore no adverse water quality impact would be expected.

6.11 Operation, Maintenance, and Responsibilities of Interim Sewage Treatment Plant

Proper operation and maintenance of interim STP is essential to safeguard the quality of discharge effluent, subject to the following aspects:

(i) Competent technicians to be employed by the development management office to operate the STP. They are to be fully conversant with the operating procedures as stipulated in the operation and maintenance manual.

(ii) The proposed STP only serves the proposed development and thus the operation and maintenance (O&M) cost would be borne by the future management office of the development. The Applicant will ensure the design of STP is cost-effective such that the O&M cost imposed is reasonable.

(iii) The STP is to be kept in a tidy state. This includes regular hosing down, scraping of the walkways, whitewashing the walls, cleaning and painting the metalwork, and maintaining adequate lighting and ventilation.

(iv) Where parts of the STP are sited beneath ground, forced ventilation will be provided.

(v) Online sensors will be installed in the STP to monitor the parameters of Ammonia, Nitrite & Nitrate, and TSS. Easily accessible sampling point will also be provided for sampling of the treated effluent for laboratory testing.

(vi) Turbidity meter will be installed at the outlet of membrane filtration as well as the outlet of Reverse Osmosis (RO) to indicate the efficiency of pollutant removal from the corresponding process units, adjustment of RO system can then be made to suit the variation of pollutants.

(vii) Samples of treated effluent of STP and abstracted channel water will be documented weekly, such that the lows and highs of the pollutant variations can be captured. Results will be compared against the total annual loadings, adjustment of water abstraction amount, membrane backwash frequency, RO unit operation will be fine-tuned to ensure effluent quality meet discharge license under the Water Pollution Control Ordinance and the target effluent quality in **Table 6-6**.

(viii) Based on the pollutant offsetting approach, co-treating sewage with abstracted channel water will be subject to the amount of pollutants in the channel water for offsetting. The proposed target effluent quality of the STP has taken it into account. The annual pollution loading in abstracted channel water (kg) and annual pollution loading in effluent of the interim STP (kg) would be balanced.

(ix) A check and balance system monitor the pollutant loading every week. Monthly or quarterly report shall be submitted. By the end of each year, the exceeding and shortcoming amount will be balanced to quantify no net increase in pollutant loading achieved based on total pollutant reduction of the year.

(x) The production of sludge is estimated to be approx. 4 m^3/d. While the reject water from the RO unit is normally around 20% of the influent depends on the quality of RO influent. The sludge and reject water will be transported by tankers from the interim private STP to government's STW for offsite treatment. A storage tank with capacity of 150 m^3 will be provided for storage of the RO reject water.

(xi) The Project Proponent will be responsible for the future sewer connection upon its available in the future and STP decommissioning with connection details subject to agreement of DSD. Appropriate conditions could be imposed in the Environmental Permit (EP) to ensure the EP holder to take up the responsibility to ensure connection to public sewer when trunk sewer is ready.

(xii) The Project Proponent will be responsible for the maintenance of the proposed water abstraction facilities and the associated pipelines. The proposed water abstraction facilities will be decommissioned together with the interim STP once the public sewer becomes available.

(xiii) The discharge of treated effluent from the interim STP should follow the discharge licence requirements under the WPCO as well as the terms and conditions specified in the EP under the EIAO.

Apart from ensuring the sewage discharge quality, the STP with also be provided with mitigation measures to avoid other nuisance to the resident. For example an effective odour removal system as well as appropriate acoustic treatment at STP (Sections 3.7.2.3 and 4.4.3 refer).

6.12 Mitigation Measures to Minimize Adverse Impact due to Potential Sewage Overflow and Emergency Discharge

The following measures will be adopted in order to eliminate adverse impact due to potential sewage overflow, emergency discharge and change in flow regime beyond the expectation of this assessment:

(i) Adequate spare parts for the plant will have to be made readily available by storage.

(ii) Qualified personnel will be hired to inspect the plant condition and carry out maintenance on a regular basis.

(iii) Regular test, maintenance and replacement of membranes and plant equipment will be carried out in accordance to the recommendations from manufacturers or as recommended by the qualified personnel after inspection.

(iv) Equalization tank with capacity of 168 m^3 (~ 3 days of sewage storage depending on actual flow condition) will be provided in case of entire outage of the interim STP.

(v) Tank away will be provided for prolonged outage of the interim STP, for disposal of sewage at designated sewage treatment works to be assigned by DSD.

With the above measures in place the likelihood of emergencies discharge would be very low even when multiple incidents occurring concurrently (including failure of both normal and backup power supply, incoming of excessive sewage flow for longer than 24 hours continuously, unavailable of tanker truck, etc.). As such it is considered that the proposed interim scheme of local discharge after on-site sewage treatment would not cause net increase of pollution load to the Deep Bay WCZ.

Also, in case of abnormal effluent quality is detected from water sampling, discharge of treated effluent will be suspended and all sewage will be diverted to the equalization tank for temporary storage until the problem is rectified. In case of entire outage of the STP, channel water will not be abstracted from Ngau Tam Mei Drainage Channel. And if prolonged outage of the interim STP is anticipated, tankers will be arranged to transport the sewage for disposal to Government operated public sewage treatment works to be assigned by DSD.

6.13 Environmental Monitoring and Audit

With the proposed measures for the interim STP, no adverse sewerage impact will be envisaged as a result of the Project. Nevertheless, specific monitoring requirements have been proposed to monitor the implementation of the interim STP and its performance, three key pollutants BOD_5, TN and TP suggested in **Section 6.8** will be monitored by taking water samples from Ngau Tam Mie Channel abstraction point and the discharge outlets of the proposed STP, which will be licensed under the WPCO and implemented under the EP conditions of the Project. EM&A requirements are provided in **Chapter 13** of this report.

Other pollutant such as SS, NH_3-N and E.coli are sampled as indicators for better understanding on the changes of solids, organic, nutrient and bacterial loads to the Deep Bay WCZ.

Water samples will be taken every week, with a total of 52 sampled data each year. Monthly report will be prepared for the first 3 months until the STP operation becomes stabilized, and then switch to quarterly reports. Total pollution loadings will be reviewed annually, by comparing the total pollution loadings in abstracted water from Ngau Tam Mei Drainage Channel based on the 52 sample data each year, and that of the pollution loading discharge from the STP, which must comply with “no net increase” on BOD_5, TN and TP in kg/yr. Interim reviews on pollution loading will also be carried out on quarterly basis and with actions to be undertaken. The event and action plan can be referred to EM&A manual, while the details of the operation and maintenance, exact water quality monitoring points, procedures of pollution load offsetting calculations as well as emergency response plan to deal with emergencies such as malfunction of the STP will be documented in the Operation Manual during detailed design stage before commencement of the operation.

6.14 Impact Summary and Conclusion

The Project Site is located at the east of Kam Pok Road near Fairview Park in Yuen Long and falls within the Yuen Long / Kam Tin sewerage catchment. The proposed development will

generate a peak flow of about 4.41 L/s and proposed to be discharged to the planned trunk sewer at Kam Pok Road under PWP No. 4235DS, as permanent measure.

The sewage effluent generated from the proposed development is relatively small amount when compared to the spare capacity of the downstream sewerage facilities. The proposed development will not impose adverse sewerage impact to the surrounding areas. Also there will be no anticipated residual adverse sewerage impact during the operation of the interim Sewage Treatment Plant.

Considering that the current implementation programme of the Ngau Tam Mei Sewerage under PWP No. 4235DS is under review and subject to public consultation, provision of a private STP to handle the proposed development sewage is considered as an interim measure. The interim STP will adopt advanced process with biological treatment, membrane filtration and Reverse Osmosis (such as MBR + RO) to co-treat approximately 0.6 L/s sewage with channel water to meet no net increase in pollution load to Deep Bay requirement. In addition, it is understood that nutrient and bacterial requirements are not specified under the current discharge license of YLSTW. The proposed effluent of the interim STP is anticipated to have better water quality than the effluent of existing YLSTW.

Furthermore, in addition to the provision in WPCO, the interim STP will also need to fulfil the requirement of no net increase of pollution loading to the Deep Bay. Therefore, it is proposed to abstract water from nearby channel for co-treatment. The assessment demonstrated that after the completion of the development, the above requirements can be met. The proposed Target Effluent Quality of the interim STP can refer to **Table 6-6**, which is also tabulated below.

Item	Target Effluent Quality of STP *	Group C Inland Discharge Standards in WPCO (for flow of ≤100 m^3/d) *	Annual Pollution Loads from 200 m^3 channel water (before Development), **	Annual Pollution Loads (after Development with co-treatment) **	Annual Reduction of Pollution Loads at Deep Bay WCZ **
BOD_5	3	<20	292	274	18
TN-N	4	Not Specified	398	365	33
TP	0.5	<10	58	47	11
TSS	10	<20	4,453	916	3,537
NH_3-N	2	<2	197	183	15
E.c*oli.* (no.)	1000	<1,000	2.2×10^{13}	9.1×10^{11}	2.1×10^{13}

Remark: The above figures are extracted from **Tables 6-6** and **6-9**.

* All units in mg/L except *E. coli* which is in no./100ml.

** All units in Kg per annual except E. coli which is in no. per annual.

The sewerage system within the development area will be designed to facilitate the future connection to the government public sewerage system at Kam Pok Road. The proposed sewerage system for the development will be connected to San Tin and Ngau Tam Mei sewerage system once it becomes available.

The discharge of treated effluent from the interim STP is required to comply with the terms and conditions in the discharge licence under the WPCO as well as the conditions specified in the EP of this Project. Maintenance and emergency measures have also been recommended to ensure effective operation of the STP. Equalization tank will be provided in case of entire outage of the STP. Tank away will be provided for prolonged outage of STP.

In addition, continuing the current situation, the quality of discharges to Deep Bay from the proposed site is not expected to improve in the future until the planned public trunk sewer is constructed by the Government. But upon completion of the Project with the provision of on-

site treatment facility the total pollution loads to Deep Bay could be reduced, an estimation of total pollution loads reduction based on Ngau Tam Mei Drainage Channel data recorded between 2012 and 2015 can be referred to **Table 6-9**.

With the proposed mitigation measures, no adverse short-term and long-term environmental impacts in respect of water quality, ecological, public health and safety arising from both the long term and interim sewerage scheme are anticipated. No adverse residual sewerage impact will be incurred as a result of the development.

7. WASTE MANAGEMENT

7.1 Summary

This Chapter identifies the quantity, quality and timing of wastes arising as a result of construction and operation of the Project. The waste management implications and the associated environmental impacts are evaluated and assessed in accordance with the criteria and guidelines given in Annexes 7 and 15 of the EIAO-TM. Clause 3.9.5 of the EIA Study Brief sets out the scope and requirement of the assessment.

No particular land contamination issue was identified as the Project Site has not been used by land contamination uses as stated in Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM. There are no records of existing and/ or historic activities relating to chemicals and hazardous substances in the area. Thus, further assessment is not required.

As advised by the Project Engineer, the construction method mainly involve the following procedures: site clearance to remove the surface vegetation, site formation, construction of boundary wall, import of inert filling material, and construction of infrastructure and superstructure. Foundation of the superstructure will likely to be carried out through pilling.

The appropriate disposal method and good site practices for handling, storage and disposal of waste during construction phase, have been recommended. Opportunities for reducing construction waste generation and maximizing re-use on-site were evaluated.

Due to the low-density nature of the proposed residential development, the operation of the development will generate limited amount of domestic waste. Standard approach that is widely adopted in other parts of Hong Kong shall be adopted for the handling and disposal of this small quantity of waste during the operational phase. Waste generated will be collected and disposed of properly by a licensed contractor using refuse collection vehicles (RCV). It is unlikely that there will be any significant residual environmental impact. Therefore, the waste management implication during the operation of the residential development is not evaluated further in this EIA study.

7.2 Environmental Legislation, Standards, Guidelines and Criteria

The principle legislation governing waste management in Hong Kong is the Waste Disposal Ordinance (Cap. 354) (WDO), and its subsidiary regulations. The Ordinance, enacted in 1980, generally encompasses all stages of waste management, from place of arising to final disposal point of waste. The Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C), enacted under the WDO in 1992, provides controls on all aspects of chemical waste disposal, including storage, collection, transport, treatment and final disposal. Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N), percentage of inert material in construction waste to be disposed of at landfill site; sorting facility; or public fill reception facility will be controlled.

In addition to the WDO and its subsidiary regulation, the following legislations have some bearing on the handling, treatment and disposal of wastes in Hong Kong, viz.:

- Land (Miscellaneous Provisions) Ordinance (Cap. 28);
- Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation;
- Dangerous Goods Ordinance (Cap. 295);
- Air Pollution Control (Open Burning) Regulation (Cap. 311O); and

- Environmental Impact Assessment Ordinance (Cap. 499), Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) Annex 7 and Annex 15.

There are also various guidelines which are relevant to waste management in Hong Kong such as:

- Waste Disposal Plan for Hong Kong (December 1989), Planning, Environmental and Lands Branch Government Secretariat;
- A Guide to the Registration of Chemical Waste Producers, Environmental Protection Department, Hong Kong;
- A Guide to the Chemical Waste Control Scheme, Environmental Protection Department, Hong Kong;
- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, Environmental Protection Department;
- Works Bureau Technical Circular No. 12/2000, Fill Management;
- Works Bureau Technical Circular No. 2/93, Public Dumps;
- Works Bureau Technical Circular No. 2/93B, Public Filling Facilities;
- Work Bureau Technical circular No. 16/96, Wet Soil in Public Dumps;
- Works Bureau Technical Circular No. 4/98, Use of Public Fill in Reclamation & Earth Filling Projects;
- Works Bureau Technical Circular No.19/2001, Metallic Site Hoardings and Signboards;
- Project Administration Handbook for Civil Engineering Works, 2014 Edition (Section 4.1.3 of Chapter 4 on management of construction and demolition materials) (Note: the previous ETWB TC(W) No. 33/2002, Management of Construction/Demolition Materials including Rocks, was subsumed into the above-mentioned document);
- ETWB TC(W) No. 6/2010, Trip-ticket System for Disposal of Construction and Demolition Materials;
- ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites; and
- "Construction and Demolition Waste" in PNAP ADV-19, published by Buildings Department;
- Practice Guide for Investigation and Remediation of Contaminated Land (2011);
- Guidance Note for Contaminated Land Assessment and Remediation, (2007); and
- Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management, (2007)

7.3 Potential Land Contamination Due to Historic and Current Land Use

7.3.1 Approach and Scope of Assessment

The following approach was used for the land contamination assessment:

- Desktop study to review the current and historical land uses. The objective is to identify any potential contaminative land uses within the Study Area; and
- Site reconnaissance to identify the existing land uses and to confirm the general environmental conditions associated with each of the identified sites. This is a non-intrusive approach for making an initial determination of the likely nature of any potential

contamination, and, where identified, to evaluate whether there were any significant land contamination concerns associated with these properties.

In addition, other sources of information such as historical Hong Kong survey maps, previous applications for planning permission at the Town Planning Board, records and photographs taken from site visits, have also been collated and reviewed.

There are also previously approved EIA projects in adjacent to the Project Site. This includes the construction of public sewers and a pumping station along the existing Ngau Tam Mei Drainage Channel (NTMDC)[10] and construction of a cycle track[11] adjacent to the Project Site. Information in these approved EIA reports was also reviewed.

7.3.2 Potential Impacts

According to the Study Brief, if any contaminated land uses as stated in Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM is identified, the Applicant shall carry out a land contamination assessment as detailed from sub-section 3.9.5.2 (iv) (a) to (f) of the Study Brief and propose measures to avoid disposal.

If there is any potential land contamination identified within the Project boundary due to either current or historic land uses, further investigation in accordance with sub-section 3.9.5.2 of the Study Brief will be required. The major potential impacts from contaminated soil are considered to be the following:

- health risks to site workers;
- disposal of contaminated soils, where encountered; and
- potential health risks to future users of the cycle tracks.

7.3.3 Historic and Current Land Uses

7.3.3.1 Historic Land Uses

The Project Site is zoned for "R(D)" zone in the approved Mai Po and Fairview Park OZP No. S/YL-MP/6. Review of historic aerial photos found that the Project Site was vacant and partially used as open air car parking only (since year 2000's). Aerial photos showing the car parking activity is provided in **Appendix 7-2**. Before year 2000's, the Project Site was found to be vacant. Aerial photo taken in year 1999 showing that the Project Site was vacant, is also provided in **Appendix 7-2.** There was no change in land use status before year 1999 and the Project Site was found vacant in the past. There was no known historic land uses at the Project Site in accordance with Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM that would result in potential land contamination issue. According to the HKSAR Government Fire Services Department (FSD), neither records of dangerous goods licence nor incidents of spillage/ leakage were found within and/ or immediate adjacent to the Project Site (**Appendix 7-1** refers). EPD's chemical waste producer registration records were also checked. There is a recorded chemical waste producer (lubricating oil and waste battery) for a warehouse within the existing open storage site to the south-east of Project Site (about 70m away from Project Site as mentioned in Section 7.3.3.2). However, the concerned open storage site is outside the boundary of Project Site. There was no chemical waste producer record within

10 Agreement No. CE 66/2001(EP), EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD), Environmental Impact Assessment (Final), March 2004 (EIA Application No. 094/2004). Sections 12.4 and 12.5 and Figures 12.9 and 12.10

11 Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" (EIA Application No. EIA-159/2008). December 2008, Section 8.6 and Figures 2-1, 8-1 to 8-3.

the Project Site and there was no chemical spillage accident record within and/ or in vicinity of the Project Site. As such, there is no particular land contamination concern.

Historic TPB records of the Project Site were also reviewed. Since year 1999, there were several planning applications for house development as well as applications for temporary uses within the Project Site were submitted to TPB under S16 of the Town Planning Ordinance. Details of these planning applications are summarized in Table 2-1 (please refer to Section 2.4). There was also recent planning application for houses development approved at the Project Site, however, there was no construction of the approved house development since then. Based on site reconnaissance results, the Project Site is currently used as open car parking only (Section 7.3.3.2 refers).

Asides from the above, historic information from the approved nearby EIA project (i.e. the proposed cycle track project[12]), which was submitted in year 2008 as well as its submitted EIA project profile in year 2006 were also reviewed. The alignment of planned cycle track is shown in **Figure 1-2**, and a section of which is in adjacent to the Project Site. According to Sections 8.6.1 and 8.6.2 in the approved cycle track EIA report[12], the reported land uses (i.e. rural area, farmland, with scattered village houses) were identified along the Ngau Tam Mei Drainage Channel. There was also low density residential areas such as Fairview Park and Man Yuen Chuen located in the middle section of Ngau Tam Mei Drainage Channel. No site of potential land contamination was identified near Fairview Park area or in vicinity of the Project Site. The submitted EIA project profile of the same project in year 2006 also indicates no particularly land use or any building structure within or immediate adjacent to be Project Site.

In addition, according to another approved nearby EIA project before year 2006 (i.e. the public sewer project[13]). The location of the concerned proposed public sewer of that project is shown in **Figure 1-2.** The current Project Site is immediately adjacent to a section of the proposed public sewer along Kam Pok Road. The approved public sewer EIA report[13] has identified potential land contamination sites on both sides of the proposed sewers through site reconnaissance visits during the EIA study, and the review of historic land use information including aerial photos in year 2000s' and before that. According to Sections 12.4.1, 12.5.1, and Figures 12.9 and 12.10 in that EIA report, there was no site of potential land contamination identified near Fairview Park area or in vicinity of the Project Site. There was also no particular building structure within or immediately adjacent to the Project Site indicating that the Project Site was occupied.

Based on the above information, the Project Site was used as open air car park and has not been used by other land uses as stated in Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM that may result in potential land contamination. No hot spot was identified within the Project Site during site reconnaissance. According to the EIA report of nearby approved EIA projects, which cover historic land use information, there was no site of potential land contamination reported near Fairview Park area or in vicinity of this Project Site. As the project Site was not used by historical land uses as stated in Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM, there is no concern of land contamination issue at the Project Site. Since no historic land contamination uses were identified at the Project Site, potential land contamination issue due to historic land uses is not expected.

12 Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" (EIA Application No. EIA-159/2008). December 2008, Section 8.6 and Figures 2-1, 8-1 to 8-3.

13 Agreement No. CE 66/2001(EP), EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS - Yuen Long and Kam Tin Sewerage and Sewage Disposal (YLKTSSD), Environmental Impact Assessment (Final), March 2004 (EIA Application No. 094/2004). Sections 12.4 and 12.5 and Figures 12.9 and 12.10.

7.3.3.2 Current Land Uses

A preliminary desktop review and site reconnaissance have identified the various current land uses within and adjacent to the Project Site. Currently, the majority of the Project Site is vacant with paved car parking area located within the Project Site. There is also an abandoned water pond at the south-eastern corner of the Project Site. Site reconnaissance visit was undertaken in February 2009 and in October 2011 to identify existing land uses. The land use status was found to be same during the subsequent visit undertaken in January 2012, February 2014, and December 2015. Based on the site visit, no vehicle repairing activity or any activity stated in Sections 3.1 and 3.2 of Annex 19 of the EIAO-TM, that would likely result in land contamination, has been identified on-site. No trace of potential land contamination was identified during the site reconnaissance visit. In addition, as discussed above, no potential land contamination issue has been identified at the Project Site. There is no change in land use status at the Project Site to date. Site photos of present condition of Project Site are provided in **Appendix 7-2**.

The surrounding area of the Project Site is characterized by a mixture of existing Ha Chuk Yuen Road to the east; existing Fung Chuk Road and Kam Pok Road to the north and west of the Project Site. The existing Ngau Tam Mei Drainage Channel is also located to the further west. To the South of the Project Site is the existing Ha San Wai Road. An existing open storage site for storage of precast units and carparking is located to the south-east of the Project Site outside the Project Site boundary. This open storage site is concrete paved. There is also a sheltered warehouse within the open storage site, which is about 70m away from the Project Site. However, the development will not involve ground excavation in adjacent to the open storage site as the Project Site will be filled up to the proposed formation level.

General speaking, the existing ground level at the northern portion of the Project Site where proposed houses are located, is about +6.5mPD in average. The existing mPD level for the southern portion is about +4.8mPD in average. The developable area of the proposed houses will be raised to an average level of about +5.45mPD and 6.5mPD for the southern portion and the northern portion, respectively. Therefore, the development is unlikely require significant excavation. Instead, the existing ground level will need to be raised to the proposed site formation level by imported fill materials. Given that significant excavation is not required for this Project, direct contact with existing soil materials by the future users is unlikely. Thus, potential land contamination problem at the Project Site is unlikely.

Since there is no historic and/ or existing land uses at the Project Site that would result in potential contamination of soil and underground water, land contamination at the Project Site is not expected. Thus, further assessment on this aspect is not required.

7.4 Waste Generation during Construction Phase

Construction of the proposed development mainly involves construction of the proposed residential development and associated infrastructures and facilities as described in **Section 1.6**.

The majority of waste to be generated as a result of the proposed development would be excavated materials during site formation and filling. Handling, transportation and storage of excavated materials will likely be involved at this stage. Construction of buildings, associated infrastructures and facilities would also generate waste, but the quantity will be in small amount through the adoption of standard construction methods and use of pre-fabricated materials as much as practicable. The production of construction waste due to over-ordering or as “side-products” of construction activities should be minimized by the Contractor(s) through careful design, planning, good site management, control of ordering procedures, segregation and reuse of materials.

The varieties of waste that may arise due to the construction activities mainly include the followings:

- Waste due to site clearance;
- Construction and Demolition (C&D) materials/ waste;
- Chemical waste; and
- General refuse.

The potential environmental impact arising from the handling, storage, transport and disposal of these different categories of wastes are described below. The nature of each of these wastes and the recommended waste management measures are identified.

In any case, landfill disposal shall only be considered as a last resort of waste management for the non-inert portion of the excavated materials.

Construction waste of this Project will be controlled through the implementation of mitigation measures described in this report. It is expected that mitigation measures will also be implemented by nearby planned development projects under their respective EIA studies. Thus, no adverse impact is anticipated.

7.4.1 Site Clearance Waste

The Project Site is currently vacant. Surface vegetation within the Project Site will be removed at the start of the Project and set aside for reuse, if necessary.

The amount of site clearance works within the Developable Area will be limited to the removal of a thin layer of top soil and vegetation. Based on initial estimation, about 7,000m^3 of materials would be generated during site clearance. Among which, about 5,600m^3 of inert top soil is intended to be sorted on-site and re-used at landscaping areas subject to the satisfaction of engineering requirements (see Table 7-1). Any surplus inert materials will be disposed of at public fill facility. It is estimated that about 1,400m^3 of non-insert materials (e.g. vegetation) will be disposed of at landfill site. The above figures are based on preliminary estimation and the exact quantity will be provided during the detailed design stage later on. In any case, landfill disposal shall only be considered as a last resort of waste management.

7.4.2 Excavated Materials / Imported Filling Materials

For the Developable Area, excavated materials will be generated during the site formation of the Project site. General speaking, the Project Site is topographically flat, rural in character. General speaking, the existing ground level at the northern portion of the Project Site where proposed houses are located, is about +6.5mPD in average. There are general slopes surrounding the Project site boundary where the ground level gradually decreases to about the road level. The existing mPD level for the southern portion is about +4.8mPD in average.

The developable area of the proposed houses will be raised and is up to about +5.45mPD and 6.5mPD for the southern portion and the northern portion, respectively. Thus, fill materials will be required for the site formation works within the southern portion of the Site. It is expected that imported fill materials of approximately 52,500m^3 would be required for the site formation works in question. As filling works are required, there is an incentive for the Contractor(s) to re-use materials on-site as much as possible in order to minimise associated construction costs.

The Project Engineer shall also ensure excavated materials from the Project Site are re-used on-site as much as practicable. Any materials not suitable for filling shall be disposed of at

public fill facilities. In any case, landfill disposal shall only be considered as a last resort of waste management for the non-inert portion of the excavated materials.

The estimated amount of materials to be generated, re-used, and disposed of is summarized in Table 7-1.

7.4.3 Excavation/ Disposal of Pond Sediment

There is an abandoned pond (about 0.33 ha) within the Project Site (**Figure 8-3** refers) (assuming an average depth of sediment of 3m, the concerned quantity of sediment is about 9,900m^3). The concerned pond is located within the existing car park area. As discussed in Section 7.3.3, the Project Site is currently occupied by an existing car parking operation and the Project Site is currently fenced off.

Minimization/ Avoidance of Excavation of Pond Sediment

During construction, the concerned abandoned pond within Project Site will be filled up. The concerned pond sediment is intended to be left in place and not to be disturbed as far as possible. However, should pond sediment be encountered during construction, it should be temporarily stored and re-used on-site and no offsite disposal is expected (for example, re-use as fill material during site formation stage. Subject to detailed design stage, mixing pond sediment with cement material may be required so that its quality can meet the engineering requirements). Potential water quality impact due to surface runoff from the concerned works area and the odour impact during construction at pond area, are addressed in Chapter 5 (water quality) and Chapter 3 (air quality), respectively. It is also understood that there is no specific environmental standard/ requirement for measuring/ controlling on-site re-use of pond sediment. If solidified materials will not be reused on-site and to be used as public filling materials, prior approval from Public Fill Committee of Civil Engineering and Development Department should be sought beforehand in accepting the solidified materials at public fill.

As this Project will require imported fill materials in order to raise the site level to the proposed site formation level, this also provides an incentive for contractor(s) to reduce the amount of materials to be excavated provided that the materials can be re-used and its quality can meet the engineering requirements.

The above requirements are also provided in EM&A Manual for implementation.

7.4.4 Construction and Demolition Waste

Construction waste may comprise unwanted materials generated during construction, including rejected structures/ materials which have been over ordered or are surplus to requirements, and used materials. Generally speaking, construction waste mainly arise from the construction of earth retaining structures and other maintenance activities carried out by the Contractor, which may include the followings:

- Wood from formwork and falsework;
- Equipment and vehicle maintenance parts;
- Materials and equipment wrappings;
- Unusable/surplus concrete/grouting mixes; and
- Damaged/contaminated/surplus construction materials.

The volume of demolition waste would be very low as the Project Site is currently vacant and no major demolition work will be required.

The concerned Project construction works involve construction of low-density low-rise (2-storeys tall) residential development using standard construction practices, thus significant amount of construction waste is not expected. Construction of the proposed development does not involve any facilities which may require significant foundation works or piling works, thus waste to be generated due to foundation works is expected to be minimum.

The amount of construction waste to be generated from this Project will be subject to contractor(s)' operating procedure and site practices, however, the contractor(s) of this Project will be required to reuse materials on site as far as practicable and minimize waste arising. This could be achieved through recovery, reuse and/ or recycling of materials involved in the construction. Whenever practicable, the production of construction waste due to over-ordering or as "side-products" of construction activities should be minimised by the contractor through careful design, planning, good site management, control of ordering procedures, segregation and reuse of materials. These measures will also assist the Contractor(s) in minimizing costs associated with the construction works. Prefabricated building construction elements could also be used as appropriate to avoid generation of surplus construction materials.

For examples, wooden boards can be reused on-site or off-site, though the reusability and quantity of final waste to be generated will be subject to the quality, size and shape of the boards proposed by the contractor(s). Timbers which cannot be reused shall be sorted and stored separately from all other inert waste before disposal.

Should construction site hoarding be erected, metal fencing or building panels, which are more durable than wooden panels, are recommended to be used as far as practicable. Opportunity shall also be sought to re-use any wooden boards used in site fencing on-site or off-site. Concrete and masonry can be crushed and used as fill material if practicable. On-site burning of wooden waste is prohibited.

Cross contamination of inert C&D materials by other waste categories shall be minimised as far as practicable through provision of storage facilities for storage of different categories of waste. Inert materials including soil, rock, concrete, brick, cement plaster/ mortar, inert building debris, aggregates and asphalt should be segregated from and stored separately from other waste categories to ensure proper handling and reuse. The on-site temporary facilities should be equipped with dust control measures where necessary.

By reducing the quantity of C&D materials requiring off-site disposal through proper reuse on-site, the potential traffic impacts due to transportation of materials can be reduced. Thus, additional traffic flow generated from transportation of construction materials due to movement of vehicles in and out of the Project Site is considered to be insignificant.

Spent bentonite slurries, if any, will be handled and disposed of properly in accordance with the requirements set out in the Practice Note for Professional Persons (PN1/94) Construction Site Drainage.

In order to avoid dust, odour and erosion impacts, any stockpile areas within the Project Site should be covered with tarpaulin or impermeable sheeting. Any vehicle carrying C&D waste should have their load covered when leaving the works area. Vehicles should be routed as far as possible to avoid sensitive receivers in the area. Potential air and surface runoff impacts due to handling of excavated materials are presented in the Chapters 3 and 5, respectively.

Estimation on types, timing and quantities of wastes to be generated during construction, as well as its route of disposal, is provided in Table 7-1.

7.4.5 Chemical Waste

As defined under the Waste Disposal (Chemical Waste) (General) Regulation, chemical waste includes any substance being scrap material or unwanted substances specified under Schedule 1 of the Regulation.

Chemical waste that could be generated from construction works would primarily arise from chemicals used in operation and maintenance of on-site equipment. These may include fuel, oil, lubricants, cleaning fluids, and solvents arising from leakage or maintenance of on-site equipment and vehicles. Chemical generated from daily operation of the construction works shall be recycled/ reused on-site as far as practicable.

The amount of chemical waste that will be generated from the construction works will depend on the contractor's on-site maintenance intention, age and number of plant and vehicles used. Nevertheless, chemical wastes such as lubricating oil or solvent generated by workers are not expected to be in large quantity. The likely chemical waste types are readily accepted at the chemical waste treatment centre at Tsing Yi or other licensed waste oil recycling facilities in Hong Kong.

If off-site disposal of chemical waste is required, they should be collected and delivered by a licensed contractor, and disposed of strictly following the Waste Disposal (Chemical Waste) (General) Regulation.

The contractors shall register with EPD as chemical waste producers when chemical waste is produced.

Chemical waste generated has to be stored in suitable containers and away from water bodies so that leakage or spillage is prevented during the handling, storage, and subsequent transportation.

Provided that the handling, storage and disposal of chemical wastes are in accordance with the Waste Disposal (Chemical Waste) (General) Regulation and the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, this will unlikely cause an unacceptable environmental impact.

Fossil fuel and used lubricants from trucks and machinery are classified as chemical waste.

The Contractor shall prevent fuel and lubricating oil leakage from plant and storage sites from contaminating the construction site. All compounds in work areas shall be positioned on areas with hard paving and served by drainage facility. Sand/ silt traps and oil interceptors shall be provided at appropriate locations prior to the discharge points.

7.4.6 General Refuse

Throughout the construction phase, the workforce on the construction site will generate a variety of general refuse requiring disposal. These refuse will mainly consist of food wastes, aluminium cans, empty plastic bottles and waste paper, etc. Nevertheless, estimates of general refuse generated from the Site Formation works are dependent on the number of workers. As no information regarding the number of workers on-site is available at this early project stage, it has been assumed that about 180 workers in average will work on the Developable Area during site formation at any one time. Based on a generation rate of 0.65 kg per worker per day, the daily arising of general refuse during site formation would be approximately 117 kg/ day.

General refuse generated at the construction site should be stored separately from construction and chemical wastes to avoid cross contamination. A reliable waste collector

shall be employed by the Contractor to remove general refuse from the construction site on a daily basis where appropriate to minimise the potential odour, pest and litter impacts.

Open burning for the disposal of construction waste or the clearance of the Project Site in preparation for construction work is prohibited under the Air Pollution Control (Open Burning) Regulation.

Table 7-1 Summary Table of Estimated Materials to be Generated, Re-used and Disposed of

Construction Activities	Total Quantity Generated	C&D Waste to be disposed of off-site	C&D material to be re-used
Site clearance	~7,000m^3	1,400m^3 (C&D waste that cannot be reused or recycled, to be disposed of at NENT landfill as last resort (subject to confirmation during detailed design)	5,600 m^3 (Inert C&D material to be reused at landscaping area as much as possible)
Site formation and filling, etc.	~52,500 m^3 (imported fill materials) #	-	It is expected that all C&D materials (52,500 m^3) will be reused on-site for site formation. Any surplus inert C&D materials to be disposed of at public filling area in Tuen Mun Area 38 (subject to confirmation during detailed design).
Pond Sediment	9,900 m^3	-	Estimated quantity of pond sediment at existing abandoned pond. Pond sediment is intended to be left in place and not to be disturbed. In case pond sediment is encountered during construction, it will be re-used on-site and no off-site disposal is expected.
Building construction	~753 m^3 *	~98 m^3 ** (C&D waste that cannot be reused or recycled, to be disposed of at NENT landfill as last resort (subject to confirmation during detailed design).	~655 m^3 ** (Inert C&D materials to be disposed of at public fill area in Tuen Mun Area 38) (subject to confirmation during detailed design).
General Refuse (e.g. Food waste, waste paper, empty container generated from workforce)	117kg/day (preliminary estimate)	117kg per day	Refuse station for compaction and containerisation and then dispose of at NENT landfill.
Chemical Waste (e.g. Cleansing fluids, solvent, lubrication oil and fuel from construction plants and equipment)	Less than few cubic meters/month (preliminary estimate)	Less than few cubic meters/month	To be collected by licensed chemical waste collector.

Remark: Estimated quantity of waste quantity during construction phase, which is subject to detailed design stage.

Estimated volume of filling/ excavation materials during site formation including estimated pond sediment at abandoned pond.

* Estimated based on the generation rate of 0.1m^3 per 1m^2 of Gross Floor Area (GFA). According to the approved OZP, the maximum allowed Gross Floor Area (GFA) of the Project Site is 7,529 m^3 (i.e. 37,645m^2 x 0.2 (plot ratio)). The waste generated due to construction of building structures is estimated based on the generation rate of 0.1m^3 per 1m^2 of GFA (similar waste generation rate was also adopted in the approved EIA Report in the "Agreement No. CE61/2007(CE), North East New Territories New Development Areas Planning and Engineering Study – Investigation", Section 7.5.1.2).

** According to the statistical information in the Monitoring of Solid Waste in Hong Kong, published by EPD, it is estimated that about 87% of the construction waste was categorised as public fill and the remaining 13% as C&D waste (similar figure was also adopted in the approved EIA Report in the "Agreement No. CE61/2007(CE), North East New Territories New Development Areas Planning and Engineering Study – Investigation", Section 7.5.1.2).

7.5 Construction Waste Management Measures

To ensure the appropriate handling of the C&D materials, it is recommended that a Waste Management Plan (WMP) shall be developed by the contractor and incorporated in the Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/2005 – Environmental Management on Construction Sites at the commencement of the construction works.

In formulating the EMP in respect to waste management, the following hierarchy should be considered:

- Avoidance and minimization to reduce the potential quantity of C&D materials generated;
- Reuse of materials as practical as possible;
- Recovery and Recycling as practical as possible; and
- Proper treatment and disposal in respect to relevant laws, guidelines and good practice.

The EMP shall be submitted to the Engineer's Representative (ER) and the Project Environmental Team Leader (ETL) for approval, and shall be implemented throughout the Project.

The EMP shall covers the followings and developed taking into account the recommended control measures given in this Chapter where appropriate:

- A waste management policy, organization chart, and responsibility;
- An estimation on the location, type, nature, quality and quantity of different waste streams to be generated from the Project works, and the corresponding waste management methodology;
- A method statement for demolition and transportation of the excavated materials and other construction wastes;
- Potential for recycling or reuse should be explored and opportunities taken if waste generation is unavoidable;
- Recommendations for appropriate disposal routes if waste cannot be recycled;
- A system to control the disposal of C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively through a trip-ticket system in accordance with the PNAP ADV-19; and
- A system to record the C&D materials/ C&D waste to be generated, disposed of, reused, and recycled, respectively.
- The EMP should be approved before the commencement of construction. All mitigation measures in the approved EMP should be fully implemented.

The Project Proponent/ ER will ensure that the day-to-day operations comply with the approved EMP. The Project Proponent/ ER shall require the contractor to separate public fill from C&D waste for disposal at appropriate facilities. In addition, the Project Proponent/ ER shall regularly audit Contractor(s)' records for the disposal, reuse and recycling of C&D materials for monitoring purposes.

Based on the above waste management recommendations, a detailed management and control plan shall be formulated during the detailed design stage. A good management and control can prevent the generation of significant amount of waste. On-site sorting of construction wastes will be recommended. Secondary on-site sorting can be achieved by

avoiding the generation of “mixed waste” through good site control. Construction wastes shall be sorted to remove contaminants, with the inert materials broken up into small pieces before being transported to the public fill reception facilities.

Chemical and oily wastes generated from the construction activities, vehicle and plant maintenance and oil interceptors should be disposed of as chemical waste in strict compliance with the Waste Disposal (Chemical Waste) (General) Regulations.

The demolition and construction work shall be considered in the planning and design stages to reduce the generation of C&D waste where possible. Landfill disposal shall only be considered as the last resort.

Construction methods with minimum waste generation quantity and other environmental impacts shall be considered in the detailed design.

In addition, the Project Proponent shall require the contractor to reuse inert C&D materials (e.g. excavated soil) on-site or in other suitable construction sites as far as possible, in order to minimize the disposal of C&D materials to public fill reception facilities.

The Project Proponent shall encourage the contractor to maximize the use of recycled or recyclable C&D materials, as well as the use of non-timber formwork to further minimize the generation of construction waste.

The following additional control/ mitigation measures are recommended to be followed by the Contractor:

- Storage of different waste types – different types of waste should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area equipped with required control measures (e.g. dust control) should be provided;
- Trip-ticket system – in order to monitor the proper disposal of non-inert C&D waste to landfills and to control fly-tipping, a trip-ticket system should be included as one of the contractual requirements and audited by the Environmental Team;
- Records of Wastes – a recording system should be proposed to record the amount of wastes generated, recycled and disposed of (including the location of disposal sites);
- Training – The contractor should provide his workers with proper training of appropriate waste management procedure to achieve waste reduction as far as practicable and cost-effective through recovery, reuse and recycling and avoid contamination of reusable C&D materials;
- Incorporate good practice in “Recommended Pollution Control Clauses for Construction Contracts” published by EPD in respect to removal of waste material from the construction site into the contract of the contractor.

In additional to the above, the relevant construction waste pollution clauses to be included in construction contracts are summarized in the Sections 7.5.1 to 7.5.3.

7.5.1 Waste Minimisation

The Contractor shall submit to the Engineer for approval a waste management plan with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site operations comply with the approved waste management plan.

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.

The Contractor shall ensure that different types of wastes are segregated on-site and stored in different containers, skips or stockpiles to facilitate reuse/recycling of waste and, as the last resort, disposal at different outlets as appropriate.

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

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 and, as the last resort, disposal of at landfills.

The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites).

The Contractor shall implement a trip ticket system in accordance with the “Construction and Demolition Waste” in PNAP ADV-19 for public fill, C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively.

Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.

7.5.2 Waste Nuisance Control

The Contractor shall not permit any sewage, wastewater or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Project Site onto any adjoining land or allow any waste matter [or refuse] which is not part of the final product from waste processing plants to be deposited anywhere within the Project Site [or onto any adjoining land]. He shall arrange removal of such matter from the Project Site [or any building erected or to be erected thereon] in a proper manner to the satisfaction of the Engineer in consultation with the Director of Environmental Protection.

7.5.3 Chemical Waste Control

The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation.

The Contractor shall apply for registration as chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation when chemical waste is produced. All chemical waste shall be properly stored, labelled, packaged and collected in accordance with the Regulation.

7.5.4 Pond Sediment

As mentioned in Section 7.4.3, concerned abandoned pond within Project Site will be filled up during construction stage. Existing pond sediment is intended to be left in place and not to be disturbed as far as possible.

However, should pond sediment be encountered during construction, it should be fully re-used on-site (e.g. as fill material during site formation) given its quality can meet relevant engineering requirements. If solidified materials cannot not be reused on-site and to be used

as public filling materials, prior approval from Public Fill Committee of Civil Engineering and Development Department should be sought beforehand in accepting the solidified materials at public fill.

As this Project will require imported fill materials in order to raise the site level to the proposed site formation level, this also provides an incentive for contractor(s) to reduce the amount of materials to be excavated provided that the materials can be re-used and its quality can meet the engineering requirements. The Contractor(s) will be required to minimize the amount of materials to be excavated and to re-use excavated materials on-site.

7.6 Waste Generation during Operational Phase

The proposed residential development will accommodate a population of about 132 after full occupation. With reference to the Data from Monitoring in Solid Waste in Hong Kong 1999, the capita generation rates of domestic waste will be 1.48 kg/day in 2016. Based on the above assumptions, the estimated quantity of wastes to be generated from this Development during the operation will be about 195 kg/day.

Refuse collection points (RCP) will be provided for the residential development (e.g. near the interim STP subject to the detailed design). A licensed waste collector shall be employed to collect domestic waste on daily basis. Given the scale of proposed development, it is expected that number of refuse collection vehicles visiting the Project Site (so as associated traffic noise) will not be significant. To minimize odour nuisance, odour absorption system will be provided, details of which will be provided in the detailed design phase. In order to comply with Building Regulation, mechanical ventilation will also be provided at the RCP. With proper management and maintenance of the waste facilities, possible leachate impact from the RCP is not anticipated.

It is also recommended that separate collection bins for used aluminium cans, waste paper and plastic bottles should be provided at strategic locations within the residential development area and adjacent to the passive recreational facilities in order to promote and encourage recycling during the operational phase.

During operation, waste generated by this Project will be properly controlled through the implementation of mitigation measures described in this report. It is expected waste generation by nearby planned development sites will also be controlled through mitigation measures committed under their respective EIA studies. No adverse impact is therefore anticipated.

7.7 Environmental Monitoring and Audit

Given the mitigation measures are in place, no adverse impact will be anticipated due to operation of the Project, and no environmental monitoring and audit (EM&A) will be necessary during operation.

During construction, in order to ensure the effectiveness of implementation of mitigation measures, it is proposed that an EM&A program is carried out during construction. The Environmental Team (ET) shall check the contractor(s)' practice and ensure the above recommendations are properly implemented. Details of the EM&A requirements are provided in **Chapter 13** of this report.

7.8 Impact Summary and Conclusion

The waste streams that would be generated during the construction of the proposed Project were identified and evaluated in terms of their nature, type, quantity, and associated

environmental impacts. Opportunities for reduction in waste generation through recovery, reuse or recycling have been identified in the assessment.

Provided that the recommendations set out in this Chapter are implemented, no waste related regulatory non-compliance and unacceptable environmental impacts are expected as a result of handling, storage, transportation and disposal of construction waste arising from the proposed residential development.

The Project Site is vacant and partially used as open air car park. No historic and/ or existing land uses at the Project Site that would result in potential land contamination has been identified. Thus, land contamination at the Project Site is not expected.

Domestic waste may be generated during the operational phase of this Project. However, given the scale of this Project the quantity of waste is expected to be small. Standard approach that is widely adopted in other parts of Hong Kong for handling and disposal of waste shall be adopted. Refuse collection chambers shall be provided and a licensed waste collector will be employed to collect domestic waste on daily basis.

With these measures in place, it is unlikely that there will be any residual environmental impact.

8. ECOLOGY

8.1 Summary

This chapter presents the Ecological Impact Assessment on any direct and indirect potential impacts to ecology arising from the construction and operation of the Project. The ecological impact assessment has been conducted in accordance with the requirements of Annexes 8 and 16 of the EIAO-TM and the EIA Study Brief for the Project (ESB-210/2009). Ecological baseline conditions of the Project Area and its surroundings were described, potential ecological impacts including losses or damages of habitats and other potential impacts to the inhabiting flora and fauna were assessed, and the need of mitigation measures such as avoidance, minimization and compensation were investigated. The potential ecological impacts on the identified species and habitats were found acceptable with implementation of mitigation measures.

8.2 Relevant Legislation, Standards, Guidelines and Criteria

The HKSAR ordinances and regulations relevant to ecological assessment of this Project include the following:

- Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation, the Forestry Regulations (Cap. 96A);
- Town Planning Ordinance (Cap. 131);
- Wild Animals Protection Ordinance (WAPO, Cap. 170);
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586); and
- Environmental Impact Assessment Ordinance ("the EIAO", Cap. 499) and the associated TM (EIAO-TM), in particular Annexes 8 and 16; and
- Town Planning Board Guidelines for Application for Development within the Deep Bay Area under Section16 of the Town Planning Ordinance.

Ecological assessment also made reference to the following guidelines and standards as well as international conventions:

- EIA Study Brief No. 210/2009;
- Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10, "Conservation";
- Ecological Baseline Survey For Ecological Assessment (EIAO Guidance Note No. 7/2010);
- Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys (EIAO Guidance Note No. 10/2010);
- PELB Technical Circular 1/97 / Works Branch Technical Circular 4/97, "Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures";
- ETWB Technical Circular (Works) No. 5/2005, “Protection of natural streams/rivers from adverse impacts arising from construction works”;

- Relevant wildlife protection laws of the PRC;
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the "Ramsar Convention"), which requires parties to conserve and make wise use of wetland areas, particularly those supporting waterfowl populations;
- United Nations Convention on Biological Diversity, which requires parties to regulate or manage biological resources important for the conservation of biological diversity, to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. Sgnatories of the convention are required to make active efforts to protect and manage their biodiversity resources. The Government of Hong Kong SAR has stated that it will be “committed to meeting the environmental objectives” of the Convention;
- International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species;
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

8.3 Key Ecological Issues

According to the Study Brief No. ESB - 210/2009, key ecological issues identified include the following:

- Recognized sites of conservation importance’s such as the Wetland Conservation Zone, Wetland Buffer Zone, Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, Mai Po Village SSSI and Mai Po Marshes SSSI (**Figure 8-1**);
- Wetlands including fish ponds, wet agricultural land and marshes;
- Roosting, breeding and feeding sites for wetland birds; and
- Any other habitats identified as having special conservation interests by this study.

8.4 Methodology

Project Area of the present proposed Project is shown in **Figure 1-1** of the present EIA. The Assessment Area for the purpose of terrestrial and aquatic ecological impact assessment includes all areas within 500m distance from the Project Area boundary (**Figure 8-2**).

Relevant literature including previous EIAs and Hong Kong biodiversity database were reviewed. Field surveys were conducted between July 2009 to June 2010, of a 12-month period covering wet and dry seasons, fulfilling the requirements stipulated in the EIA Study Brief (i.e. covering at least 6 months and both wet and dry seasons), to record ecological data within the assessment area and establish the ecological profile for incorporation into the assessment. In addition to day-time surveys, night-time surveys were also conducted (in July 2009 and January 2010) to record nocturnal fauna including birds, herpetofauna and mammals. Additional surveys were also performed in the 2010/2011 winter (February and March 2011), and July 2014, and the 2015/2016 winter (from November 2015 to January 2016) to update the site conditions and ecological baseline. Data analysis and discussions described habitats and species found in the Assessment Area, highlighting those that are rare, of conservation importance, or protected by law. Survey methods of flora and faunal groups

were made reference to "Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys (EIAO Guidance Note No. 10/2010);" and are described below.

8.4.1 Habitat and Vegetation

Habitats in the Assessment Area were mapped based on the latest government aerial photos and ground truthing. Walk-over surveys were conducted at representative areas of each habitat type. Plant species in each habitat type were identified (with the aid of binoculars when necessary) and their relative abundance were recorded, with special attention to rare and protected species. Colour photographs were taken of all habitats encountered on site and of ecological features of special importance. Habitat maps of the Assessment Area were produced at the required scale using GIS software. Nomenclature and conservation status of plant species follow AFCD (2003, 2004) and Xing *et al*. (2000).

8.4.2 Avifauna

Bird surveys were conducted monthly between July 2009 and June 2010, February and March 2011 and July 2014. Bird surveys were also conducted twice each month between November 2015 and January 2016. The surveys covered both breeding season and overwintering season of birds. Birds within the Project Area and Assessment Area were surveyed quantitatively using transect count method and point count method. Locations of survey transects and vantage points are shown in **Figure 8-2**. All birds seen or heard were identified and their abundance recorded. Signs of breeding (e.g. nests, recently fledged juveniles) were also recorded. As some birds (e.g., owls, nightjars) are nocturnal, night surveys were conducted during wet and dry seasons. Nocturnal birds were identified by active searching using spot-light and by their calls. Nomenclature of the bird species followed the latest version of List of Hong Kong Birds by Hong Kong Bird Watching Society (HKBWS).

Flight behaviour of birds within the Project Area and Assessment Area was also observed at three observation points. Monthly surveys were conducted between November 2009 and June 2010, February and March 2011, July 2014, and between November 2015 and January 2016. Flying birds were identified and counts. The heights and directions of flying birds observed within the Assessment Area were estimated.

8.4.3 Other Terrestrial Fauna

Mammals within the Project Area and Assessment Area were surveyed qualitatively. Surveys were conducted during July 2009, January and June 2010, March 2011, July 2014 and December 2015. All sightings, tracks, and signs of mammals found were recorded. Nomenclature of mammal follows Shek (2006). As some mammal species (e.g. bats) are nocturnal, night surveys were conducted during wet and dry seasons. Nocturnal Mammals were actively searched using spot-light.

Herpetofauna within Project Area and the Assessment Area were surveyed qualitatively. Surveys were conducted during the following periods: July - August 2009, March - May 2010, March 2011, July 2014 and November 2015. All reptiles and amphibians sighted were recorded. Nomenclature of amphibian follows Chan *et al*. (2005) and reptile follows Karsen *et al*. (1998). As herpetofauna are mostly nocturnal and more active during wet season, night surveys were carried out in wet seasons of 2009, 2010 and 2014. Potential microhabitats of herpetofauna such as wall, fallen logs, litter, channel/nullah, fishpond margins, underneath of stones or other materials, artificial container (e.g. pots) were searched during surveys to locate cryptic or secretive herpetofauna species. Amphibians were also identified by their calls during night surveys.

Dragonflies and butterflies within Project Area and the Assessment Area were surveyed quantitatively using the transect count method. Surveys were conducted during the following

periods: July - November 2009, April - June 2010, March 2011, July 2014 and November 2015. Dragonflies and butterflies observed were identified and recorded. Nomenclature of dragonfly follows Tam *et al*. (2011) and nomenclature of butterfly follows Chan *et al*. (2011).

8.4.4 Aquatic Fauna

Aquatic fauna (such as freshwater fish and invertebrates) within the Project Area and Assessment Area were studied by active searching and direct observation. Surveys were conducted in September 2009, March 2010, March 2011, July 2014 and November 2015. Baited fish cages, which is a standard survey method in Hong Kong, were deployed inside the pond within the Project Area, while direct observations were made at the pond as well as other aquatic habitats (nullah and drainage channel) in the Assessment Area. As aquatic habitats within the Assessment Area were mainly fish ponds, a Fisheries Impact Assessment was also performed through desktop review and site verification, and reported in another chapter.

8.4.5 Survey Schedule

The time schedule of the ecological survey programme is presented in **Table 8-1** below:

Table 8-1 Ecological Survey Programme

	2009						2010						2011		2014	2015		2016
Month	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Feb**	**Mar**	**Jul**	**Nov**	**Dec**	**Jan**
Habitat and Vegetation		√	√	√			√	√					√	√	√			√
Bird	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Mammal	√						√							√	√		√	
Herpetofauna	√	√							√	√	√			√	√	√		
Butterfly & Dragonfly	√	√	√	√	√					√	√	√		√	√	√		
Stream and Freshwater Fauna			√						√					√	√	√		

8.5 Results of Literature Review

8.5.1 Recognized Sites of Conservation Importance

There is no Recognized Site of Conservation Importance within the Project Area of this Project.

The Project is located outside Wetland Conservation Area (WCA) and immediately outside the boundary of Wetland Buffer Area (WBA) (**Figure 8-1**), and part of the Assessment Area thus covered the WBA. The planning intention of WBA is to protect the ecological integrity of the fishponds and wetlands within the Wetland Conservation Area (WCA) and to prevent development that would have a negative off-site impact on the ecological value of those fishponds. The “no-net-loss in wetland” principle and wetland enhancement and management scheme according to the TPB Guidelines (TPB PG-No. 12C) do not apply to this Project.

The Project Area is about 520m from the boundary of WCA. WCA comprises of the existing and contiguous, active or abandoned fishponds in the Deep Bay Area. The planning intention of WCA is to conserve the ecological value of the fishpond which form an integral part of the wetland ecosystem in the Deep Bay Area. New development within the WCA will not be

allowed unless it is required to support the conservation of the ecological value of the area or the development is essential infrastructural project with overriding public interest.

Other recognised sites of conservation importance in Northwest New Territories included the Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, Mai Po Marshes SSSI, Mai Po Village SSSI Egretry and Mai Po Lung Egretry.

About 1500 ha of wetland in the Mai Po and Inner Deep Bay region was designated as a Ramsar Site on 4 September 1995. The wetland habitats in the Ramsar Site included intertidal mudflats, mangroves, tidal shrimp ponds (*gei wais*), fishponds and reedbeds. The site serves as an important over-wintering and refuelling station site for the migratory waterbirds.

Mai Po Nature Reserve comprises *gei wais*, fishponds and extensive area of mangroves and mudflat. This reserve provides important habitats for waterbirds and other wildlife (e.g., Eurasian Otter).

The Mai Po Village SSSI Egretry is a piece of fung shui woodland of size about 53ha behind the Mai Po Village, and is about 2km from the boundary of the Project Area. This woodland once provided nesting habitats for a number of ardeid species. The ardeids are now nesting in trees near the former woodland nesting areas.

Nesting population of ardeids in Hong Kong was annually surveyed by The Hong Kong Bird Watching Society since 1998. The nesting ardeid populations in Mai Po Village SSSI Egretry since 1998 are shown in **Table 8-2**. Five ardeid species have been recorded nesting in the Mai Po Village SSSI egretry. Only Little Egret and Chinese Pond Heron nested in this egretry since 2005.

Foraging ecology of Little Egret and Chinese Pond Heron nesting in Mai Po Village SSSI Egretry was studied previously (Wong 1992, Young 1998, City University of Hong Kong. 2001). Fishpond was the most frequently used habitat by both species. Drained fishponds are particularly attractive to Little Egret (Young 1998). The average distances flown by Little Egret and Chinese Pond Heron were 2.1km and 1.6km respectively (Wong 1992, Young 1998). Foraging ecology of Little Egret and Chinese Pond Heron in Mai Po Village SSSI Egretry was also studied in 2011 during the EIA study of “Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long, N.T.” (ENVIRON Hong Kong Limited. 2013). Most breeding birds of these two species took off from the Mai Po Village egretry flew towards Mai Po, Tam Kon Chau or other nearby wetlands to forage.

There is another active egretry, known as the Mai Po Lung Egretry, near the Mai Po Village SSSI Egretry. The Mai Po Lung Egretry is 2.7km from the boundary of the Project Area. This egretry was discovered in 2000. Little Egret and Chinese Pond Heron were recorded nesting in this colony, and the nesting population is smaller than that of the Mai Po Lung Egretry (**Table 8-3**). Foraging ecology of Little Egret and Chinese Pond Heron nesting in Mai Po Lung Egretry was not studied previously, but the uses of foraging habitat and average flight distance of might be similar to the observations in the Mai Po Village SSSI Egretry.

An ardeid nesting colony was reported in mangroves within the Mai Po Marshes Nature Reserve in 2015 (named as “Mai Po Marshes Nature Reserve Egretry” in Anon. 2015). This colony is about 5km from the boundary of the Project Area. There were 204 ardeid nests (including 123 Great Egret nests, 10 Little Egret nests, 62 Black-crowned Night Heron nests and 9 Eastern Cattle Egret nests) in this colony in 2015.

The assessment area of “Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long, N.T.” overlapped with the Assessment Area of the Project. Ecological surveys of the EIA

study of this development project were conducted between January and July 2009, and between August and December 2010 (ENVIRON Hong Kong Limited. 2013). The usage of grassland/shrubland and drainage channel by ardeids within the Assessment Area of the present project during peak breeding season of ardeid (April to July) was very low. The maximum counts of ardeids in habitats fall within the Assessment Area of the present study were also very low during peak breeding season of ardeids.

Table 8-2 Nesting Populations of Ardeid in Mai Po Village SSSI Egretry since 1998 (data from Anon. 2004, 2005, 2006, 2008, 2009, 2010, 2011, 2012a, 2012b, 2013, 2014, 2015, Wong and Kwok 2001, Wong 2002, Wong and Woo 2003)

Year	Little Egret	Chinese Pond Heron	Cattle Egret	Great Egret	Black-crowned Night Heron	Total nests (% of total in Hong Kong)
1998	38	34	16	-	45	133 (NA)
1999	39	12	22	6	26	105 (12.7%)
2000	44	6	10	8	40	108 (14.5%)
2001	50	7	15	12	25	109 (13.1%)
2002	37	14	12	15	9	87 (9.0%)
2003	42	14	3	2	-	61 (8.3%)
2004	28	16	6	-	-	52 (5.8%)
2005	37	51	-	-	-	88 (8.5%)
2006	35	50	-	-	-	85 (8.4%)
2007	4	30	-	-	-	34 (4.1%)
2008	2	55	-	-	-	57 (8.6%)
2009	8	135	-	-	-	143 (17.7%)
2010	19	108	-	-	-	128 (17.2%)
2011	35	118	-	-	-	153 (19%)
2012	29	125	-	-	-	154 (18.1%)
2013	21	125	-	-	-	146 (19.3%)
2014	80	122	-	-	-	202 (21%)
2015	104	131	-	-	1	236 (16.6%)

Table 8-3 Nesting populations of ardeid in Mai Po Lung egretry since 1998 (data from Anon. 2004, 2005, 2006, 2008, 2009, 2010, 2011, 2012a, 2012b, 2013, 2014, 2015, Wong and Kwok 2001, Wong 2002, Wong and Woo 2003)

Year	Little Egret	Chinese Pond Heron	Total nests (% of total in Hong Kong)
2000	1	14	15 (2.0%)
2001	1	43	44 (5.3%)
2002	2	45	47 (4.8%)
2003	1	36	37 (5.1%)
2004	10	35	45 (5.2%)
2005	5	56	61 (5.9%)
2006	12	74	86 (8.5%)
2007	18	31	49 (6.0%)
2008	16	21	37 (5.6%)
2009	3	6	9 (1.1%)
2010	2	5	7 (1%)
2011	1	4	5 (0.6%)
2012	-	12	12 (1.4%)
2013	-	12	12 (1.6%)
2014	3	33	36 (3.8%)
2015	5	68	73 (5.1%)

The Mai Po Marshes SSSI contains the largest area of mangroves in Hong Kong. The gei wais provide important feeding habitats for both resident and migratory birds. This SSSI was designated on 15 September 1976.

These sites are more than 1km from the Project Area, and hence not likely to be affected by the proposed development project.

8.5.2 Review of Previous Studies

A study on the evaluation of measure in prevention of predation of Great Cormorant on commercial fishponds was previously conducted by AFCD between December 2006 and February 2007 (Ecosystems Ltd 2008) covered some of the fishponds at the south of the Project Area, which fell within 500m from the present Project Area. Diversity of waterbirds on these fishponds was found very low (*ibid*.), probably due to the high disturbance level from the surrounding container sites.

The Assessment Area of the present project overlapped with those of five other EIA/EcoIA studies, including:

- "Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2";
- "Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River";

- "Proposed Residential cum Passive Recreational Development within "Recreation" ("REC") Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long, N.T." (hereafter REC Site EIA);

- "Comprehensive Development and Wetland Protection near Yau Mei San Tsuen" (hereafter Yau Mei Site EIA); and

- "Residential Development within R(D) Zone at Various Lots in DD104, Yuen Long, N.T." (hereafter R(D) Site EcoIA).

There was no significant observation in the Assessment Area of the present project from the EIA studies of "Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2" (EIA-094/2004) and "Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" (EIA-159/2008).

Yau Mei Site is located about 350m to the north of the present Project. The 500m distance of Yau Mei Site EIA covered the northern half of the present Assessment Area, including the urbanized/disturbed habitat of the Project Area. Ecological surveys were conducted between September 2007 and August 2008. Fauna species of conservation importance recorded in this EIA study included 35 bird species, 1 reptile species, 2 dragonfly species and 2 butterfly species (**Table 8-4**). The bird species of conservation importance were mostly waterbirds (e.g., Northern Shoveler *Anas clypeata*, Yellow Bittern *Ixobrychus sinensis*). These waterbird species were recorded in a variety of habitats, e.g., agricultural land, drainage channel, fishpond habitat (Appendix 8.3 of ENVIRON Hong Kong Limited 2015). None of these waterbirds, however, was recorded in the abandoned fishpond inside the Project Area as it fell outside the assessment area of the Yau Mei Site EIA. Number of waterbird species recorded in other habitat types was lower. Abundance of two dragonfly species and two butterfly species of conservation importance recorded in the surveys were low.

The Project Area of the present project fell within the assessment area of the REC Site EIA. Ecological surveys were conducted between January 2009 and July 2009 and between August 2010 and January 2011. Fauna species of conservation importance recorded in this EIA study included 2 mammal species, 27 bird species, 2 dragonfly species and 2 butterfly species (**Table 8-4**). The bird species of conservation importance were mostly waterbirds (e.g., Black-faced Spoonbill *Platalea minor*, Red-billed Starling *Spodiopsar sericeus*). These species were mainly recorded in grassland/shrubland within the REC Site and fishpond in the assessment area of this study. Two dragonfly species and two butterfly species of conservation importance were recorded in the surveys. Their abundance were low.

The Project Area of the present project also fell within the assessment area of the R(D) Site EcoIA. Ecological surveys were conducted between February and July 2009 and between August 2010 and January 2011. Fauna species of conservation importance recorded in this EIA study included 26 bird species, 2 dragonfly species and 2 butterfly species (**Table 8-4**). These species were generally present in low number.

During the R(D) Site EcoIA, the Ngau Tam Mei Drainage Channel was found to provide foraging habitats to ardeids in winter. Food items might be brought in this channel by tides. High counts of ardeids were occasionally recorded during dry season. Observations of bird surveys of the Ngau Tam Mei Drainage Channel conducted for CEDD between 2006 and 2009 were also reviewed in the Yau Mei Site EIA. Some wetland dependent species and species of conservation importance (e.g., Little Egret, Great Egret) were recorded in this channel. In the REC Site EIA, the survey results showed that Ngau Tam Mei Main Drainage Channel supported a number of ardeids, and the counts of some species were higher in winter: Little Egret (high count of 101 individuals in January 2009), Grey Heron (80) and Great Egret (65),

both recorded in December 2010, Chinese Pond Heron (five recorded in August 2010) and Black-faced Spoonbill (up to six recorded in December 2010). Under the approved Comprehensive Development and Wetland Protection near Yau Mei San Tsuen (EIA 227/2015), a pre-construction ecological baseline survey is required and is currently on-going. Birds in the section of Ngau Tam Mei Drainage Channel between Fung Chuk Road and Castle Peak Road (Tam Mei section) were surveyed, and observations from this survey between August 2015 and May 2016 provided more updated information about utilization of this channel by waterbirds. The recorded species are mainly common in Hong Kong, and included some wetland dependent species of conservation importance (e.g., Black-faced Spoonbill). The numbers of each of these waterbird species were not more than 10 individuals for each survey. Black-faced Spoonbill was only recorded once during the surveys. Four birds were observed during low tide in December 2015. The number of waterbirds were higher in low tide when the channel bed was exposed and provided some foraging habitats.

Fishponds within WCA which are more or less continuous and less disturbed are considered of higher ecological value, but ecological value of ponds to the east of the Ngau Tam Mei Channel, including the abandoned fishpond within the Project Area, was ranked as “low” in the REC EIA (Table 8.21 in ENVIRON Hong Kong Limited 2013) and R(D) Site EcoIA (Table 15 of AEC 2014).

Flight lines of four ardeid species, including Grey Heron, Great Egret, Little Egret and Chinese Pond Heron, were studied between October and November 2009, and April to June 2011 during the Yau Mei Site EIA. These ardeid species mainly flew between the fishponds near Palm Springs and the Ngau Tam Mei Main Drainage Channel, and along the Ngau Tam Mei Main Drainage Channel (Appendix 8.4 of ENVIRON Hong Kong Limited 2015). No major flight path of these ardeid species above the Project Area of the present project was identified.

Flight lines of birds were studied in March and July 2009 during the REC Site EIA. The number of observations was low. No regular flight between a breeding ground and a foraging area in ardeid breeding season) and/or between a foraging area and a roosting site (such as cormorant roost in winter) was observed. The observed birds in flight were mainly over the Ngau Tam Mei Main Drainage Channel and the northern part of the REC Site.

Flight lines of birds were studied in March and July 2009 during the ecological study for the R(D) Site. Three bird species, including Great Cormorants, Black-faced Spoonbill and Northern Shoveler, were observed flying across the Project Area of the present project. The number of birds of these species observed was low compared to Deep Bay population. The minimum flight height across the Project Area was more than 16m, and most of these birds flew at heights above 24m. The observed flight heights were all taller than the proposed heights of building in the Project Area.

Table 8-4 Fauna Species of Conservation Importance from Previous Studies

Fauna	Yau Mei Site EIA [1]	REC Site EIA [2]	R(D) Site EcoIA [3]	Yau Mei Site On-going baseline survey	Local/ Regional/ International Conservation Status [4, 5, 6, 7]	Commonness & distribution in Hong Kong
Mammal						
Japanese Pipistrelle *Pipistrells abramus*		+			WAPO	Very Common, Widely distributed throughout Hong Kong
Small Asian Mongoose *Herpestes javanicus*		+			WAPO	Uncommon, Fairly widely distributed in countryside areas in the New Territories
Bird						
Common Teal *Anas crecca*	+	+	+		WAPO; RC	Common winter visitor. Found in Deep Bay area, Shuen Wan, Tai Lam Chung Reservoir, Victoria Harbour, Urban Park.
Northern Shoveler *Anas clypeata*	+				WAPO; RC	Abundant winter visitor. Found in Deep Bay area
Little Grebe *Tachybaptus ruficollis*	+	+	+		WAPO; LC	Common resident. Found in Deep Bay area.
Black-faced Spoonbill *Platalea minor*	+	+	+	+	IUCN: endangered; WAPO; PGC	Common winter visitor. Found in Deep Bay area.
Yellow Bittern *Ixobrychus sinensis*	+				WAPO; (LC)	Uncommon summer visitor and passage migrant. Found in Deep Bay area, Chek Keng, Tai Long Wan.
Cinnamon Bittern *Ixobrychus cinnamomeus*	+				WAPO; LC	Scarce passage migrant. Found in Deep Bay area, Tai Long Wan, Tap Mun, Long Valley, Sha Lo Tung, Mui Wo, and Ma Tso Lung.
Black-crowned Night Heron *Nycticorax nycticorax*	+	+	+		WAPO; (LC)	Common resident and winter visitor. Widely distributed in Hong Kong
Striated Heron *Butorides striatus*	+				WAPO; (LC)	Present all year, locally uncommon in summer and scarce in winter. Widely distributed in Hong Kong

Fauna	Yau Mei Site EIA [1]	REC Site EIA [2]	R(D) Site EcoIA [3]	Yau Mei Site On-going baseline survey	Local/ Regional/ International Conservation Status [4, 5, 6, 7]	Commonness & distribution in Hong Kong
Chinese Pond Heron *Ardeola bacchus*	+	+	+	+	WAPO; PRC (RC)	Common resident. Widely distributed in Hong Kong.
Grey Heron *Ardea cinerea*	+	+	+	+	WAPO; PRC	Common winter visitor. Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar.
Purple Heron *Ardea purpurea*	+	+			WAPO; RC	Uncommon passage migrant. Found in Deep Bay area.
Great Egret *Ardea abla*	+	+	+	+	WAPO; PRC (RC)	Common resident and winter visitor. Widely distributed in Hong Kong.
Intermediate Egret *Egretta intermedia*	+	+	+	+	WAPO; RC	Common passage migrant. Found in Deep Bay area, Tai Long Wan, Starling Inlet, Tai O, Cape D'Aguilar
Little Egret *Egretta garzetta*	+	+	+	+	WAPO; PRC (RC)	Common resident. Widely distributed in coastal area throughout Hong Kong.
Great Cormorant *Phalacrocorax carbo*	+	+	+	+	WAPO; PRC	Common winter visitor. Widely distributed in coastal areas throughout Hong Kong.
Black Kite *Milvus migrans*	+				WAPO; (RC)	Common resident and winter visitor. Widely distributed in Hong Kong.
Black-winged Stilt *Himantopus himantopus*	+	+	+	+	WAPO; RC	Common passage migrant. Found in Deep Bay area, Long Valley, Kam Tin.
Little Ringed Plover *Charadrius dubius*	+	+	+		WAPO; (LC)	Common winter visitor and passage migrant. Widely distributed in freshwater areas throughout Hong Kong.
Greater Painted-snipe *Rostratula benghalensis*	+	+	+		WAPO; LC	Passage migrant and winter visitor. Found in Ha Tsuen, Lok Ma Chau, Kam Tin, Long Valley, Hong Kong Wetland Park

Fauna	Yau Mei Site EIA [1]	REC Site EIA [2]	R(D) Site EcoIA [3]	Yau Mei Site On-going baseline survey	Local/ Regional/ International Conservation Status [4, 5, 6, 7]	Commonness & distribution in Hong Kong
Pintailed/Swinhoe's Snipe *Gallinago stenura/megala*	+	+	+		WAPO; LC	-
Common Greenshank *Tringa nebularia*	+	+	+		WAPO; RC	Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong
Wood Sandpiper *Tringa glareola*	+	+	+		WAPO; LC	Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong.
Pied Avocet *Recurvirostra avosetta*				+	WAPO; RC	Abundant winter visitor. Found in Deep Bay area
White-throated Kingfisher *Halcyon smyrnensis*	+	+	+	+	WAPO; (LC)	Common resident. Widely distributed in coastal areas throughout Hong Kong
Pied Kingfisher *Ceryle rudis*	+				WAPO; (LC)	Uncommon resident. Widely distributed in lakes and ponds throughout Hong Kong.
Greater Coucal *Centropus sinensis*		+	+	+	WAPO; China Red Data Book: Vulnerable	Common resident. Widely distributed in Hong Kong.
Collared Crow *Corvus torquatus*	+	+	+		IUCN: near-threatened; WAPO; LC	Uncommon resident. Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek Lap Kok, Shuen Wan, Lam Tsuen.
Chinese Penduline Tit *Remiz consobrinus*	+				WAPO; RC	Common passage migrant and winter visitor. Found in Deep Bay area, Tai O , Mui Wo, Long Valley, Luk Keng, Chek Lap Kok
Red-throated Pipit *Anthus cervinus*		+	+		WAPO; LC	Common passage migrant and winter visitor. Widely distributed in dry agricultural areas

Fauna	Yau Mei Site EIA [1]	REC Site EIA [2]	R(D) Site EcoIA [3]	Yau Mei Site On-going baseline survey	Local/ Regional/ International Conservation Status [4, 5, 6, 7]	Commonness & distribution in Hong Kong
						throughout Hong Kong
Pallas's Grasshopper Warbler *Locustella certhiola*	+	+	+		WAPO; LC	Common autumn passage migrant. Found in wetland areas throughout Hong Kong
Bright-capped Cisticola *Cisticola exilis*		+	+		WAPO; LC	Scarce winter visitor. Widely distributed in grassland throughout Hong Kong
Zitting Cisticola *Cisticola juncidis*	+	+	+		WAPO; LC	Common passage migrant and winter visitor. Widely distributed in grassland throughout Hong Kong.
Red-billed Starling *Spodiopsar sericeus*	+	+	+		WAPO; GC	Common winter visitor. Widely distributed in Hong Kong
White-cheeked Starling *Spodiopsar cineraceus*	+				WAPO; PRC	Common winter visitor. Found in Deep Bay area, Kam Tin, Long Valley
Daurian Starling *Agropsar sturninus*	+				WAPO; LC	Scarce passage migrant. Found in Mai Po, Long Valley, Kam Tin, Lam Tsuen, Tolo Harbour area, Kowloon Park, Mui Wo, Ho Chung.
White-shouldered Starling *Sturnia sinensis*	+	+	+		WAPO; (LC)	Common passage migrant. Found in Kam Tin, Deep Bay area, Po Toi Island, Long Valley, Victoria Park, Ho Chung, Ma Tso Lung, Mui Wo, Lam Tsuen Valley
Bluethroat *Luscinia svecica*	+				WAPO; LC	Common passage migrant and winter visitor. Widely distributed in wet agricultural areas throughout Hong Kong
Red-throated Pipit *Anthus cervinus*	+				WAPO; LC	Common passage migrant and winter visitor. Widely distributed in dry agricultural areas

Fauna	Yau Mei Site EIA [1]	REC Site EIA [2]	R(D) Site EcoIA [3]	Yau Mei Site On-going baseline survey	Local/ Regional/ International Conservation Status [4, 5, 6, 7]	Commonness & distribution in Hong Kong
						throughout Hong Kong
Chinese Grosbeak *Eophona migratoria*	+	+	+		WAPO; LC	Rare winter visitor. Widely distributed in Hong Kong
Reptile						
Many-banded Krait	+				China Red Data Book: Vulnerable PRC	Widely distributed in New Territories, Hong Kong Island and Lantau Island.
Butterfly						
Pale Palm Dart *Telicota colon*		+	+		LC	Rare, Widely distributed in grassland and shrubland throughout Hong Kong
Plain Hedge Blue *Celastrina lavendularis*	+				LC	Very Rare, Tai Po Kau, Tai Lam Country Park, Kadoorie Farm and Botanic Garden, Ngau Ngak Shan
Danaid Egg-fly *Hypolimnas misippus*	+	+	+		LC	Uncommon, Ngau Ngak Shan, Lung Kwu Tan, Hong Kong Wetland Park, Mount Parker, Cloudy Hill, Lin Ma Hang
Dragonfly						
Coastal Glider *Macrodiplax cora*	+	+	+		LC	Common, Hong Kong Wetland Park, Kam Tin, Lai Chi Wo, Nim Wan and Luk Keng
Scarlet Basker *Urothemis signata*	+	+	+		LC	Common, Common in areas containing abandoned fish ponds throughout Hong Kong

1: ENVIRON Hong Kong Limited (2015); 2: ENVIRON Hong Kong Limited (2013); 3: AEC (2014); 4: AFCD (2015), 5: Wang (1998), 6: Zhao (1998), 7: IUCN (2015)
LC = local concern, PRC = potential regional concern, RC = regional concern, GC = global concern; Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence (Fellowes *et al*,.2002).

8.6 Results of Field Surveys

8.6.1 Habitat and Vegetation

The Project Area is composed of a paved car park with little vegetation cover, an isolated abandoned fishpond, and an area disturbed by previous earthwork and partially concrete

paved. Some young plantations established on the engineering slope on the northern fringe of the Project Area. A total of 33 plant species were recorded in the Project Area, 20 of which are exotic species (**Appendix 8-1**). None of the recorded species was considered of conservation importance / concern.

Habitats recorded within the Assessment Area included plantation, agricultural land, grassland/shrubland, fishpond, drainage channel/nullah, and urbanised/disturbed, (**Figures 8-3 & 8-4, Table 8-5**). A total of 157 plant species were recorded within the Assessment Area., 107 of which are exotic species (**Appendix 8-1**). No plant species considered of conservation importance / concern was recorded during the ecological field survey within the Assessment Area.

Table 8-5 Habitats recorded within the Assessment Area

Habitat	Size (ha)	Percentage (%)	Size (ha)
	Assessment Area		Project Area
Plantation	4.03	3.1	0.3
Agricultural Land	3.34	2.6	-
Grassland/Shrubland	13.85	10.8	-
Urbanised/Disturbed	91.28	71.4	3.17
Fishpond	8.96	7.0	0.33
Flood Storage Pond	0.82	0.6	-
Nullah	1.61	1.3	-
Drainage Channel	3.95	3.1	-
Total	**127.84**	**100.0**	**3.8**

Plantation was mainly found on engineered slopes along the Ngau Tam Mei Drainage Channel, roadsides and the surrounding of the Project Area. Major trees recorded were *Leucaena leucocephala*, *Melaleuca quinquenervia*, *Albizia lebbeck*, *Lagerstroemia speciosa*, and *Macaranga tanarius*. The understorey was planted with amenity shrubs including *Hibiscus rosa-sinensis*, *Schefflera arboricola*, and *Calliandra hematocephala*. Forty-two plant species were recorded.

A small area of agricultural land was once found near the northern boundary of the Assessment Area. Major crops were lettuce (*Lactuca sativa*) while fruit trees such as longan (*Dimocarpus longan*) and papaya (*Cairica papaya*) were also seen. However most of these agricultural plots were found abandoned or left fallowed during later surveys. Some abandoned agricultural lands were inundated and covered with some reeds and other wetland plants during wet season. Twelve plant species were recorded in this habitat.

The urbanised/disturbed area was composed of the existing residential area, open storage area, villages, highways and roads and was the dominant habitat in the Assessment Area. Ornamental or landscaping species recorded in this habitat included *Acacia confusa*, *Melaleuca quinquenervia*, *Albizia lebbeck* and *Syzygium jambos*. Seventy-four plant species were recorded.

Most drainage channel and nullah were concreted with little vegetation grown on banks or bottom, and hence provide very little habitat for floral or faunal utilisation. Most recorded species are ruderal herbs or weeds such as *Panicum maximum* and *Conyza canadensis*. A few individuals of mangrove species, i.e. *Acanthus ilicifolius*, colonised on channel banks.

Seventeen plant species were recorded here. The Ngau Tam Mei Drainage Channel passing through the Assessment Area had grasscreted banks and in some sections the channel bed was covered by muddy sediment. Waterbirds, mostly ardeids, were observed roosting and foraging in this drainage channel during low tides in winter, mainly at locations of 150m north of the Project Area (see sections on avifauna below).

Grassland/Shrubland was formed apparently from abandonment of agricultural land followed by earthwork and possibly also hydroseeding. This habitat was dominated by weeds and ruderals while a few isolated trees were also seen. Part of these grassland/shrubland was inundated and covered with some reeds during wet season. No plant species of conservation importance was recorded in the reed stands or the seasonally inundated areas in grassland/shrubland during the ecological survey of previous study (ENVIRON Hong Kong Limited. 2013).

Two kinds of ponds were recorded in the Assessment Area: fish ponds and flood storage pond. The fish ponds recorded in both the Project Area and Assessment Area were found abandoned when the field survey commenced. Some were overgrown with reeds while others had disturbed bunds and little vegetation cover. During the verification surveys in 2016, all fishponds in the Assessment Area still found remained abandoned. The flood storage pond is an engineering pond which was part of the drainage channel element where surplus water during wet season was stored. The bunds were planted with some ornamental and native vegetation.

8.6.2 Avifauna

The Project Area is composed of a concrete paved car park with little vegetation cover and an isolated abandoned fishpond. The fishpond in the Project Area appeared to be abandoned for long time, and subjected to disturbance from the adjacent carpark at least since early 1990's. Therefore, trash shrimps and fishes, which are abundant in active fishponds during drain-down for harvesting of commercial fishes and attracting many waterbirds (Young and Chan 1997), were not available in the pond within the Project Area. Fishpond in the Project Area was not drained throughout the whole study period. In addition, the pond is surrounded by urbanised/disturbed areas, which are of very high human disturbance. The pond bunds are steep and could provide little foraging habitats for wading birds. No aquatic fauna collected by the baited fish cages deployed in the abandoned fishpond inside the Project Area. The ecological value of the fishpond inside the Project Area as foraging habitats of waterbirds is very limited.

The rest of the Project Area is a paved car park with limited vegetation cover. The ecological value of this type as habitat of wildlife is also limited, due to the high disturbance level.

Twelve bird species were recorded in the Project Area (**Appendices 8.2a**). Four of the recorded species are considered of conservation importance, including Little Grebe, Grey Heron, Little Egret and Chinese Pond Heron (**Table 8-6**). Abundance of these waterbird species were present in the Project Area in very low abundance, which accounted for insignificant proportion of Deep Bay population. These species were also found in other areas within the Assessment Area. The other bird species recorded in the Project Area are common in Hong Kong, and are typical of disturbed areas (e.g., Chinese Bulbul, Eurasian Tree Sparrow).

Most of the Assessment Area is Urbanised/Disturbed, which is subjected to very high human disturbance level and with very little vegetation. Other habitats within the Assessment Area (e.g., plantation, fish pond) were mostly fragmented and small in size. Fauna recorded in the Assessment Area were mostly disturbance tolerant species.

A total of 69 bird species were recorded in the Assessment Area (**Appendix 8.2a**). Species richness was considered low in plantation, urbanised/disturbed, grassland/shrubland, pond (fishpond and flood storage pond) and channel/nullah, and low to moderate in agricultural land within the Assessment Area. Bird abundance were low in plantation, agricultural land (active and abandoned), urbanised/disturbed, wasteland, pond (fishpond and flood storage pond) within the Assessment Area. Bird abundance was moderate in drainage channel/nullah.

Twenty bird species recorded in the Assessment Area were considered of conservation importance (**Table 8-6**) (**Figure 8-3**). These species of conservation importance included Little Grebe *Tachybaptus ruficollis*, Great Cormorant *Phalacrocorax carbo*, Grey Heron *Ardea cinerea*, Purple Heron *Ardea purpurea*, Chinese Pond Heron *Ardeola bacchus*, Black-crowned Night Heron *Nycticorax nycticorax*, Little Egret *Egretta garzetta*, Eastern Cattle Egret *Bubulcus coromandus*, Great Egret *Ardea alba*, Black-faced Spoonbill *Platalea minor*, Black Kite *Milvus migrans*, Common Kestrel *Falco tinnunculus*, Eastern Buzzard *Buteo japonicus*, Little ringed Plover *Charadrius dubius*, Wood Sandpiper *Tringa glareola*, Common Redshank *Tringa totanus,* Greater Coucal *Centropus sinensis*, White-throated Kingfisher *Halcyon smyrnensis*, Zitting Cisticola *Cisticola juncidis* and Collared Crow *Corvus torquatus*.

Single Little Grebes were recorded in the abandoned fishponds within Project Area. No sign of breeding was observed in this pond. This species was also recorded in fishponds outside the Project Area in the Assessment Area.

Great Cormorants were recorded outside the Project Area. All observed birds flew over the drainage channel passing through the Assessment Area.

Seven ardeid species of conservation importance were recorded within the Assessment Area. These ardeids were recorded in fishponds, flood storage pond and drainage channel in the Assessment Area. Flocks of 50 Little Egrets and 20 Great Egrets were recorded in the section of Ngau Tam Mei Drainage Channel at 150m north of the Project Area with some emergent plants during low tide in a survey in January 2010. Apart from this observation, abundance of ardeids observed in the Assessment Area was generally not high. The number of foraging ardeids observed within the Assessment Area during peak breeding season of ardeids (April to July) was very low (< 10 birds). This showed that utilization of the wetland habitats within the Assessment Area as foraging habitats by breeding ardeids was low.

Black-faced Spoonbills were once observed foraging in the same section of Ngau Tam Mei Drainage Channel during low tide in December 2015. The number of birds (2 birds) observed was also low.

Three species of raptors of conservation importance, Black Kite, Eastern Buzzard and Common Kestrel, were recorded within the Assessment Area. Black Kites were recorded in soaring above urbanised/disturbed and fishpond. Common Kestrel was observed foraging in active agricultural land. Eastern Buzzards were observed soaring above urbanised/disturbed, grassland/shrubland and fishpond outside the Project Area.

Three species of waders of conservation importance were recorded within the Assessment Area. These were Little Ringed Plover, Wood Sandpiper and Common Redshank. All were recorded in drained fishponds within the Assessment Area, and were present in low abundance. The other species of conservation importance, including Greater Coucal, White-throated Kingfisher, Zitting Cisticola and Collared Crow, were present in low abundance within the Assessment Area.

Table 8-6 Bird species of conservation importance

Common names & *Scientific names*	Project Area			Assessment Area (excluding Project Area)			Commonness in Hong Kong [1]	Local/ regional/ international Protection and Conservation Status [1, 2, 3, 4]
	No. of surveys with records*	Mean no. **	Max no.	No. of surveys with records *	Mean no. **	Max no.		
Little Grebe *Tachybaptus ruficollis*	4	0.16	2	8	0.33	2	Common resident. Found in Deep Bay area	WAPO (Cap 170); LC
Great Cormorant *Phalacrocorax carbo*	-	-	-	8	0.33	2	Common winter visitor. Widely distributed in coastal areas throughout Hong Kong	WAPO (Cap 170); PRC
Grey Heron *Ardea cinerea*	1	0.08	2	10	0.67	7	Common winter visitor. Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar	WAPO (Cap 170); PRC
Purple Heron *Ardea purpurea*	-	-	-	2	0.08	1	Uncommon passage migrant. Found in Deep Bay area	WAPO (Cap 170); RC
Chinese Pond Heron *Ardeola bacchus*	1	0.04	1	10	1.21	8	Common resident. Widely distributed in Hong Kong	WAPO (Cap 170); PRC, (RC)
Black-crowned Night Heron *Nycticorax nycticorax*	-	-	-	6	0.33	2	Common resident and winter visitor. Widely distributed in Hong Kong	WAPO (Cap 170); (LC)
Little Egret *Egretta garzetta*	2	0.08	1	22	3.63	50	Common resident. Widely distributed in coastal area throughout Hong Kong	WAPO (Cap 170); PRC, (RC)
Eastern Cattle Egret *Bubulcus coromandus*	-	-	-	3	1.00	13	Resident and common passage migrant. Widely distributed in Hong Kong	WAPO (Cap 170); (LC)
Great Egret *Ardea alba*	-	-	-	12	1.71	20	Common resident and winter visitor. Widely distributed in Hong Kong	WAPO (Cap 170); PRC, (RC)
Black-faced Spoonbill *Platalea minor*	-	-	-	1	0.08	2	Common winter visitor. Found in Deep Bay area	WAPO (Cap 170); IUCN Red List: Endangered; China Red Data Book: Endangered; PGC
Black Kite *Milvus migrans*	-	-	-	8	0.33	1	Common resident and winter visitor. Widely distributed in Hong Kong	WAPO (Cap 170); Class 2 Protected Animal of China; Appendix 2 of CITES;

Common names & *Scientific names*	**Project Area**			**Assessment Area (excluding Project Area)**			**Commonness in Hong Kong [1]**	**Local/ regional/ international Protection and Conservation Status [1, 2, 3, 4]**
	No. of surveys with records*	**Mean no. ****	**Max no.**	**No. of surveys with records ***	**Mean no. ****	**Max no.**		
								(RC)
Common Kestrel *Falco tinnunculus*	-	-	-	1	0.04	1	Common autumn migrant and winter visitor. Widely distributed in Hong Kong	WAPO (Cap 170); Class 2 Protected Animal of China; Appendix 2 of CITES
Eastern Buzzard *Buteo japonicus*	-	-	-	3	0.13	1	Common winter visitor. Widely distributed in Hong Kong	WAPO (Cap 170); Class 2 Protected Animal of China; Appendix 2 of CITES
Little Ringed Plover *Charadrius dubius*	-	-	-	1	0.13	3	Common winter visitor and passage migrant. Widely distributed in freshwater areas throughout Hong Kong	WAPO (Cap 170); (LC)
Wood Sandpiper *Tringa glareola*	-	-	-	3	0.13	1	Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong	WAPO (Cap 170); RC
Common Redshank *Tringa totanus*	-	-	-	1	0.13	3	Common passage migrant. Found in Deep Bay area	WAPO (Cap 170); RC
Greater Coucal *Centropus sinensis*	-	-	-	2	0.08	1	Common resident. Widely distributed in Hong Kong	WAPO (Cap 170); Class 2 Protected Animal of China; China Red Data Book: vulnerable
White-throated Kingfisher *Halcyon smyrnensis*	-	-	-	2	0.08	1	Common resident. Widely distributed in coastal areas throughout Hong Kong	WAPO (Cap 170); (LC)
Zitting Cisticola *Cisticola juncidis*	-	-	-	1	0.04	1	Common passage migrant and winter visitor. Widely distributed in grassland throughout Hong Kong	WAPO (Cap 170); LC
Collared Crow *Corvus torquatus*	-	-	-	1	0.08	2	Uncommon resident. Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek lap Kok, Shuen Wan, Lam Tsuen	IUCN: near-threatened; WAPO (Cap 170); LC

1: AFCD (2015), 2: Wang (1998), 3: Zhao (1998), 4: IUCN (2015).

Level of concern: LC = local concern, PRC = potential regional concern, RC = regional concern, GC = global concern; Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence (Fellowes *et al*,.2002).

* Number of surveys with record of the respective species.

** The mean count was number of individuals per total number of surveys.

Twenty-nine species of birds were observed flying above the Assessment Area (**Appendix 8.2b**). No major flight line was observed over the Project Area. Very few birds (2.4% of total observed) flew across the Project Area as it and the surroundings were mainly urbanized/disturbed area.

Large waterbirds are considered of lower flight maneuverability and hence will be more vulnerable to barrier to flight. Large waterbird species observed flying in the Assessment Area included Little Egret, Great Egret, Grey Heron, Black-crowned Night Heron, Chinese Pond Heron, Eastern Cattle Egret and Great Cormorant (**Table 8-7**). The flight heights of these large waterbird species ranged between 15 and 34m above ground (see **Table 8-7**), with a mean of 22m. These species were mainly flying along the drainage channel within the Assessment Area. Only Chinese Pond Heron (31m) and Little Egret (27m, 32m) were observed flying across the Project Area during the surveys and the abundance was very low.

Other bird species (e.g., Crested Myna *Acridotheres cristatellus*, Common Magpie *Pica pica*) observed within the Assessment Area mainly flew to-and-fro the agricultural lands in the northern side of the Assessment Area.

Table 8-7 Summary of Flight Observations of Large Waterbirds

Height Interval (m)	Project Area (no. of birds)	Assessment Area (no. of birds)
0-10	0	0
10-20	0	20
20-30	1	55
30-40	2	55
>40	0	0

8.6.3 Other Terrestrial Fauna

Butterfly and dragonfly

Nine species of butterfly were recorded in the Project Area (**Appendix 8.3**). All recorded species are very common or common in Hong Kong, and were present in low abundance. None of the recorded species was considered of conservation importance. The low diversity of butterfly in the Project Area was related to high disturbance level, low vegetation cover and dominated by exotic plant species.

Thirty-one species of butterfly were recorded in the Assessment Area (**Appendix 8.3**). Apart from Common Sergeant *Athyma perius*, all are common in Hong Kong (Chan *et al*. 2011). Common Sergeant is uncommon in Hong Kong. No butterfly species recorded was considered of conservation importance. Abundance and species richness of butterflies were low in all types of habitats within the Assessment Area. The low diversity of butterfly within the Assessment Area was due to low vegetation coverage and diversity.

Five species of dragonfly were recorded in the Project Area (**Appendix 8.4**). All recorded species are common or abundant in Hong Kong.

A total of 16 species of dragonfly were recorded in the Assessment Area (**Appendix 8.4**). All are common in Hong Kong (Tam *et al*. 2011). Abundance and species richness of dragonflies were very low in all types of habitats within the Assessment Area. The low diversity of dragonfly within the Assessment Area was due to paucity of optimal freshwater habitat. Drainage channel and nullah within the Assessment Area were of poor water quality. The presence of fish in fishponds and flood storage ponds limited the uses as breeding habitats by dragonflies.

Herpetofauna

Two species of reptiles were recorded in the Project Area (**Appendix 8.5**). Both species are common in Hong Kong.

Six species of reptiles were recorded in the Assessment Area (**Appendix 8.5**). These were Chinese Gecko *Gekko chinensis*, Bowring's Gecko *Hemidactylus bowringii*, Changeable Lizard *Calotes versicolor*, Chinese Skink *Eumeces chinensis*, Long-tailed Skink *Mabuya longicaudata* and King Cobra *Ophiophagus hannah*. All except King Cobra are common in Hong Kong, and occur in many types of habitats (Karsen *et al*. 1998).

King Cobra is widespread but uncommon in Hong Kong (Chan *et al*. 2006). This species occurs in many types of habitats, e.g., grassland, shrubland. King Cobra is listed in Appendix 2 of CITES, considered "vulnerable" by IUCN Red List and ranked "critically endangered" by China Red Data Book (Chan *et al*. 2006). This species was recorded in grassland/shrubland within the Assessment Area.

Two species of amphibians were recorded in the Project Area (**Appendix 8.5**). Both species are common in Hong Kong. These species were recorded in very low abundance. The low number of amphibian species recorded was related to the isolation and high level of disturbance level.

Five species of amphibians were recorded within the Assessment Area (**Appendix 8.5**). These were Asian Common Toad *Bufo melanostictus*, Gunther's Frog *Rana guentheri*, Asiatic Painted Frog *Kaloula pulchra,* Paddy Frog *Fejervarga limnocharis* and Brown Tree Frog *Polypedates megacephalus*. All are common in Hong Kong (Chan *et al*. 2005).

Mammal

Two species of mammals were recorded in the Project Area (**Appendix 8.5**). Four species of mammals were recorded within the Assessment Area (**Appendix 8.5**). Apart from Japanese Pipistrelle, none of these species was considered of conservation importance. Japanese Pipistrelles *Pipistrellus abramus* is considered of conservation importance. Japanese Pipistrelles were sighted all over the Assessment Area (**Appendix 8.5**). This species is common in Hong Kong and occurs in many types of habitats (Shek 2006). All bats are protected under WAPO in Hong Kong. The other mammal species (e.g., Brown Rat *Rattus norvegicus*) recorded within the Assessment Area are considered of low conservation importance. No medium-sized mammal was recorded in the Assessment Area during the surveys. This was due to the high level of disturbance and isolation from natural habitats.

8.6.4 Aquatic Fauna

There was no aquatic fauna collected by the baited fish cages deployed in the abandoned fishpond inside the Project Area. Only Tilapia were recorded in the pond within the Project Area. Tilapia and Mullet *Mugil cephalus* were observed in the nullah and drainage channel within the Assessment Area.

Mullet is often found in estuarine areas and coastal waters. They could move between the brackish water and the seawater. Tilapia is also common in brackish waters, freshwater ponds as well as ditches throughout Hong Kong. Both species are considered of low conservation importance.

8.6.5 Condition Prior to Pond-filling

The Project Area is outside both WBA and WCA under the TPB Guidelines (TPB PG-No. 12C) (see Section 8.5.1). The Project Site is zoned as "Residential (Group D)" ["R(D)"] on the approved Outline Zoning Plan, so the Project Site is planned for residential development with planning permission. As discussed in **Section 2.2**, pond filling in the development zone "R(D)" was approved in the previous planning application no. A/YL-MP/170 in year 2010.

Nevertheless, the ecological conditions prior to pond filling was investigated based on best available information such as historic aerial photos and previous published documents. Fishponds in the Deep Bay region were mainly converted from rice fields since the mid 1960s (Irving and Morton 1988). As revealed from the past aerial photos, there were previously two ponds within the Project Area, which were basically intact in 1999. When the Study Brief of this Project was issued in 2009, there was only one pond within the Project Site. The existing abandoned pond within the Project Area was partially filled in 2009. Filling might occur between 2009 and 2010.

Aerial photos were reviewed to identify any changes of potential ecological value of the Project Area and the surrounding areas as waterbird habitats. Pond-filling, in fact, would only affect the ecological characteristic of the ponds within the Project Area. The effect would be localized and had no effect on the other habitats within the Assessment Area, particularly because the abandoned pond in the Project Area was isolated from other wetland habitats and surrounded by urbanised disturbed habitats for long time and before filling occurred. The ecological profile prior to pond filling was also evaluated by reviewing previous EIA studies listed as following, which have also covered the Assessment Area in general:

- Environmental Impact Assessment for the Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin (EIA-052/BC) (ERM 1996) (survey period: from December 1994 to January 1995);
- Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2 (AEIAR-078/2004) (survey period: from July 2002 to January 2003); and
- Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" (AEIAR-133/2009) for any significant record from these two ponds (survey period: from November 2006 to April 2007).

The two ponds in the Project Area were located near Chuk Yuen Tsuen. These two ponds were already isolated from the continuous and contiguous Deep Bay wetland system in 1990. According to previous EIA study (ERM 1996), fishponds in the vicinity of Chuk Yuen Tsuen and Ha San Wai (probably included the two ponds in the Project Area) were ranked as "Grade C" ponds as per the AFD fishpond classification. The classification criteria of Grade C ponds were "Areas with scattered small fish ponds and substantial amount of fishponds are either idle or filled. They are subject to high development pressure due to its proximity to developments". In general, small, scattered ponds located near developments would be subject to higher level of disturbance, which would discourage the utilisation by large waterbirds. Hence, the two ponds in the Project Area were unlikely important foraging habitats for large waterbirds at that time.

In addition to the above-mentioned EIA study, the assessment areas of the EIA studies of "Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2" and "Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River" also covers the existing abandoned fishpond within their Project Area. The ecological surveys

of both previous EIA studies were conducted before filling of the existing abandoned fishpond occurred. There was nil observation of significant ecological value at this abandoned fishpond (i.e. no species of conservation importance recorded) in these previous EIA studies. Ecological value of the subject abandoned fishpond was assessed as low in the EIA report for the sewerage project above.

Based on the current ecological survey results presented in Section 8.6.2, utilisation of this abandoned fishpond by waterbirds was found very low although some waterbirds were recorded at this abandoned pond. This abandoned pond was unlikely their key foraging habitats since they were also found in other areas within the Assessment Area in particular Ngau Tam Mei Channel in higher numbers. Relatively, the abundance of waterbird species recorded in the Project Area were very low, which accounted for insignificant proportion of Deep Bay population (Section 8.6.2 refers). Previous EIA studies and the survey findings of this project did not indicate that this pond was important habitats for ardeids. Given the abandoned fishpond within the project area is small, isolated and subject to disturbance due to heavy traffic movement of the adjacent car park for a long time, its potential as foraging habitat for waterbirds is considered very low even before filling occurred. The ecological profile established from literature review and ecological surveys, which also reflects the condition prior to pond-filling within the Project Area, is then used for the ecological assessment of this Project as described in following paragraphs.

8.7 Evaluation of Habitats and Species

The ecological importance of the habitats within the Project Area (**Table 8-8**) and Assessment Area was evaluated in accordance with the criteria stipulated in Annex 8 of EIAO-TM (**Table 8-9** to **Table 8-14**).

In accordance with Table 3, Annex 8 of the EIAO-TM, the ecological value of species was assessed in terms of protection status (e.g. fauna protected under WAPO (except birds), and flora and fauna protected under regional/global legislation/conventions), species distribution (e.g. endemic), and rarity (e.g. rare or restricted). The list and evaluation of faunal species of conservation importance recorded within the Assessment Area, according to the EIAO-TM, are given in **Table 8-15**.

8.7.1 Habitats within the Project Area

The Project Area of the present project, however, is mainly covered by urbanized/disturbed habitat, which is not important habitats of these waterbird species. The single isolated abandoned fishpond within the Project Area is also not considered important habitat to these species due to the isolation and the high disturbance level from the surrounding areas (e.g., car park in the Project Area).

Table 8-8 Evaluation of Plantation Habitat within the Assessment Area

Criterion	Description		
	Urbanised/disturbed	Plantation	Abandoned Fishpond
Naturalness	Man-made habitat	Man-made (planted).	Man-made habitat
Size	3.17 ha	0.3 ha	0.33 ha
Diversity	Low flora diversity. Low diversity of butterfly, low diversity of bird, and very low diversity of dragonfly.	Low flora diversity. Low diversity of butterfly, bird, and very low diversity of dragonfly.	Low flora diversity. Low diversity of butterfly and bird, and very low diversity of dragonfly.

Criterion	Description		
	Urbanised/disturbed	Plantation	Abandoned Fishpond
Rarity	None for flora Fauna species of conservation importance: Japanese Pipistrelle and Chinese Pond Heron (flew over the Project Area without landing)	No flora or fauna species of conservation importance	None for flora. Fauna species of conservation importance: Little Grebe, Chinese Pond Heron, Little Egret, Grey Heron
Re-creatability	Easy to recreate	Easy to recreate	Easy to recreate
Fragmentation	None	Formed thin belts on engineered slopes	Isolated from other continuous wetland ecosystem of Deep Bay.
Ecological linkage	Not functionally linked to habitats of conservation importance	Not functionally linked to habitats of conservation importance	Not functionally linked to habitats of conservation importance
Potential value	Low	Low due to small footprint and regular maintenance	Very low due to isolation, small size and subject to high level of disturbance.
Nursery/breeding ground	No significant record.	No significant records.	No significant record.
Age	N/A	Young	N/A
Abundance/richness of wildlife	Low for butterfly and bird, very low for dragonfly.	Low for butterfly and bird, and very low for dragonfly	Low for butterfly and bird, very low for dragonfly.
Overall ecological value	Very Low	Very Low	Very Low

8.7.2 Habitats within the Assessment Area

Habitats within the Assessment Area are mostly of low ecological value, dominated by Urbanised/disturbed.

The Ngau Tam Mei Drainage Channel located to the west of the Project Area might provide some foraging habitats to these species (e.g., Black-faced Spoonbill, Little Egret) during low tides. Previous EIA studies also indicated that the channel might be used by wintering waterbirds during low tides.

In the R(D) Site EcoIA and the REC Site EIA, the Ngau Tam Mei Drainage Channel was found to provide foraging habitats to ardeids, in particular in winter. But their numbers were considered very small in the context of Deep Bay.

Fishponds within WCA which are more or less continuous and less disturbed are considered of higher ecological value, but ecological value of ponds to the east of the Ngau Tam Mei Channel, including the abandoned fishpond within the Project Area, was ranked as “low” in the REC EIA (Table 8.21 in ENVIRON Hong Kong Limited 2013) and R(D) Site EcoIA (Table 15 of AEC 2014).

Table 8-9 Evaluation of Plantation Habitat within the Assessment Area

Criterion	Description
Naturalness	Man-made (planted).
Size	A total of 4.03 ha
Diversity	Low flora diversity. Low diversity of butterfly, bird, and very low diversity of dragonfly.
Rarity	None for flora. Fauna species of conservation importance: Japanese Pipistrelle
Re-creatability	Easy to recreate
Fragmentation	Formed thin belts on engineered slopes
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low due to small footprint and subjected to high level of disturbance from traffic
Nursery/breeding ground	No significant records. Value as breeding habitat for terrestrial fauna is low due to sparse canopy and exotic tree species composition, and subjected to high level of disturbance from traffic.
Age	Young
Abundance/richness of wildlife	Low for butterfly and bird, and very low for dragonfly
Overall ecological value	Very Low

Table 8-10 Evaluation of Agricultural Land within the Assessment Area

Criterion	Description
Naturalness	Man-made habitat, mostly left fallow/abandoned
Size	3.34 ha
Diversity	Low flora diversity. Low to moderate diversity of bird, low diversity of butterfly and very low diversity of dragonfly.
Rarity	None for flora. Fauna species of conservation importance: Japanese Pipistrelle, Common Kestrel and White-throated Kingfisher and Collared Crow
Re-creatability	Easy to re-create
Fragmentation	Isolated stand
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Limited.
Nursery/breeding ground	No significant record. Minimal due to high level of disturbance from intensive management
Age	N/A
Abundance/richness of wildlife	Low for butterfly and bird, and very low dragonfly abundance
Overall ecological value	Low to moderate

Table 8-11 Evaluation of Urbanised/Disturbed Habitat within the Assessment Area

Criterion	Description
Naturalness	Man-made habitat
Size	91.28 ha
Diversity	Low flora diversity. Low to moderate diversity of butterfly, low diversity of bird, and very low diversity of dragonfly.
Rarity	None for flora. Fauna species of conservation importance: Japanese Pipistrelle, Little Egret, Chinese Pond Heron, Zitting Cisticola and Greater Coucal
Re-creatability	Easy to recreate
Fragmentation	None
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	No significant record. Minimal due to high level of disturbance
Age	N/A
Abundance/richness of wildlife	Low for butterfly and bird, very low for dragonfly.
Overall ecological value	Very Low

Table 8-12 Evaluation of Grassland/Shrubland within the Assessment Area

Criterion	Description
Naturalness	Man-made habitat, with earthwork and possibly hydroseeded after abandonment of agriculture
Size	13.85 ha
Diversity	Low flora diversity. Low diversity of butterfly and bird, and very low diversity of dragonflies.'
Rarity	None for flora; Fauna species of conservation importance: Japanese Pipistrelle, Chinese Pond Heron, Black-crowned Night Heron, Little Egret, Black Kite and King Cobra
Re-creatability	Easy to recreate
Fragmentation	None
Ecological linkage	Not functionally linked to habitats of conservation importance
Potential value	Low
Nursery/breeding ground	No significant record. Minimal as nursey/breeding ground due to high level of disturbance
Age	N/A
Abundance/richness of wildlife	Low for butterfly and bird, and very low for dragonfly.
Overall ecological value	Low to moderate

Table 8-13 Evaluation of Pond (Fish Pond and Flood Storage Pond) within the Assessment Area

Criterion	Description
Naturalness	Man-made habitat
Size	8.96 ha (abandoned fish pond), 0.82 ha (flood storage pond)
Diversity	Low flora diversity. Low diversity of butterfly and bird, and very low diversity of dragonfly.
Rarity	None for flora. Fauna species of conservation importance: Japanese Pipistrelle, Little Grebe, Chinese Pond Heron, Black-crowned Night Heron, Purple Heron, Little Egret, Great Egret, Eastern Buzzard, Little Ringed Plover, Wood Sandpiper, Common Redshank, Black Kite and Greater Coucal
Re-creatability	Easy to recreate
Fragmentation	The fishpond within the Project Area is isolated from other wetland habitats. Fishponds in the southern corner of the Assessment Area exist as a fairly large patch
Ecological linkage	The fishpond within the Project Area and those to the east of the Project Area are not functionally linked to habitats of conservation importance. Some of the fishponds in the southern corner of the Assessment Area fall within WBA.

Criterion	Description
Potential value	Very low for the fishpond in the Project Area and those to the east of the Project Area due to isolation, small size and subject to high level of disturbance. Low to moderate for those fishponds in the south corner of the Assessment Area due to larger size and located within/close to WBA
Nursery/breeding ground	No significant record. Minimal for the fishpond in the Project Area as nursey/breeding ground due to subjected to high level of disturbance. The abandoned fishponds in the south corner of the Assessment Area might provide breeding habitats for birds, amphibians and dragonflies.
Age	N/A
Abundance/richness of wildlife	Low for butterfly and bird, very low for dragonfly.
Overall ecological value	Very Low for the fishpond in the Project Area and those to the east of the Project Area. Low to moderate for Flood Storage Pond. Low to moderate for those fishponds in the south corner of the Assessment Area.

Table 8-14 Evaluation of Drainage Channel/Nullah within the Assessment Area

Criterion	Description
Naturalness	Man-made, with concrete bank and bottom
Size	1755 m, 3.95ha (Drainage channel), 2283 m, 1.61ha (nullah)
Diversity	Low flora diversity. Low diversity of bird and butterfly, very low diversity of dragonflies.
Rarity	Fauna species of conservation importance: Japanese Pipistrelle, Great Cormorant, Grey Heron, Chinese Pond Heron, Little Egret, Eastern Cattle Egret, Great Egret, Black-faced Spoonbill, Black Kite.
Re-creatability	Easy to recreate
Fragmentation	The Ngau Tam Mei Main Drainage Channel is connected to the Kam Tin River Channel. Other drainage channel/nullahs are fragmented by urbanised/disturbed habitats
Ecological linkage	Hydrological linked to Inner Deep Bay
Potential value	Low due to the main function for flood control, surrounded by urbanised/disturbed habitats. The Ngau Tam Mei Main Drainage Channel could provide foraging and roosting habitats for some water birds
Nursery/breeding ground	No significant record. Minimal as nursey/breeding ground due to subjected to high level of disturbance and low habitat complexity
Age	N/A
Abundance/richness of wildlife	Low aquatic fauna abundance. Moderate for bird, low for butterfly and very low for dragonfly.
Overall ecological value	Moderate for the Ngau Tam Mei Main Drainage Channel Low for other drainage channel/nullah

8.7.3 Fauna Species of Conservation Importance within the Assessment Area

From both literatures and field survey results, three species of butterfly, two species of dragonfly, two specie of mammal and forty-one species of avifauna, mostly waterbirds, were considered of conservation importance.

Table 8-15 Evaluation of faunal species of conservation importance within the Assessment Area

Common name	Locations	Protection status	Distribution	Rarity
Japanese Pipistrelle	Seen in all types of habitats within Project Area and Assessment Area	WAPO (Cap 170)	Widespread	Very common in Hong Kong
Little Grebe	Recorded in fishpond within the Project Area and Assessment Area Recorded in very low abundance in the abandoned fishpond in the Project Area	WAPO (Cap 170); LC	Mainly found in Deep Bay area	Common in Hong Kong
Great Cormorant	Flying above drainage channel outside the Project Area	WAPO (Cap 170); PRC	Mainly found in Deep Bay area	Common in Hong Kong
Grey Heron	Roosting in grassland/shrubland, fishpond, flood storage pond and drainage channel outside the Project Area Recorded in very low abundance in the abandoned fishpond in very low numbers	WAPO (Cap 170); PRC	Mainly found in Deep Bay area	Common in Hong Kong
Purple Heron	Recorded in fishpond outside the Project Area	WAPO (Cap 170); Level of Concern: RC	Found in Deep Bay area	Uncommon passage migrant
Chinese Pond Heron	Mainly found in areas with emergent plants in drainage channel, also found in fishpond, grassland/ shrubland and flood storage pond outside the Project Area;	WAPO (Cap 170); PRC, (RC)	Widespread	Common in Hong Kong

Common name	Locations	Protection status	Distribution	Rarity
	Recorded in very low numbers in the abandoned fishpond in the Project Area; One bird flew over the Project Area			
Black-crowned Night Heron	Single birds found in grassland/ shrubland and fishpond outside the Project Area	WAPO (Cap 170); (LC)	Mainly found in low lying wetlands and coastal areas with mangroves	Common in Hong Kong
Little Egret	Found in areas with emergent plants in drainage channel, also found in urbanized/disturbed, grassland/ shrubland, flood storage pond and fish pond outside the Project Area; Recorded in the abandoned fishpond in the Project Area in very low numbers, two birds observed flew across the Project Area	WAPO (Cap 170); PRC, (RC)	Widespread	Common in Hong Kong
Eastern Cattle Egret	Found in drainage channel and agricultural land outside the Project Area	WAPO (Cap 170); (LC)	Widespread	Common in Hong Kong
Great Egret	Mainly found in areas with emergent plants in drainage channel, also found in grassland/ shrubland and flood storage pond outside the Project Area	WAPO (Cap 170); PRC, (RC)	Mainly found in Deep Bay area	Common in Hong Kong
Black-faced Spoonbill	Two birds foraging in section of Ngau Tam Mei drainage channel near Yau Mei San Tsuen outside the Project during low tide	WAPO (Cap 170); IUCN Red List: Endangered; China Red Data Book: Endangered; Level of Concern: PGC	Found in Deep Bay area	Common winter visitor
Black Kite	Soaring above urbanized/disturbed and fishpond outside the Project Area	WAPO (Cap 170); Appendix 2 of CITES; Class 2 Protected Animal of PRC	Widespread	Common in Hong Kong

Common name	Locations	Protection status	Distribution	Rarity
Eastern Buzzard	Soaring above urbanized/disturbed, grassland/shrubland and fishpond outside the Project Area	WAPO (Cap 170); Appendix 2 of CITES; Class 2 Protected Animal of PRC	Widespread	Common winter visitor
Common Kestrel	Single birds foraging in agricultural land outside the Project Area	WAPO (Cap 170); Appendix 2 of CITES; Class 2 Protected Animal of PRC	Widespread	Common in Hong Kong
Little Ringed Plover	Three birds were recorded in drained fishpond outside the Project Area	WAPO (Cap 170); (LC)	Widespread	Common in Hong Kong
Wood Sandpiper	Three birds were recorded in drained fishpond outside the Project Area	WAPO (Cap 170); RC	Widespread	Common in Hong Kong
Common Redshank	Three birds were recorded in drained fishpond outside the Project Area	WAPO (Cap 170); RC	Mainly found in Deep Bay area	Common in Hong Kong
Greater Coucal	Found in grassland/ shrubland and fishpond habitat outside the Project Area	WAPO (Cap 170); Appendix 2 of CITES; Class 2 Protected Animal of PRC; China Red Data Book: Vulnerable	Widespread	Common in Hong Kong
White-throated Kingfisher	Recorded in agricultural land outside the Project Area	WAPO (Cap 170); (LC)	Mainly found in coastal mudflat and mangroves, also seen in inland fishponds, wet agricultural areas	Common in Hong Kong
Zitting Cisticola	One bird was recorded in urbanized/disturbed outside the Project Area	WAPO (Cap 170); LC	Found in open areas with long grasses	Uncommon in Hong Kong
Collared Crow	One bird was recorded in agricultural land outside the Project Area	WAPO (Cap 170); LC IUCN Red List: Near threatened	Usually found near coastal areas	Uncommon in Hong Kong
King Cobra	One individual found in grassland/ shrubland outside the Project Area	Appendix 2 of CITES; IUCN Red List: Vulnerable China Red Data Book: Critically endangered	Widespread	Uncommon in Hong Kong

1: AFCD (2015), 2: Wang (1998), 3: Zhao (1998), 4: IUCN (2015)

Remark: Level of concern: LC = local concern, PRC = potential regional concern, RC = regional concern, GC = global concern; Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence (Fellowes *et al*,.2002).

8.8 Impact Identification and Evaluation

8.8.1 Proposed Construction Works

The extent of the Project Area is shown in **Figure 8-1**, while the master layout plan of the proposed residential development is the Recommended Layout Option shown in Figure 2-7 of **Chapter 2**.

The potential terrestrial and aquatic ecological impacts arising from the construction works, including loss of habitats, removal of vegetation, and disturbance to wildlife, were assessed in accordance with Annexes 8 and 16 of the EIAO-TM.

8.8.2 Construction Phase Impacts

Direct Impact due to Habitat Loss

The Project Area is located outside WBA and of 520m from WCA. There will be no encroachment to the fishponds and wetlands within the WCA, or influence on the planning intentions of the WBA on protecting the ecological integrity of WCA.

Loss of habitats and associated vegetation due to site formation within the Project Area will constitute direct ecological impacts of the Project (**Table 8-16**). The Project Area is covered by habitats of very low ecological value. Estimated habitat loss includes 3.17 ha of urbanised/disturbed area, 0.3 ha of plantation and 0.33 ha of abandoned fishpond.

Losses of limited extent of urbanised/disturbed area and plantation and their associated flora and fauna, are considered **insignificant,** due to the small area affected, disturbed nature, low diversity of flora and fauna and the presence of only common species. No mitigation for loss of these habitats is required. Plantation lost to the Project will be mainly composed of the undesirable weedy species *Leucaena leucocephala*, which is among the 100 worst invasive spp in the world and supported low diversity of flora and fauna.

Loss of abandoned fishpond and the associated flora and fauna is considered **Insignificant** due to the small area affected, disturbed nature and the limited ecological importance. The pond has also become degraded in function and habitat quality due to isolation from the continuous and contiguous Deep Bay wetland system. Only a few waterbird species were recorded in this pond during the surveys. Their abundance were very low and made up insignificant proportion of Deep Bay population. This fishpond remnant was not considered important foraging habitats of waterbirds, and was subjected to high disturbance level at least since early 1990's and long-term isolation. Utilization by waterbird was very low. Previous EIA studies and the survey findings of this project did not indicate that this pond is important habitats for ardeids during breeding season. No mitigation for loss of this habitat is required.

There will be no additional works area outside the Project Area, and thus no temporary habitat loss is anticipated.

Table 8-16 Potential direct ecological impacts to existing habitat within the Project Area

Criteria	Urbanised/disturbed	Plantation	Abandoned fishpond
Habitat Quality	Very low	Very low	Very low
Species	Low flora and fauna diversity; Fauna species of conservation importance: Japanese Pipistrelle, Chinese Pond Heron (flew over the Project Area without landing).	Low flora and fauna diversity	Low flora and fauna diversity; Fauna species of conservation importance: Little Grebe, Chinese Pond Heron, Little Egret, Grey Heron. Abundance of these species were very low.
Size/ Abundance	Major habitat loss in the Project Area: 3.17ha; Low faunal abundance	Very small (0.3 ha) in a Hong Kong context. Very low faunal abundance	Very small (0.33 ha) in a Hong Kong context. Very low faunal abundance
Duration	Permanent loss of existing habitat	Permanent loss of existing habitat	Permanent loss of existing habitat
Reversibility	Habitat loss would be permanent and irreversible.	Habitat loss would be permanent and irreversible.	Habitat loss would be permanent and irreversible.
Magnitude	Insignificant	Insignificant	Insignificant
Overall Impact Severity without Mitigation	**Insignificant**	**Insignificant**	**Insignificant**

Indirect disturbance Impact due to Construction Disturbance

The construction activities, including excavation and piling during foundation works, and materials loading/unloading, and concreting during superstructure works, are likely to produce noise and cause disturbance. Among them, piling is of particular concern, especially when the traditional percussive piling is performed without appropriate specific mitigation. The potential impact due to other construction activities will not cause significant impact as the construction works will be small in scale given the nature of low-rise residential building development and low number of houses toe constructed.

High level noise disturbance can potentially lead to behavioural disturbance, auditory masking, and physiological stress to wildlife. In the most serious cases, it may also lead to abandonment of preferred habitats by the wildlife if the noise disturbance is constantly present for a prolonged duration. For the present Project, utilization of habitats adjacent to the Project Area by fauna might decrease during construction phase. The significance of construction impacts

will depend upon the distance between the source of noise and sensitive receivers, the type and frequency of disturbance and the tolerance of species to disturbance.

The immediate surroundings of the Project Area are mostly urbanized/disturbed habitat, which is considered of very low ecological value. Habitat types near the Project Area also include grassland/shrubland, flood storage pond and Ngau Tam Mei Drainage Channel, with the channel of relatively higher importance (of moderate ecological value).

Some waterbird species of conservation importance (e.g., Little Egret, Great Egret, Black-faced Spoonbill) were recorded, in these habitats, including Ngau Tam Mei Drainage Channel.

Hence, apart from the Ngau Tam Mei Drainage Channel, utilization of grassland/shrubland and flood storage pond near the Project Area by fauna might also be affected by construction noise. But these habitats are of lower importance when compared with the Ngau Tam Mei Drainage Channel (Grassland/shrubland is of low to moderate ecological value and Flood Storage Pond of low ecological value), and/or are located farther from the Project Area than the channel. Other types of habitats present in the Assessment Area are also further away from the Project Area and are not likely to be affected by the construction works.

As revealed by reviewed literatures and ecological surveys, high counts of waterbirds (mostly ardeids) foraging in the Ngau Tam Mei Drainage Channel were occasionally recorded in low tides during dry season. Flocks of ardeids were observed once in the section of drainage channel 150m north of the Project Area (**Figure 8-3**). Black-faced Spoonbills were also recorded once during the surveys (*ibid*). Counts of egrets and herons in the Assessment Area were low even in peak ardeid breeding season, however. Hence, the prime concern would be the potential disturbance to Ngau Tam Mei Drainage Channel which is utilized by some water birds, in particular the section of the channel close to the Project Area during the wintering season.

The Project Area has been used as car park since early 1990's. Fauna in the surrounding areas, particularly urbanized/disturbed habitat, have been habituated to disturbance of human activities and traffic noise from the operation of the car park. However, construction disturbance from the present Project, if percussive piling method is adopted, might still discourage the uses of Ngau Tam Mei Drainage Channel near the Project Area by these waterbirds in low tides during winter. Without mitigation measures, construction noise impact from percussive piling method will be ranked as **Moderate**, and mitigation measure is required. Given the concern, alternative piling method (non-percussive piling methods, e.g., earth auger, mini piles) that are quieter than the percussive piling method causing less shocks or vibrations, will be adopted as mitigation (**Tables 4-16 & 4-18,** and **Section 8.9** below). With the adoption of non-percussive piling method, it is expected that the disturbance impact to fauna utilizing the habitats near the Project Area, particularly Ngau Tam Mei Drainage Channel, could be reduced to **Minor**. Provision of other mitigation measures to further reduce the potential disturbance impact is also recommended in **Section 8.9** below.

Indirect Impact due to Runoff

Potential impacts to nearby aquatic habitats (e.g., drainage channel, flood storage pond) during the construction phase would mainly arise from sedimentation due to surface runoff. Elevated suspended solids levels caused by site runoff could increase the suspended solids load in the water bodies, and could decrease dissolved oxygen levels. A lower oxygen level would affect stationary species, whilst mobile species would tend to temporarily avoid the area. The result could be a temporary reduction in aquatic life abundance, and might affect the uses as foraging and roosting habitats by waterbirds. The potential impact due to runoff is considered **minor to moderate**. Mitigation measures will be required, and have been recommended in Section 5.5 of this report.

As stated in Section 5.5 of this report, contractor(s) of this Project will be required to submit a Construction Phase Drainage Management Plan with details such as design of the temporary site drainage system; wastewater treatment facilities; and maintenance of drainage system for the approval of the Engineers Representative (ER) and the Environmental Team in order to ensure that the mitigation measures are in place. The concerned drainage management plan will include recommended mitigation measures as well as best practices identified in Sections 5.5.1 and 5.5.2 of this report.

In addition, good site practice and precautionary measures (e.g. those in Section 5.5) will be implemented to avoid the potential impact due to runoff.

Light Glare from the Construction Site

Lighting for the construction site may lead to light pollution at night, which is a potential source of disturbance, if there are night roosts in the vicinity. No night roost of birds was found near the Project Area. In addition, there are existing artificial lightings in the surrounding areas of the Project Areas. Fauna sensitive to lightings would have already avoided these areas. Potential impact due to light glare during construction phase is considered as **Insignificant**.

Potential Impact to Recognized Sites of Conservation Importance

According to Clause 3.4 of the Study Brief, potential impact to recognized sites of conservation importance in Northwest New Territories during construction phase should be evaluated. The Project Area is located outside WBA, and is 520m away from the WCA. Construction works will not affect the ecological integrity of the fishponds and wetlands within WCA, or cause directly habitat loss in WBA or WCA.

Regarding the potential disturbance impacts during construction phase to recognized sites of conservation importance in Northwest New Territories, including the Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, Mai Po Village SSSI, Mai Po Marshes SSSI, Wetland Conservation Area and Wetland Buffer Area, it is considered unlikely as most of these sites of concern are far away from the Project Area, and also sheltered from the Project Area by other developed areas in between. Construction disturbance from the proposed project will be localized, reversible and short-term. The potential impact to these recognized sites of conservation importance is considered **Insignificant**.

The proposed project is not expected to cause disturbance or impact to the foraging grounds of ardeids nesting in Mai Po Village SSSI egretry, Mai Po Lung egretry and Mai Po Marshes Nature Reserve Egretry. The flight line survey by ENVIRON Hong Kong Limited (2013) showed that most breeding ardeids of Mai Po Village SSSI egretry flew to Mai Po, Tam Kon Chau or other nearby wetlands to forage. Ardeids nesting at Mai Po Lung egretry probably foraged in similar locations since this egretry is also near these areas. Fewer than 10 individuals of ardeids were recorded in the Assessment Area during the ardeid breeding season. The Project Area is mainly urbanised/disturbed area, which is not important foraging habitat of ardeids. The abandoned fishpond within the Project Area is not important foraging habitats of ardeids due to the long distance, high level of disturbance and the absence of periodic drain-down due to abandonment. In addition, foraging habitats (e.g., fishponds) are present near the Mai Po Village SSSI Egretry, Mai Po Lung Egretry and Mai Po Marshes Nature Reserve Egretry so utilisation of habitats within the Assessment Area by nesting ardeids is expected to be low. Therefore, the potential impact to due to disturbance the foraging ground of ardeid nesting in these ardeid breeding colonies by the Project during construction phase is considered **Insignificant**.

The potential impact of water quality during construction phase was assessed in Section 5.4.2. There will be no adverse water quality impact as long as the mitigation measures proposed in Section 5.5 are implemented. Hence, the potential impact on the recognized sites of

conservation importance due to deterioration of water quality during construction phase is anticipated to be **Insignificant.**

Potential Impact to Species of Conservation Importance

Four waterbird species of conservation importance were recorded in the abandoned fishpond in the Project Area. These species were present in very low abundance. Birds are very mobile and hence mortality due to site formation or other construction activities is not anticipated. Due to the small size, disturbed nature and long-term isolation, the abandoned fishpond lost to the proposed project is also not important habitats of other fauna species of conservation importance recorded in the Assessment Area. Potential impact due to loss of the abandoned fishpond to fauna species of conservation importance listed in **Table 8-15** is considered **Insignificant**.

Construction works will affect the habitats adjacent to the Project Area, including grassland/shrubland, flood storage pond and Ngau Tam Mei Drainage Channel. Some of the fauna species of conservation importance would forage or roost in these habitats. Utilisation of these habitats by these fauna species might be affected by the construction works. Potential disturbance due to construction works to these species will be mitigated by measures described in **Section 8.9**.

8.8.3 Operation Phase Impacts

Potential impacts during operational phase will include noise from residential development and human activities and noise, traffic, artificial lightings and noise barriers.

Human activities and Noise

Human activities and noise of the Project Area might potentially affect the utilization of surrounding habitats by fauna during operation phase.

Human activities will mainly be indoors and noise from residential houses will be screened by walls of houses and fence wall of the Project Area. Also, the houses will be separated from the surrounding habitats by the landscape buffer and setback area.

The Project Area and the surrounding area are mainly composed of urbanized/disturbed, which is subjected to the high level of disturbance (e.g., noise of existing traffic). Fauna in the surrounding habitats have been habituated to disturbance from noise, and is not expected to be adversely affected by the noise from the Project Area.

High counts of waterbirds were occasionally recorded in the Ngau Tam Mei Drainage Channel near the Project Area at low tides in dry season. Houses in the western side of the Project Area will be nearer to the channel. However, even these houses will be separated from the foraging habitats (i.e., mudflat) in this channel by the channel embankment, Kam Pok Road, landscape buffer and the garden area of individual houses. These areas are about 40m in width. In addition, mudflat in the Ngau Tam Mei Drainage Channel is lower in elevation and birds foraging in these habitats will not see the human activities in the Project Area easily. Potential impact to fauna of surrounding habitats due to human activities and noise is ranked as **Insignificant**.

Traffic Noise and Disturbance

Habitats along the Kam Pok Road, including urbanized/disturbed, grassland/shrubland, flood storage pond, drainage channel and agricultural land, are already subjected to the existing disturbance from traffic of Kam Pok Road and Yau Pok Road

The Project Area is currently utilized as car park with many large-sized vehicles moving in and out during daily operation. Hence, habitats along Kam Pok road are already under the existing disturbance of vehicle movements in and out the car park. The proposed population in the Project Area during operation phase will be low (112 persons in 32 houses), and hence the number of vehicles moving in and out of the Project Area is not expected to be high. Traffic generation from the Project Area during operation phase will only be 18 veh/hr and 19 veh/hr during morning and afternoon peak hours respectively. Compared to the existing traffic flow in and out of the Project Area due to the operation of car park (76 veh/hr and 40 veh/hr during morning and afternoon peak hours), there will be a decrease in traffic noise during the operation phase. The potential impact to surrounding habitats and associated fauna due to traffic noise during operation phase will be **Insignificant**. No mitigation measure is necessary.

Runoff and drainage/effluent discharge

The potential impacts of surface runoff and drainage/effluent discharge have been addressed in **Chapters 5** and **6** respectively.

The potential impact of surface runoff during operation phase has been addressed in **Chapter 5** of the EIA report. During the operation phase of the Project, there will be additional paved areas, roads and facilities which may contribute to an additional stormwater surface runoff due to the change of catchment characteristics. Given the scale of this Project (for small house development), the increase in surface runoff generated from the developable area after development should be insignificant when compared with the capacity of the trained downstream Ngau Tam Mei Drainage Channel (Section 5.4.3.2). Drainage system will be provided for the formed and paved road/areas in the proposed development to collect stormwater surface runoff. Collected surface runoff from the development site will be discharged into the NTMDC after passing through screening facilities. There will be no adverse impact on water quality.

The potential impact of effluent discharge during operation phase has been addressed in **Chapter 6** of the EIA report. During operation, an interim sewage treatment plant will be used for treatment of sewage generated from the proposed development site until the public sewerage system becomes available. Discharge of the sewage from the interim STP will follow the requirement of no net increase of pollution loading, such that the water quality of the downstream water body will not be adversely affected.

Habitat Fragmentation

The east and west parts of the Assessment Area are already fragmented by the drainage channel in existing condition. The Project Area is mainly surrounded by urbanized/disturbed, which support low abundance of fauna. Frequent movement of wildlife through the Project Area in existing condition is not expected. The proposed development project will only convert urbanized/disturbed habitat to residential landscape area during operation phase, and hence will not cause habitat discontinuties. The potential impact due to habitat fragmentation is anticipated to be **Insignificant**. Mitigation measures such as provision of wildlife corridor or wildlife tunnel is not considered necessary.

Artificial Lightings

The behaviour of nocturnal wildlife may be affected by the increased residential lighting. Nocturnal animals either avoid or are attracted to lighted areas. The Assessment Area is mostly developed. Residential buildings and other lighting sources are already present in localities near the Project Area for long time, and fauna inhabiting in nearby habitats have probably habituated to lighting. Lights from the residential buildings are not expected to be very strong. Other lightings in the Project Area will only be directed to target areas (e.g., tennis

court, basketball court) and lighting will be kept to minimum lux level for safety. Potential impacts to fauna from this source are ranked as **Insignificant**.

Barrier Effect to Bird Flight

The heights of noise barriers (4.5m) and houses (6.6m) of the proposed project are similar to the existing buildings around the Project Area. Large waterbirds, including ardeids and Great Cormorant, which are of lower flight manoeuvrability, mainly flew along the drainage channel within the Assessment Area. Flights of these species will not be impeded by buildings in the Project Area. Other bird species observed within the Assessment Area mainly flew between agricultural lands in the north fringe of the Assessment Area. No major flight line through the Project Area was observed. The potential impact due to barrier to the flight of birds is considered **Insignificant.**

Noise Barrier and Bird Collision

The Project will provide of low-rise residential development and ancillary passive recreational facilities. In order to mitigate traffic noise and noise from industrial activities in the vicinity during the operation phase, permanent noise barriers are proposed as noise mitigation measures of the Project.

Noise barriers may potentially cause bird collision. However, no major flight line was observed over the Project Area during the field surveys. Birds, particularly large waterbirds, mainly flew along the Ngau Tam Mei Drainage Channel. The Project Area will be residential area during operation phase and still surrounded by urbanized/disturbed habitat during operation phase. Due to the disturbed nature of the Project Area and surrounding areas, the Project Area is not considered as important ecological corridor. Frequent bird movement through the Project Area is not expected.

The selected option of development will have lower number of noise barriers (**Table 2.2**). Noise barriers will only be built on the eastern side of the Project Area, which will be away from the Ngau Tam Mei Drainage Channel. In addition, the height of the noise barriers will only be 4.5m. The number of panels will not be large. Materials which are opaque, non-reflective panels with colour will be used for construction of noise barriers to reduce the risk of bird collision, particularly under dim condition (e.g., dusk and dawn). Due to disturbed nature of the area, the relative low height of noise barrier, and design adopted for the noise barrier, the potential risk of bird collision is anticipated to be **Insignificant**.

Landscape Planting

The Project Area was mostly devoid of vegetation cover, and only surrounded by narrow strips of plantation of an exotic species *Leucaena leucocephala*. These vegetation cover made up of exotic plant species generally support low diversity of fauna.

Vegetation cover in the Project Area will be enriched by landscape planting during operation phase (about30% of the Project Area will be green area). The selected option of development will have wider landscape buffer (**Table 2.2**). A continuous 5-8m wide landscape buffer will be included in the northern, eastern and western boundary of the Project Area. A combination of native and ornamental, bird-attracting and butterfly-attracting plant species will be proposed in order to enhance the landscape and ecological value of the site. Plants producing berry will enhance the food resources of birds. Nectar plants will also provide food resources for butterflies. Both fauna groups will benefit from Landscape Planting. The planting of trees will also provide roosting habitats for birds. The potential impact of replacement of existing plantation by landscape planting to birds and butterflies will be **positive**.

Potential Impact to Recognized Sites of Conservation Importance

According to Clause 3.4 of the Study Brief, potential impact to recognised sites of conservation importance in Northwest New Territories during operation phase should be evaluated.

Regarding the potential disturbance impacts during operation phase to recognised sites of conservation importance in Northwest New Territories, including the Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, Mai Po Village SSSI Egretry, Mai Po Lung Egretry, Mai Po Marshes SSSI, Wetland Conservation Area and Wetland Buffer Area, it is considered unlikely as the Project Area is separated from these sites by long distances. Disturbance of noise and artificial lighting from the residential buildings will be confined to areas adjacent to the Project Area. The potential impact to these sites from the development project during operation phase is considered **Insignificant**.

Since foraging habitats (e.g., fishponds) are present near the Mai Po Marshes Nature Reserve Egretry, Mai Po Village SSSI Egretry and Mai Po Lung Egretry, the frequency of nesting ardeids flying to habitats within the Assessment Area is expected to be low. Therefore, the potential impact to due to disturbance to the foraging ground of ardeid nesting in the Mai Po Village SSSI Egretry and Mai Po Lung Egretry by the Project during operation phase is considered **Insignificant**.

The potential impact of water quality during operation phase was assessed in Section 5.4.3. With the implementation of mitigation measures proposed in Section 5.6, there will be no adverse water quality impact. No adverse water quality impact to the recognized sites of conservation importance due to deterioration of water quality during operation phase is therefore expected.

Potential Impact to Species of Conservation Importance

The Project will provide residential areas of a small proposed population (112 persons) during operation phase. Intense disturbance is not anticipated. Human activities inside the Project Area will be screened by the wall of houses, fence wall and landscape buffer. Traffic flow in and out of the Project Area will decline during operation phase. Potential impact affecting the utilization of habitats surrounding the Project Areas by the fauna species of conservation importance listed in **Table 8-17** is not considered **Insignificant**.

Table 8-17 Summary of Potential Impact During Construction and Operation Phases

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Construction phase										
Terrestrial habitat loss	Construction works	Urbanised/disturbed	Very low	Low diversity of flora and fauna Two species of conservation importance recorded, with Chinese Pond Heron only fly over this type of habitat	3.17 ha	Permanent	Irreversible	Insignificant	Insignificant	No
		Plantation	Very low	Low diversity of flora and fauna	0.3 ha	Permanent	Irreversible	Insignificant	Insignificant	No
		Abandoned fishpond	Very low	Low diversity of flora and fauna, Four waterbird species of conservation importance but the abundance was very low	0.33 ha	Permanent	Irreversible	Insignificant	Insignificant	No

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Construction disturbance	Construction works	Surrounding habitats and associated fauna, including urbanised/disturbed, flood storage pond, grassland/shrubland, Ngau Tam Mei Drainage channel	Very low for urbanised/disturbed; Low to moderate for grassland/shrubland and flood storage pond; Moderate for Ngau Tam Mei Drainage Channel	Mostly common species, but some are of conservation importance	Moderate bird abundance in Ngau Tam Mei Drainage channel, low/very fauna abundance in other habitats	Temporary	Transient and reversible	Moderate	Moderate for waterbirds occassionally utilising the Ngau Tam Mei Drainage Channel if traditional percussive piling method is used	Yes Erection of hoarding outside wintering season of waterbirds between October and March; Use of non-percussive piling method (e.g., earth auger, mini piles); Use of quiet/silenced equipment (QPMEs); Provision of mobile noise barriers in adjacent to construction plants or provision of acoustic screens by the Contractor(s); Implementation of good site practice

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Light glare	Construction works	Surrounding habitats and associated fauna, including urbanised/disturbed, flood storage pond, grassland/shrubland, Ngau Tam Mei Drainage channel	Very low for urbanised/disturbed; Low to moderate for grassland/shrubland and flood storage pond; Moderate for Ngau Tam Mei Drainage Channel	Mostly common species, but some are of conservation importance	Low abundance	Temporary	Transient and reversible	Low	Insignificant	No
Site runoff	Construction works	Ngau Tam Mei Drainage Channel	Moderate	Mostly common species, but some are of conservation importance	Low abundance	Temporary	Reversible	minor to moderate	minor to moderate	Yes, by implementation of Good Site Practice
Operation phase										

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Traffic noise, human activities	Proposed development	Urbanised/disturbed habitat, grassland/shrubland,agricultural land, flood storage pond, Ngau Tam Mei Drainage Channel	Very low for urbanised/disturbed; Low to moderate for grassland/shrubland, agricultural land and flood storage pond; Moderate for Ngau Tam Mei Drainage Channel	Mostly common species, but some are of conservation importance	Low abundance	Permanent	Irreversible	Low	Insignificant	No In fact, traffic flow in and out of the Project Area will decline during operation phase
Runoff, drainage /effluent discharge	Proposed development	Ngau Tam Mei Drainage Channel	Moderate	Mostly common species, but some are of conservation importance, including Black-faced Spoonbill	Low abundance	Permanent	Irreversible	Low	Insignificant	Discharge will pass through sand traps, Discharge of the sewage from the interim STP will follow the requirement of no net increase of pollution loading There will be no adverse impact on water quality.

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Habitat fragmentation	Proposed development	Fauna inhabiting the habitats within the Assessment Area	Vary with habitat types, mostly are of low ecological value	Mostly common species	Low	Permanent	Irreversible	Low	Insignificant	No. The Project will convert urbanised/disturbed habitats and an isolated abandoned fishpond to residential areas, and will not cause fragmentation of continouous habitats.
Artificial light	Lightings in the Project Area	Nocturnal fauna	Low	Common species	Low	Permanent	Irreversible	Low	Insignificant	No. Areas surrounding the Project Area are subjected to existing lightings for long time. Fauna sensitive to lightings probably have avoided these areas.

Impact	Source	Receiver	Nature of Impacts						Significance of an ecological impact	Mitigation Required
			Habitat quality	Species affected	Size-abundance	Duration	Reversibility	Magnitude		
Barrier effect to bird flight	Buildings in the Project Area	Large waterbirds of low flight manoeuvrability	Vary with habitat types, mostly are of low ecological value	Mostly common species	Low	Permanent	Irreversible	Low	Insignificant	No These birds mostly flew along the Ngau Tam Mei Drainage Channel; Potential barrier effect to bird flight is minimised by the low height of buildings, which are similar to the existing buildings around the Project Area
Bird collision	Noise barriers	Birds	Low	Mostly common species	Low	Permanent	Irreversible	Low	Insignificant	Minimise by using materials which are opaque, non-reflective panels with colour for construction of noise barriers

8.9 Mitigation Measures

8.9.1 Impact Avoidance

Avoidance of WCA and WBA – The Project Area is located outside the boundary of WBA (**Figure 8-1**), and is over 500m from the boundary of WCA. The proposed development has thus avoided encroachment on sensitive habitats such as the fishponds and wetlands in WCA, and the purposes of WBA on protecting the ecological integrity of WCA.

Avoidance of Important Habitats – The Project Area has avoided habitats of higher ecological value such as continuous fishponds and wetlands, or other natural habitats. Only man-made habitats of very low ecological value, including plantation, urbanised/disturbed habitat and one small isolated abandoned fishpond, will be affected.

Avoidance of Additional Habitat Loss – The Project Area will be accessed by existing road network during both construction and operation phases. There will be no impact due to temporary or permanent loss of habitats from construction of access.

8.9.2 Impact Minimisation

Construction Disturbance – Literature review and ecological surveys showed that high counts of waterbirds occasionally foraged in the Ngau Tam Mei Drainage Channel Site during low tides in winter.

Piling method (non-percussive piling methods, e.g., earth auger, mini piles) that are quieter than the percussive piling method causing less shocks or vibrations, will be adopted as mitigation (**Tables 4-16 & 4-18,** and **Section 8.9** below). With the adoption of non-percussive piling method, it is expected that the disturbance impact to fauna utilizing the habitats near the Project Area, particularly Ngau Tam Mei Drainage Channel, could be reduced to **Minor**. Provision of other mitigation measures to further reduce the potential disturbance impact is also recommended in **Section 8.9** below.

Hoarding will be erected outside wintering season of water birds (October to March) to properly delineate the works site boundary and screen disturbance to the nearby habitats during construction phase. In order to reduce the potential disturbance to wildlife utilizing habitats near the Project Area, the hoardings will be made of opaque, non-reflective materials and painted in colour that will blend in with the environment. The workers will be instructed not to disturb any nearby habitats. Furthermore, the site boundary will be clearly defined (i.e. fenced with the screening materials mentioned above) and any works beyond the boundary would be strictly prohibited.

Construction noise will be further minimised by the use of quiet/silenced equipment (QPMEs), provision of mobile noise barriers in adjacent to construction plants, or provision of acoustic screens by the Contractor(s). Other measures proposed in compliance with the Noise Control Ordinance will also be enforced and monitored as a mitigation measure under the Noise Impact Assessment (details see **Chapter 4** of this report).

Dust control measures listed in **Section 3.9.1** of this report, e.g. hard paving of the haul road, frequent watering, covering dusty materials, careful site formation scheduling etc. will reduce dust impact to an acceptable level. Good site practice and precautionary measures (e.g. those in Section 5.5) will be implemented to avoid the potential impact due to runoff. These measures will minimize the potential disturbance to the surrounding habitats and associated fauna.

As stated in Section 5.5 of this report, contractor(s) of this Project is required to submit a Construction Phase Drainage Management Plan with details such as design of the temporary site drainage system; wastewater treatment facilities; and maintenance of drainage system for

the approval of the Engineers Representative (ER) and the Environmental Team in order to ensure that the mitigation measures are in place. The concerned drainage management plan will include recommended mitigation measures as well as best practices identified in Sections 5.5.1 and 5.5.2 of this report.

Good site practice listed as follows would be implemented to minimise potential impacts due to noise, dust and runoff to the surrounding environment.

- Regular checking should be undertaken to ensure that the work site boundaries are not exceeded and that no damage occurs to surrounding areas;
- Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage at all work sites during construction;
- Implementation of noise control measures at all construction sites to reduce impacts of construction noise to wildlife habitats adjacent works areas;
- Implementation of dust control measures at all construction sites to minimise dust nuisance to adjacent wildlife habitats during construction activities;
- Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby waterbodies by rain;
- Construction effluent, site run-off and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed with the following approach in descending order;
- Dusty materials remaining after a stockpile is removed should be wetted with water;
- All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet;
- Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified; and
- Supervisory staff should be assigned to station on site to closely supervise and monitor the works.

The above measures will all contribute to the minimization of potential construction disturbance to the surrounding habitats and associated fauna. With the implementation of these measures, noise and disturbance impact would be mitigated to an acceptable level and no residual impact is anticipated**.**

Provision of Setback – Setback area on the western side of the Project Area will increase the distance between houses and Ngau Tam Mei Drainage Channel. This layout design will minimize the potential impact to wildlife in the surrounding areas, particularly waterbirds in the Ngau Tam Mei Drainage Channel, due to human activities and noise in the Project Area during operation phase. The houses will be at least 30m from the Ngau Tam Mei Drainage Channel. In addition, this layout design will also increase the distances between locations of foundation works and the Ngau Tam Mei Drainage Channel, and reduce the potential disturbance to birds foraging in this channel.

Provision of Landscape Area in the Development in particular at the Western Side – A continuous 5-8m wide landscape buffer will be included in the northern, eastern and western boundary of the Project Area. This layout design will minimize the potential impact to wildlife in the surrounding areas, particularly waterbirds in the Ngau Tam Mei Drainage Channel, due to human activities and noise in the Project Area during operation phase.

Low-rise Building – The layout proposed will only involve the construction of low-rise buildings with a maximum height of 6.6m. This will minimize the potential barrier effect to bird flights.

Incorporation of Noise Barriers with Building – Most birds were observed flying along the Ngau Tam Mei Drainage Channel, located on the western side of the Project Area. Noise barriers will only be provided on the eastern side of the Project Area. As the sewage treatment plant will also form part of noise mitigation measures (Section 11.7.1), extent of glass panel of

the noise barrier will be reduced. Compared to glass panels, building wall will cause lower risk of bird collision. These design layouts will minimize the potential impact due to bird collision.

Design of Noise Barriers – The Recommended Layout Option has the lowest overall height of noise barrier. This would minimize the potential impact of bird collision. Minimization of bird collision will also be taken into account in the design of noise barrier. Materials which are opaque, non-reflective panels with colour blend in with the environment will be used for construction of noise barriers to reduce the risk of bird collision, particularly under dim condition (e.g., dusk and dawn) to reduce bird collision.

8.10 Environmental Monitoring Programme

Regular site audit will be conducted on weekly basis for checking the implementation of the proposed good site practice during construction phase.

Ecological monitoring of utilization of the Ngau Tam Mei Drainage Channel within the Assessment Area by birds between October and March during construction phase is proposed. Baseline surveys will be conducted prior to site construction works. Observations during construction phase monitoring will be compared against the baseline data, and the effectiveness of the recommended mitigation measures will be evaluated Details of monitoring method are given in the EM&A Manual.

8.11 Cumulative Impacts

Potential cumulative impact of habitat loss, construction disturbance, increased human activities and noise, and traffic noise of the Project with other projects in nearby locations are evaluated in the following sections.

There are a few works projects near the Project Area. These included the approved cycle track project, approved public sewerage project and three planned private development sites (namely, the planned “REC Site”, “RD Site” and “Yau Mei Site” as following:

- EIA 159/2008 Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River;
- “Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 2” (EIA Application No. EIA-094/2004);
- EIA 220/2014 Proposed Residential cum Passive Recreational Development within "Recreation” (“REC”) Zone and “Residential (Group C)” Zone at Various Lots in DD 104, Yuen Long, N.T; (construction phase: 2017 – 2020)
- EIA 227/2015 Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long; (construction phase: 2015 – 2018) and
- Proposed residential development within Residential (Group D) Zone at various lots in DD104, Yuen Long, N.T. (ESB-204/2009).

Cumulative Impact due to Wetland Habitat Loss

Cycle Track and the Yuen Long and Kam Tin Sewerage projects will only cause loss of non-wetland habitats of low ecological value (e.g., grassland/shrubland, urbanized/disturbed). These two projects will not contribute to the cumulative loss of wetland habitats in the Deep Bay area.

The proposed development at the REC Site will mainly affect non-wetland habitats (e.g., grassland/shrubland, urbanised/disturbed). Only very small area and highly fragmented wetland habitats (including 0.22ha reed, 0.5ha pond and 0.1ha seasonal wet grassland) of low or very low ecological value will be lost.

The proposed development at the Yau Mei Site will affect 4.9ha agricultural land, 1.2ha pond area, 0.9ha marsh, 0.2ha reed bed, 0.2ha grassland/ shrubland, and 0.7ha seasonally wet grassland. All significant impacts would be mitigated by appropriate measures during both the construction and operation phases of the project. A wetland restoration area with long-term management plan will be created.

The proposed development at the R(D) Site will affect 0.38ha of reed and seasonally wet grassland, and 5.81ha of grassland/shrubland. The development project will be regulated by relevant guidelines, and requirements in the respective zoning intention of Outline Zoning Plan. Therefore, any loss of important habitats due to development in the R(D) Site should be compensated / mitigated, and significant cumulative impacts associated with this project are not expected.

The current Project Area is located immediately outside the boundary of WBA (**Figure 8-1**). The planning intention of WBA is to protect the ecological integrity of the fishponds and wetlands within WCA and to prevent development that would have a negative off-site impact on the ecological value of those fishponds. The proposed project will not cause loss of wetland in WBA and WCA, or affect the ecological integrity of fishponds and wetlands within WCA.

The abandoned fishpond within the Project Area is of limited ecological value due to the small size, surrounded by urbanized/disturbed area, subjected to long term disturbance from the car park in the Project Area and long-term isolation from other wetland habitats in the Deep Bay area. Field observations showed that utilisation of this pond by waterbirds was very low. Cumulative impact of loss of wetland habitat in the Deep Bay area due to the current Project and other nearby projects is considered **Insignificant.**

Cumulative Impact due to Construction Disturbance

The construction works of the Project are scheduled to commence in year 2017 and for completion by year 2018 (Section 1.6.3). The two government projects which have already obtained approval on their EIA reports under the EIAO process. However, there is currently no fixed construction programme available. Overlapping of their works programme with this Project cannot be precluded at this stage. The public sewerage project near the Project Area will include the construction of a section of gravity trunk sewer underneath Kam Pok Road and Yau Pok Road as well as construction of proposed San Tin No.1 Sewage Pumping Station near the road junction between Kam Pok Road and Castle Peak Road. All works will be carried out in small section areas within a short period, and hence the construction activities should not generate significant amount of construction noise and dust and result in cumulative impact. The section of cycle track near the Project Area will be constructed along the edge of Yau Pok Road on the other side of existing Ngau Tam Mei Channel. According to the EIA report, the concerned construction of cycle track project will involve construction of a narrow strip of cycle track, which will be constructed in sections. Typically, the working area will be 40m long by 4 m wide and no adjacent sections (200m between two neighbouring sections) will be constructed simultaneously. Cumulative impact due to construction noise and dust generated from the construction activities is not expected. With the implementation of mitigation measures recommended in **Section 8.9**, no cumulative impacts are likely to be associated with these two projects.

Construction phase of the development project at the R(D) is not fixed, but likely to take place after the completion of construction works of the Project. Construction phase of the Project might overlap with the development projects at the REC Site (100m west of the Project Area) and Yau Mei Site (350m north of the Project Area). The construction works at the Yau Mei Site will be away from the Project Area, and hence significant cumulative construction disturbance is not likely to be associated with this project. The construction disturbance caused by these two projects will be resolved by the mitigation measures recommended during the EIA studies. Impacts during the construction phase of the Project will also be mitigated by measures recommended in **Section 8.9**. Hence, the cumulative impact due to construction disturbance from the Project will be **Insignificant**.

Cumulative Impact due to Human Activities and Traffic during Operation Phase

During the operation phase, potential disturbance impact due to the increase of population in the area caused by all concurrent projects is also a concern. In accordance with "Projections of Population Distribution 2015-2024" issued by Planning Department (2015), in which the projected populations in different areas and sub-areas in Hong Kong are provided, the Project Area is located within Area 5.4.1, and so are the three concurrent residential projects (i.e. Yau Mei Site, REC Site and R(D) Site). The projected population size in Area 5.4.1 (Planning Department 2015) will be 19,200 persons in 2020 (the farthest projected year available for subareas in the report, and closer to the operation of the Project and the nearby planned developments). To take a more conservative approach, by assuming that the projected population size of Area 5.4.1 by Planning Department has not included all these residential developments, and by including not only residents but also the staffs/visitors from these residential developments, the anticipated population size in this subarea will thus be higher, at about 20,346 persons during the operation phase of the Project. The additional residents and staffs/visitors of the Project and the nearby planned development include - the present Project: 112 residents and 20 staffs; REC Site: 287 residents and 164 staffs/visitors; Yau Mei Site: 315 residents and 30 staffs; and R(D) Site 185 residents and 33 staffs (ENVIRON Hong Kong Limited 2013, 2015). The present Project is a low density residential development and the target population is the smallest among all planned residential developments at only 112 residents (**Table 2.3**), with 20 employees for club house and estate management (**Appendix 6.1**). The Project will only account for a very minor proportion (i.e., 0.6%) of the total population in the surrounding areas during operation phase. Human activities in the Project Area and the other nearby planned developments, which are also low density residential developments, will be mainly indoors and screened by walls of houses during operation phase. It is not expected that all residents would go out or stay in open areas at the same time. In fact, there are existing human activities in the car park within the Project Area. Drivers who visit the existing car park will also need to access the Project Area through Kam Pok Road and contribute to human disturbance. The proposed development will not result in a significant increase in human activities in the surrounding areas during the operation phase. Most areas within the Assessment Area are developed areas and fauna utilizing these habitats are mainly disturbance tolerant. Hence, the potential cumulative increase in disturbance to wildlife due to human activities and noise from the current Project and other nearby projects is considered **Insignificant**.

The Project Area is currently utilized as car park, with many large vehicles moving in and out during daily operation (76 veh/hr and 40 veh/hr attracted/ generated by the car park during morning and afternoon peak hours, respectively). Traffic flow of the proposed development will only be 18 veh/hr and 19 veh/hr during morning and afternoon peak hours respectively. Hence, the proposed development will not result in a significant increase in traffic flow on nearby roads (thus disturbance to surrounding areas) when compared with its existing site condition. Total traffic flow on Kam Pok Road during afternoon and morning peak hours will be 250 veh/hour and 300 veh/hour respectively (i.e., including the traffic flow due to other three nearby planned residential projects). In addition, the peak traffic flow generated by the proposed development will only account for small proportion on Kam Pok Road during

operation phase. The cumulative impact to the surrounding habitats due to traffic noise from the Project during operation phase will be **Insignificant**.

It should also be noted that the Project Site is currently used as an existing car park, which will also generate significant amount of traffic flow in the absence of the proposed development. According to the traffic survey, the existing car parking operation will generate 76 veh./hr and 40 veh./hr during the morning and afternoon peak hours, respectively. Many of these vehicles are in fact heavy vehicles. Thus, with the proposed development it will not worsen the situation. In fact, the traffic flow of proposed development would be insignificant when compared with the existing situation.

Cumulative Impact to Sites of Recognised Conservation Importance

The Project Area is located 1km from the sites of recognized conservation importance (e.g., Mai Po Nature Reserve) in Deep Bay area described in **Section 8.5.1**. Therefore, these sites are not likely to be significantly affected by the disturbance of construction works and operation of the Project. With the implementation of mitigation measures recommended in **Section 8.9**, the cumulative impact of disturbance to sites of recognized conservation importance during construction and operation phases will be **Insignificant**.

Cumulative Impact due to effluent/ sewage discharge during Operation Phase

Cumulative impact due to effluent/ sewage discharge from the current Project and other nearby projects to Ngau Tam Mei Drainage Channel has been assessed in Section 5.7.3 of the report. The sewage generated from the current and nearby planned/ approved development projects will be discharged into future public sewerage system, thus no adverse impact is expected. Given the effluent qualities from the interim STP of these projects are in compliance with the requirement of no net increase in pollution loading, no adverse cumulative impact during operational phase is expected. Hence, no significant ecological cumulative impact to Ngau Tam Mei Drainage Channel and its downstream recognized sites of conservation importance is anticipated.

8.12 Residual Ecological Impacts

The residual environmental impacts refer to the net environmental impacts after the implementation of mitigation measures. The residual impact will be the loss of 3.17 ha of urbanised/disturbed area, 0.3 ha of plantation and 0.33ha of abandoned fishpond of limited ecological value. As discussed in Section 8.8.2 above, the loss of these habitats was considered as **Insignificant** and no corresponding mitigation is required. Potential indirect impacts during both construction and operation phases will be mitigated by the recommended measures. With implementation of landscape planting which will be beneficial to birds and butterflies, the residual ecological impacts of the project are considered acceptable.

8.13 Impact Summary and Conclusion

The Project Area is located outside WBA and thus of distance with WCA. Habitats recorded within the assessment area included plantation, agricultural land, grassland/shrubland, fishpond, flood storage pond, drainage channel/nullah, and urbanised/disturbed. Ecological baseline based on the 12-month ecological survey programme revealed that the Project Area was only covered by habitats of very low ecological value. Twenty-two species of conservation importance were recorded within the Assessment Area during the ecological field survey, including one mammal species, twenty bird species and one reptile species. Potential impact to these species of conservation importance is considered **Insignificant** as no important habitat of these species will be affected. Potential construction impacts include loss of 3.17 ha of urbanised/disturbed area, 0.3 ha of plantation and 0.33 ha of abandoned fishpond. The potential impact of habitat loss was ranked as **Insignificant**. Potential impact to surrounding

habitats and associated fauna due to construction disturbance was considered **Moderate**. Potential impact due to runoff during construction phase is ranked as **Minor to Moderate**. The other impact during construction phase will be **Insignificant**. Mitigation measures including utilization of quieter construction method and machinery, provision of mobile noise barriers in adjacent to construction plants and provision of acoustic screens will be implemented. In addition, hoarding will be erected outside wintering season of water birds (October to March) to screen disturbance to the nearby habitats during construction phase. Effectiveness of the recommended measures will be evaluated by ecological monitoring surveys. The Project will cause insignificant disturbance to wildlife in surrounding habitats during operation. Potential risk of bird collision with noise barrier will be minimized by incorporation of interim sewage treatment work into noise mitigation and utilization of materials which are opaque, non-reflective panels with colour blend in with the environment for construction of noise barriers.

With the implementation of the recommended mitigation measures, there will be no significant adverse residual impact during construction and operation phases.

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9. FISHERIES IMPACT ASSESSMENT

9.1 Summary

The Fisheries Impact Assessment comprises three major parts: establishment of baseline conditions, evaluation and assessment of fisheries impact following the criteria and guidelines of Annexes 9 and 17 of the EIAO-TM, and recommendations of mitigation measures where necessary.

Key issues of the Fisheries Impact Assessment, as stipulated in Section 3.9.7.2 of the EIA Study Brief ESB-201/2009, include but not be limited to the following:

- Pond culture resources
- Water courses that serve as water sources for fish ponds

The assessment covers potential impacts on fisheries during both the construction and operation of the Project.

The Fisheries Impact Assessment includes the following according to the Study Brief:

- description of the physical environmental background;
- description and quantification of existing fisheries activities
- description and quantification of existing fisheries resources (e.g. major fisheries products and stocks);
- identification of parameters (e.g. water quality parameters) and areas that are important to fisheries;
- identification and quantification of any direct/indirect to fisheries, such as permanent resumption and temporary occupation of fish ponds, deterioration of water quality of fish ponds and the surrounding streams, hydrological disruptions such as draw-down of water table, blocking of access to the surrounding fish ponds, and disturbance by construction noise and vibration;
- evaluation of impacts and proposal of effective mitigation measures with details on justification, description of scope and programme, feasibility as well as staff and financial implications including those related to subsequent management and maintenance requirements of the proposal; and
- review of the need for monitoring during the construction and operational phase of the Project and, if necessary, propose a monitoring and audit programme.

9.2 Relevant Legislation, Standards, Guidelines and Criteria

HKSAR Ordinances and Regulations which are relevant to this study include the following:

- The Environmental Impact Assessment Ordinance (Cap. 499) and the associated TM;
- Fisheries Protection Ordinance (Cap. 171) and its subsidiary legislation, the Fisheries Protection Regulations;
- Water Pollution Control Ordinance (Cap. 358) and its supporting regulations and statements; and

9.3 Study Area

In accordance with the EIA Study Brief, the Assessment Area includes 500 m from the limit of the Project site boundary and any areas likely to be impacted by the Project.

9.4 Methodology for Baseline Establishment and Assessment

Baseline information on the Assessment Area was reviewed. A review of Government and private sector reports, independent Government published literature and academic studies was undertaken to determine the existing conditions of fisheries in the Assessment Area, and to identify practices, areas and species of potential fisheries importance which may be affected by the Project. This review included but was not limited to the following:

- Agriculture, Fisheries and Conservation Department (AFCD) latest annual report 2013/2014 and website; and
- Other relevant reports from private sectors or Government.

AFCD's annual report and website provide the most updated information on the development and trend in Hong Kong fisheries. The latest annual fisheries production is also provided.

The validity of the information compiled during the literature review has been assessed before it is adopted into the present EIA study.

Field checks were conducted in August 2009, April 2010, Jan 2011 and July 2014. Coverage of ponds during each survey is shown in **Table 9.1**. Management status of fishponds was judged by the maintenance conditions of the pond bunds and the facilities on pond bunds, the presence/absence of aerators inside the ponds and fodder on the pond bunds. Overgrown of bunds by grass, absence of aerators in ponds and fodder on pond bunds were considered signs of abandoned status.

Impacts are assessed in the absence of mitigation. The construction and operational phase impacts on pond culture resources have been assessed individually, then cumulatively, in combination with other existing, committed and proposed developments.

Table 9-1 Survey programme

Survey dates	Ponds checked*
27 August 2009	Ponds No. 1 – 21
30 April 2010	Ponds No. 1 – 12, 21
20 Jan 2011	Ponds No. 1 – 12, 21
25 July 2014	Ponds No. 1 – 12, 21
24 Nov 2015	Ponds No. 1 – 12

* Numbering of ponds referred to Figure 9.1; access to ponds no. 13 – 20 were blocked since Nov 2009, access to pond no. 21 was blocked in Nov 2015

9.5 Baseline Conditions

9.5.1 Sites of Fisheries Importance

Besides the fish ponds within both the Project Area and the Assessment Area, there is no other designated or recognized site of fisheries importance within the fisheries assessment area based upon recent government aerial photos and site visit observations.

The Project Area is located immediately outside the boundary of Wetland Buffer Area (WBA) (**Figure 8-1**), and part of the Assessment Area thus fell within the WBA. The planning intention of WBA is to protect the ecological integrity of the fishponds and wetlands within the Wetland Conservation Area (WCA) and to prevent development that would have a negative off-site impact on the ecological value of those fishponds.

WCA comprises of the existing and contiguous, active or abandoned fishponds in the Deep Bay Area. The planning intention of WCA is to conserve the ecological value of the fishpond which form an integral part of the wetland ecosystem in the Deep Bay Area. New development within the WCA will not be allowed unless it is required to support the conservation of the ecological value of the area or the development is essential infrastructural project with overriding public interest. The Project Area is about 520m from the boundary of WCA.

For some fishponds in Hong Kong, the surrounding streams/water courses would be one of the water sources. The major water course within the Assessment Area would be the Ngau Tam Mei Main Drainage Channel (**Figure 9-1**). However, the distance between this channel and the ponds inside the Assessment area are at least 100 m, with roads and urbanized areas in between. Therefore, the practicability of using the flow in the drainage channel for fishpond culture purposes is in doubt.

9.5.2 Pond Fish Culture

Fisheries in Hong Kong consist of capture fisheries and culture fisheries (which are further divided into pond culture and mariculture). The Assessment Area is far from marine area and thus there is neither capture fisheries nor mariculture fisheries. This FIA thus focuses on pond culture fisheries.

The pond fish culture industry (either freshwater or brackish) is centred in the north-west New Territories. In 2014, the local inland ponds, covering an area of approximately 1,140 ha, produced 2,001 tonnes of freshwater fish. Most ponds practice polyculture of carps mixed with tilapia or grey mullet. Some coastal ponds have been converted to culture brackish species, such as scat, sea bream, pompano and giant grouper, to reap better profits. Majority of the fry and fingerlings are imported from the Mainland and Taiwan. Some of the grey mullet fry may also be caught in local coastal waters. Traditionally, fry are stocked in early spring and most fish species reach marketable size in eight to twelve months (Information from AFCD website).

Within 500 m of the Project Area, there are twenty-one fish ponds and the total area was 8.9ha (Figure 9-1). Only an isolated abandoned fish pond was identified within the Project Area. Other fishponds were all away from the Project Area, including one pond located about 340 m northwest to the Project Area, eight ponds situated about 100 m east to the Project Area, and twelve ponds about 200 m south to the Project Area (**Figure 9-1**). According to the results of field checks for the present EIA study, all fishponds within the Assessment Area were abandoned. There was one irregular-shaped pond adjacent to the Project Area. It was a floodwater storage pond as part of the floodwater pumping station managed by DSD, rather than fish ponds.

The abandoned pond inside the Project Area was of poor conditions in terms of pond fish culture practices (**Figure 9-2**). The pond had been partially filled with soil and construction materials. The pond water was turbid and stagnant as observed. Area immediately adjacent to the pond was a paved area used as car park. The pond was thus highly disturbed and under high constraint for any pond culture.

9.6 Impact Identification and Evaluation

9.6.1 Construction Phase – Direct Impacts

The small filled abandoned fish pond within the Project Area will not be retained for the development, and thus the construction of the Project would cause a permanent loss of 0.33 ha abandoned fish pond. This pond is currently of poor conditions for pond culture, and would be difficult to be resumed given the currently surrounding conditions and operations. The chance that the pond within the Project Area will be resumed as active pond is very low.

When compared with the 1,140 ha of culture fishponds in Hong Kong, the fishpond loss caused by the Project is considered to be very small (i.e. less than 0.029% of Hong Kong and 3.7% in the Assessment Area). Given the fact that the affected fishpond is abandoned and small in size, the potential impacts on pond fish production in Hong Kong from this loss would be **insignificant**. The impacts of construction and operation phases were evaluated in **Table 9-2**.

Table 9-2 Construction and Operation Stage Impacts

Impact	Source	Receiver	Nature of Impacts						Severity	Mitigation Required
			Nature of impact	Size of affected area	Loss of fisheries resources/ production	Destruction and disturbance of nursery and spawning grounds	Impact on fishing activities	Impact on aquaculture activity		
Construction phase										
Fish pond loss	Site formation	Abandoned pond within the Project Site	Permanent	0.33 ha	Yes (only if the abandoned fish pond within the Project Site resumed)	No	No	The fishpond area will be lost.	Insignificant	No
Drainage channel water quality deterioration	Site runoff and wastewater	Potential water source for pond culture	Temporary	In the vicinity	No	No	No	Potentially affect the pond culture if the flow from the drainage channel is used as water source	Insignificant	No specific fisheries mitigation required. Only standard site practices (refer to Chapter 5)
Operation phase										
NA										

9.6.2 Construction Phase - Indirect Impacts

The major potential activities that could cause water quality impacts during the construction phase of the Project include:

- Construction site runoff; and
- Wastewater from construction activities.

Construction site runoff and wastewater might not cause water quality impacts on the surrounding fishponds since the ponds are at least 100 m away from the Project Area. Mitigation measures as mentioned in Section 5.4.2 will be implemented to minimise the potential impact of construction site runoff and wastewater to water quality including water quality of the surrounding fishponds.

The drainage channel to the west of the Project Area might potentially serve as water source for fish ponds in the Assessment Area. However, the need of utilisation of this water source for the fishponds in the Assessment Area would be low as the ponds were separated from this channel at some distance by roads. Even though, adequate site drainage will be provided to ensure that site runoff and wastewater will be properly contained and treated prior to discharge into the surrounding water courses.

The access to all other fishponds inside the Assessment Area would not be blocked or occupied during the construction phase. The construction works would be limited within the Project boundary. The Contractor would be required under the Contract to maintain or re-provide all existing roads/accesses throughout the construction period. However, only limited traffic is expected to increase. Even for the abandoned fishponds (**Figure 9-1**), at the northwest, east and south of the Project Area, access would not be impacted and any resumptions of fish culture operations would not be affected.

9.6.3 Operational Phase – Indirect Impacts

Given the nature of the Project, no disturbance on the fishpond culture operation or deterioration of the fishpond water quality during the operation phase of the channel are anticipated. The pond operators/owners may opt to redevelop aquaculture in the currently abandoned fishponds at the northwest, east and south of the Project Area during the operation phase.

Residential discharge will be collected by municipal sewer system, and other activities arising from the residential development will not have an impact on culture activities and water quality of fish ponds and nearby drainage channel during the operation phase.

9.7 Mitigation of Impacts

As all the direct and indirect impacts in both construction and operation phases are insignificant, no specific fisheries mitigation measures are required.

Standard site practice detailed in Chapter 5 would be implemented to avoid or minimise the impacts on water quality on site, which are summarized as follows:

- Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage at all work sites during construction;
- Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby waterbodies by rain;

- Construction effluent, site run-off and sewage should be properly collected and/or treated;
- Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified; and
- Supervisory staff should be assigned to station on site to closely supervise and monitor the works.

9.8 Residual Impacts

The residual impacts from the Project would be loss of 0.33 ha of fishpond area. The successful implementation of zone "R(D)" and the impacted fishpond is abandoned, the residual impact is acceptable.

9.9 Environmental Monitoring and Audit

Other than the water quality monitoring programme at nearby water courses/ channels during the construction phase, no specific fisheries EM&A programme would be required during the construction and operation phases of the Project.

9.10 Impact Summary and Conclusion

Literature review and field checks have been conducted to establish the fisheries baseline condition of the assessment area and assessment of potential impacts conducted in accordance with the EIAO-TM requirements. The Project would cause a loss of 0.33 ha of an abandoned fishpond. Potential impacts on fisheries of the Assessment Area during both construction phase and operation phase are ranked as **Insignificant**. No mitigation is required and the residual impact is acceptable. Other than the water quality monitoring programme, no specific fisheries EM&A programme would be required.

9.11 References

AFCD website. (http://www.afcd.gov.hk/eindex.html)

AFCD 2013. *AFCD Department Report 2013-2014*.

(http://www.afcd.gov.hk/misc/download/annualreport2014/en/fisheries.html)

Environmental Protection Department (2009). EIA Study Brief (ESB-210/2009) for Proposed Low-rise and Low-density Residential Development at Various Lots and their Adjoining Government Land in D.D.104 East of Kam Pok Road, Mai Po, Yuen Long, N.T.

10. CULTURAL HERITAGE

10.1 Summary

The aims of the Cultural Heritage Impact Assessment (CHIA) are the followings:

- to identify and highlight all archaeological deposits, cultural heritage resources, built heritage structures and cultural/ historical landscapes in the Study Area;
- to assess direct and indirect impacts which may result from the proposed Project on these resources; and to recommend mitigation of impacts where required.

The CHIA will follow the Antiquities and Monuments Office Guidelines for Cultural Heritage Impact Assessment and will fulfil the requirements as set out in Annex 10 and 19 of the Technical Memorandum on EIA Process (EIA Ordinance, Cap. 499, S.16).

10.2 Environmental Legislation, Standards, Guidelines and Criteria

Legislation, Standards and Guidelines relevant to the consideration of Cultural Heritage impacts under this study include the following:

- Antiquities and Monuments Ordinance
- Environmental Impact Assessment Ordinance
- Hong Kong Planning Standards and Guidelines
- Technical Memorandum on Environmental Impact Assessment Process
- Guidelines for Cultural Heritage Impact Assessment

10.2.1 Antiquities and Monuments Ordinance

The Antiquities and Monuments Ordinance (the Ordinance) provides the statutory framework to provide for the preservation of objects of historical, archaeological and paleontological interest. The Ordinance contains the statutory procedures for the Declaration of Monuments. The proposed monument can be any place, building, site or structure, which is considered to be of public interest by reason of its historical, archaeological or paleontological significance.

Under Section 6 and subject to sub-section (4) of the Ordinance, the following acts are prohibited in relation to certain monuments, except under permit;

- To excavate, carry on building works, plant or fell trees or deposit earth or refuse on or in a proposed monument or monument;
- To demolish, remove, obstruct, deface or interfere with a proposed monument or monument.

The discovery of an Antiquity, as defined in the Ordinance must be reported to the Antiquities Authority (the Authority), or a designated person. The Ordinance also provides that, the ownership of every relic discovered in Hong Kong after the commencement of this Ordinance shall vest in the Government from the moment of discovery. The Authority on behalf of the Government may disclaim ownership of the relic.

No archaeological excavation may be carried out by any person, other than the Authority and the designated person, without a licence issued by the Authority. A licence will only be issued if the Authority is satisfied that the applicant has sufficient scientific training or experience to enable him to carry out the excavation and search satisfactorily, is able to conduct, or arrange for, a proper scientific study of any antiquities discovered as a result of the excavation and search and has sufficient staff and financial support.

It should also be noted that the discovery of an antiquity under any circumstances must be reported to the authority, i.e. the Secretary for Development or designated person. The authority may require that the antiquity or suspected antiquity is identified to the authority and that any person who has discovered an antiquity or suspected antiquity should take all reasonable measures to protect it.

10.2.2 Environmental Impact Assessment Ordinance

The Environmental Impact Assessment Ordinance (EIAO) was implemented on 1 April 1998. Its purpose is to avoid, minimise and control the adverse impact on the environment of designated projects, through the application of the EIA process and the Environmental Permit (EP) system.

10.2.3 Hong Kong Planning Standards and Guidelines

Chapter 10 of the HKPSG details the principles of conservation of natural landscape and habitats, historic buildings and archaeological sites. The document states that the retention of significant heritage features should be adopted through the creation of conservation zones within which uses should be restricted to ensure the sustainability of the heritage features. The guidelines state that the concept of conservation of heritage features, should not be restricted to individual structures, but should endeavour to embrace the setting of the feature or features in both urban and rural settings.

The guidelines also address the issue of the preparation of plans for the conservation of historic buildings, archaeological sites and other antiquities. It is noted that the

Existing Declared Monuments and proposed Monuments be listed in the explanatory notes of Statutory Town Plans and that it be stated that prior consultation with AMO is necessary for any redevelopment or rezoning proposals affecting the Monuments and their surrounding environments.

It is also noted that planning intention for non-statutory town plans at the sub-regional level should be include the protection of monuments, historic buildings, archaeological sites and other antiquities through the identification of such features on sub-regional layout plans. It also addresses the issue of enforcement. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong, and Government departments involved in conservation.

10.2.4 Technical Memorandum on Environmental Impact Assessment Process

The general criteria and guidelines for evaluating and assessing impacts to Cultural Heritage are listed in Annexes 10 and 19 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). It is stated in Annex 10 that all adverse impacts to Sites of Cultural Heritage should be kept to an absolute minimum and that the general presumption of impact assessment should be in favour of the protection and conservation of all Sites of Cultural Heritage. Annex 19 provides the details of scope and methodology for undertaking Cultural Heritage Impact Assessment, including baseline study, impact assessment and mitigation measures.

10.2.5 Guidelines for Cultural Heritage Impact Assessment

This document, as issued by the Antiquities and Monuments Office, outlines the specific technical requirement for conducting terrestrial archaeological and built heritage impact assessments and is based upon the requirements of the Technical Memorandum for Environmental Impact Assessment. It includes the parameters and scope for the Baseline Study, specifically desk-based research and field evaluation. There are also included guidelines encompassing reporting requirements and archive preparation and submission in the form of Guidelines for Archaeological Reports and Guidelines for the Handling of Archaeological Finds and Archives.

The prerequisite conditions for conducting impact assessment and mitigation measures are presented in detail, including the prediction and evaluation of impacts based upon five levels of significance (Beneficial, Acceptable, Acceptable with Mitigation Measures, Unacceptable and Undetermined). The guidelines also state that preservation in totality must be taken as the first priority and if this is not feasible due to site constraints or other factors, full justification must be provided.

Mitigation measures will be proposed in cases with identified impacts and shall have the aim of minimising the degree of adverse impact and also where applicable providing enhancement to a heritage site through means such as enhancement of the existing environment or improvement to accessibility of heritage sites. The responsibility for the implementation of any proposed mitigation measures must be clearly stated with details of when and where the measures will be implemented and by whom.

10.3 Methodology and Assessment Results

A CHIA has been undertaken for the Project by China Point Consultants Limited. A report detailing the assessment methodology and results is also provided in **Appendix 10-1**.

10.4 Impact Assessment

10.4.1 Construction Phase

According to CHIA report presented in Appendix 10-1, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during construction phase is anticipated.

10.4.2 Operational Phase

According to the CHIA report presented in Appendix 10-1, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during operational phase is anticipated.

10.5 Mitigation Measures

As there were no associated impacts identified, no mitigation measure was required. As a precautionary measure however, it is recommended that care should be taken during the construction stage to report any signs of possible discovery of artefacts.

10.6 Residual Environmental Impacts

As no impact is predicted, no residual impact will be incurred.

10.7 Environmental Monitoring and Audit

There are no environmental monitoring and audit requirements proposal for cultural heritage.

10.8 Impact Summary and Conclusion

According to the assessment findings, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during construction and operational phase is anticipated.

The proposed development will not encroach upon any known site of archaeological interest or areas of archaeological interest, and will not have any direct or indirect impacts on any declared monuments, graded or proposed graded historic buildings, cultural landscape features, graves or historical village during construction and operational phases. No specific EM&A requirement is considered necessary.

11. LANDSCAPE AND VISUAL

11.1 Introduction

This section describes legislation and guidelines that have been reviewed in the Landscape and Visual Impact Assessment (LVIA). The landscape baseline reviews the condition of existing landscape resources (LRs) and landscape character areas (LCAs), planning and development control framework, and the visual amenity and visually sensitive receivers (VSRs).

The assessment has been based on the criteria and guidelines stated in Annexes 10 and 18 of the EIAO-TM and covered in the scope outlined in the EIA Study Brief. The assessment identifies potential landscape and visual impacts that would occur during the construction and operational phases of low-rise and low-density residential development at various Lots and their Adjoining Government Land in D.D. 104, East of Kam Pok Road, Mai Po, Yuen Long, recommends landscape mitigation measures to alleviate the impacts; and identifies residual effects apparent after mitigation.

11.2 Environmental Legislations, Standards, Guidelines and Criteria

Legislation, Standards, Guidelines and Criteria relevant to the consideration of landscape and visual impacts in this report include the following:

- Environmental Impact Assessment Ordinance (Cap. 499) and the Technical Memorandum on EIA Process (EIAO-TM), particularly Annexes 3, 10, 11, 18, 20 and 21;
- EIAO Guidance Note 8/2010 on Preparation of Landscape and Visual Impact Assessment under the EIAO;
- Town Planning Ordinance (Cap 131);
- Hong Kong Planning Standards and Guidelines Chapter 4 and Chapter 10;
- ETWB TCW No. 6/2005 on Maintenance of Vegetation and Hard Landscape Features;
- ETWB TCW No. 29/2004 on Registration of Old and Valuable Trees, and Guidelines for their Preservation;
- ETWB TCW No. 8/2005 - Aesthetics Design of Ancillary Buildings in Engineering Projects;
- Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislations;
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
- EPD Guidelines and References on Design of Noise Barriers, Second Issue, January 2003;
- GEO Publication No. 1/2011 "Technical Guidelines on Landscape Treatment and Bio-engineering for Man-made Slopes and Retaining Walls"; and GEO Technical Guidance Note No. 20 (TGN 20);
- Land Administration Office , Lands Department Practice Note No. 7/2007 Tree Preservation and Tree Removal Application for Building Development in Private Projects; and
- Study on Landscape Value Mapping of Hong Kong, 2005.

11.3 Assessment Methodology

11.3.1 Landscape Impact

11.3.1.1 General

The preparation of the LVIA is based on the EIAO GN No. 8/2010 “Preparation of Landscape and Visual Impact Assessment under the EIAO” for evaluation of proposed development. **Section 2** of EIA describes the details of the Project and this LVIA section also provides a summary. The methodology for the LVIA is described in the following sections.

11.3.1.2 Review of Planning and Development Control Framework

A review of the existing planning studies and documents has been undertaken as part of the baseline study to gain an insight into the planned role of the site, its surrounding areas, and

its landscape context and to help to determine if the project fits into the wider existing and future landscape context. This review has considered the Outline Zoning Plans including Approved Kam Tin North Outline Zoning Plan No. S/YL-KTN/9, Approved Mai Po & Fairview Park Outline Zoning Plan No. S/YL-MP/6, Approved Ngau Tam Mei Outline Zoning Plan No. S/YL-NTM/12 and Approved Nam Sang Wai Outline Zoning Plan No. S/YL-NSW/8. Compatibility of the proposed works to the planned developments within the Study Area is considered in terms of the landscape and visual impacts.

11.3.1.3 Landscape Baseline Review and Impact Assessment

The assessment of the potential impacts of a proposed scheme on the existing landscape comprises two distinct sections namely the baseline survey and the landscape impact assessment. Landscape Impact Assessment (LIA) Study Area has been undertaken to include all areas within 500 m of the site boundary in accordance with the EIA Study Brief.

A baseline survey of the existing landscape resources and landscape character has been undertaken based on a combination of desktop studies and site surveys. The landscape elements which contribute to the landscape character include:

- Local topography and geology
- Woodland extent and type
- Other vegetation types
- Built form
- Patterns of settlement
- Land use
- Scenic spots
- Details of local materials, styles, streetscapes, etc.
- Prominent watercourses and water bodies; and
- Cultural and religious identity.

The process of landscape characterisation draws on the information gathered in the desktop and site survey and provides an analysis of the way in which the elements including the identified landscape resources (LRs) interact to create the character of the landscape. The Study Area is then divided into broadly homogenous units of similar character, which are called Landscape Character Areas (LCAs).

The sensitivity of the individual LRs and LCAs is rated using low, medium or high depending on the following factors:

- Condition, quality and maturity (maturity in this context refers to the age of the LR or LCA relative to its constituent components therefore a woodland containing mature trees would be considered to have a high level of maturity) of the LRs / LCAs;
- Importance and rarity of special landscape elements (rarity being of either local, regional, national or global importance) ;
- Significance of the LRs / LCAs from a local and regional perspective (therefore the sensitivity of a LR or LCA which is either rare in a local or regional context is greater than one which is common place);
- Ability of the LRs / LCAs to accommodate change; and
- Statutory or regulatory requirements relating to the landscape including its resources.

The next stage of the assessment process is the identification of the assessment of the magnitude of change (rated as negligible, small, intermediate or large) arising from the implementation of the project and the principal sources of impact based on the following factors:

- Scale of the works and the associated supporting facilities
- Compatibility of the project with the surrounding landscape
- Duration of impacts (temporary or permanent) under construction and operation phases and
- Reversibility of change

The degree of significance of landscape impact is derived from the magnitude of change which the project will cause to the LRs/LCAs and the sensitivity of the LRs/LCAs. This makes a comparison between the landscapes, which would have existed in the absence of the Project with that predicted as a result of the implementation of the project. The significance threshold for impacts to LRs and LCAs is rated as significant, moderate, slight or insubstantial. The impacts may be beneficial or adverse.

The significance threshold is derived from the following matrix:

Magnitude of Change caused by Project				
	Large	Moderate Impact	Moderate / Significant Impact	Significant Impact
	Intermediate	Slight / Moderate Impact	Moderate Impact	Moderate / Significant Impact
	Small	Slight Impact	Slight / Moderate Impact	Moderate Impact
	Negligible	Insubstantial	Insubstantial	Insubstantial
		Low	Medium	High
		Sensitivity of LRs/LCAs		

11.3.1.4 Tree Survey Methodology

To minimize conflicts with existing vegetation a preliminary tree survey in accordance with LAO PN No. 7/2007, 'Tree Preservation and Tree Removal Application for Building Development in Private Projects' has been undertaken to inform the potential tree impact assessed in this LVIA as a result of the proposed works. This tree survey involves the identification of individual trees within the proposed works area. The survey includes individual tree species, sizes, health condition, form, and amenity value and their treatment as a result of the implementation of proposed works.

This existing tree data allows the fine tuning of the detailed design for the proposed works and ensures that any significant trees including potential old and valuable trees or rare or protected tree species, where possible, be protected in current location or through transplantation during both the construction and operational phases of the Project.

11.3.2 Visual Impact

11.3.2.1 Visual Baseline Review and Impact Assessment

The assessment of the potential visual impact of the scheme comprises two distinct parts:

- Baseline survey which identifies the visual envelope, zone of visual influence, the visually sensitive receivers and their quality of existing views and their sensitivity to change as a result of proposed works; and
- Visual impact assessment which includes the identification of the sources of visual impact, and their magnitude, that would be generated during construction and operation phases of the proposed works; and identification of the principal visual impacts primarily in consideration of the degree of change to the baseline conditions.

The assessment area for the Visual Impact Assessment (VIA) is defined by an Visual Envelope (VE) which includes all areas from which the proposed works can be seen, or the area forms the view shed formed by natural / manmade features such as existing ridgelines, built development and for example areas of woodland / large trees. Within the VE, Zone of Visual Influence (ZVI) is identified to demonstrate the visibility of the proposed works. This is

achieved through a combination of detailed walkover surveys, and desk-top study of topographic maps and photographs, and preparation of cross-sections to determine visibility of the improvement works from various locations.

The baseline survey of all views towards the proposals is undertaken by identifying:

- The VE and ZVI are the area from which the whole or portions of the development or other structure or its associated offsite construction activities and temporary works is theoretically visible; and
- The visually sensitive receivers (VSRs) within the visual envelope whose views will be affected by the scheme.

The potential receivers are considered as four groups:

- Views from residences – the most sensitive of receivers due to the high potential of intrusion on the visual amenity and quality of life;
- View from workplaces – less sensitive than above due to visual amenity being less important within the work environment;
- Views from recreational landscapes – including all areas apart from the above, e.g., public parks, recreation grounds, footpaths, cultural sites etc. Sensitivity of this group depends on the length of stay and nature of activity, e.g. sitting in a park as opposed to an active sporting pursuit; and
- Views from riverside access, public roads and railways – including vehicle travellers with transitory views.

The assessment of sensitivity has also been based on the quality and extent of the existing view. Therefore a view from a residential property, which would normally be considered the most sensitive view, may be less so if for example it is degraded by existing development or partially screened by intervening visual obstacles such as existing vegetation. Factors affecting the sensitivity of receivers for evaluation of visual impacts include:

- Value and quality of existing views;
- Availability and amenity of alternative views;
- Type and estimated number of receiver population;
- Duration or frequency of view; and,
- Degree of visibility.

Views available to the identified VSRs are rated according to their sensitivity to change using low, medium or high.

The location and direction of its view relative to the scheme also influences the sensitivity of each group. Typical viewpoints from within each of the visually sensitive groups are identified and their views described. Both present and future (planned) visually sensitive receivers (PVSRs), if any, are considered.

The factors affecting the magnitude of change for assessing the visual impacts include the following:

- Scale of the works and the associated supporting facilities;
- Compatibility of the project with the surrounding landscape;
- The extent of visibility of the proposed works and level of potential blockage of existing views;
- Viewing distance;
- Duration of impacts under construction and operational phases; and
- Reversibility of change

The magnitude of change to the views will be classified as follows:

- Large: e.g. large project works extent/ extensively blocked the views of VSRs / Project nature is not compatible to existing visual context / works area located in the foreground of the visual context / permanent impacts / irreversible of change;

- Intermediate: e.g. intermediate project works extent / partially blocked the views of VSRs / project nature is fairly compatible to existing visual context / works area located in the middle ground of the visual context and not immediately adjacent to VSRs or their views are already partially screened by existing topography, built structures or vegetation / permanent impacts/ Irreversible of change;
- Small: e.g. small project works extent / no blockage of views / project nature is compatible to existing visual context / works area located in distant to VSRs / permanent impacts and duration of construction impacts is short/ Irreversible change or temporary change of view; and
- Negligible: e.g. no discernible change in visual context.

The significance threshold for visual impact is rated in a similar fashion to the landscape impact, i.e. significant, moderate, slight and negligible. The impacts may be beneficial or adverse.

Therefore the impact is derived from the magnitude of change, which the project will cause, to the existing visual context and the sensitivity of VSRs. The significance threshold is derived from the following matrix:

Magnitude of Change Caused by Project				
	Large	Moderate Impact	Moderate / Significant Impact	Significant Impact
	Intermediate	Slight / Moderate Impact	Moderate Impact	Moderate / Significant Impact
	Small	Slight Impact	Slight / Moderate Impact	Moderate Impact
	Negligible	Insubstantial	Insubstantial	Insubstantial
		Low	Medium	High
		Sensitivity of VSRs		

Table 11.1 below provides an explanation of the degree of impact for both landscape and visual impact of the project.

Table 11-1 Degree of Impact

Impact	Description
Significant	Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing landscape quality or visual amenity.
Moderate	Adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing landscape quality or visual amenity.
Slight	Adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in the existing landscape quality or visual amenity.
Insubstantial	No discernible change in the existing landscape quality or visual amenity.

11.3.3 Mitigation Measures

The purpose of mitigation is to avoid, reduce, and where possible remedy or offset any adverse effects on the environment arising from the proposed works. The ideal strategy for identifiable adverse impacts is one of avoidance. If this is not possible, alternative strategies of reduction, remediation and compensation should be explored.

Mitigation measures may be considered under two categories:

- Primary mitigation measures which are embedded into the project design and have been developed through an iterative design process. These mitigation measures is the most effective if considered as an integral part of the site layout and design to avoid adverse impact in the design process; and
- Secondary mitigation measures designed to specifically address the remaining (residual) adverse effects arising from the proposed works.

Primary mitigation measures form integrated mainstream components of the proposed works focusing on the adoption of alternatives to the alignment and their associated above-ground structures; and refinements to the basic engineering and architectural design including layout, built structures etc. to avoid and/or minimize potential adverse impacts. The design philosophy can also describe the benefits to the design of alternative solutions, introduced to reduce potential adverse impacts, and indicate how these have been addressed.

Secondary mitigation measures are specifically designed to mitigate the adverse impacts of the proposed works and are considered in the assessment of the landscape and visual impacts. These may take the form of remedial measures such as colour and textural treatment of built structure; and compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new amenity area etc.) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long-term impacts.

Programme for the mitigation measures will be provided. The agencies responsible for the funding, implementation, management and maintenance of the mitigation measures will be identified.

11.3.4 Residual Impacts

The residual impacts are those, which remain after the proposed mitigation measures, have been implemented. This has been assessed both during the construction period and during the design year, which is often taken to be 10 to 15 years after the proposed scheme has been opened to normal operation when the soft landscape mitigation measures are deemed to have reached a level of maturity, which allows them to perform their original design objectives.

The level of impact is derived from the magnitude of change, which the project will cause to the LRs/LCAs and the visual context of VSRs taking into account the beneficial effects of the proposed mitigation and the sensitivity of LRs/LCAs and VSRs. The significance threshold is derived from the matrices described separately above for the landscape and visual impacts.

In accordance with Annex 10 of the EIAO-TM a final conclusion is also made of the residual landscape and visual impacts attributable to the proposed scheme. The degree of residual impact is considered in accordance with the Residual Impact Significance Threshold Matrix in **Table 11-2** below.

Table 11-2 Residual Impact Significance Threshold Matrix

Residual Impact	Description
Beneficial	The project will complement the landscape and visual character of its setting, will follow the relevant planning objectives and will improve overall and visual quality
Acceptable	There will be no significant effects on the landscape, no significant visual effects caused by the appearance of the project, or no interference with key views.
Acceptable with mitigation measures	There will be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures.
Unacceptable	The adverse effects are considered too excessive and are unable to mitigate practically;
Undetermined	Significant adverse effects are likely, but the extent to which they may occur or may be mitigated cannot be determined from the study. Further detailed study will be required for the specific effects in question.

11.3.5 Graphic Presentation of Mitigation Measures

- In order to illustrate these landscape and visual impacts and to demonstrate the effectiveness of the proposed landscape and visual mitigation measures, photomontages at selected representative viewpoints have been prepared to illustrate:
- Existing conditions
- Day 1 of Operation Phase without Landscape and Visual Mitigation Measures
- Day 1 of Operation Phase with Landscape and Visual Mitigation Measures and
- Year 10 of Operation Phase with Landscape and Visual Mitigation Measures

11.3.6 Prediction of Acceptability of Impacts

An overall assessment of the acceptability, or otherwise, of the impacts will be carried out according to the five criteria set out in Annex 10 of the EIAO-TM, namely Beneficial, Acceptable, Acceptable with Mitigation Measures, Unacceptable and Undetermined.

11.4 Selection of the Recommended Layout

11.4.1 Alternative Development Options and Layouts

Evaluation of layout options and the relevant landscape and visual issues have been discussed in Section 2 of this Report. The process of selecting a recommended layout for the proposed development considered several alternative layout options based on the initial findings of the various assessments. Scenario 1 assumed that no permanent development will be taken place within the Project Site. Options A is the development layout derived during the planning application A/YL-MP/170. This layout was approved by Town Planning Board on 7 May 2010. Asides from Option A, another alternative development scheme was also developed as Option B. The Option B (recommended scheme) is the Recommended Layout forming the basis of this assessment which was subsequently approved by Town Planning Board on 7 February 2014 under the planning application A/YL-MP/202. Alternative layouts are put in **Figures 2-5 to 2-6**.

Among which, the following alternative development options and layouts are evaluated in terms of landscape and visual perspectives. All options and layouts comply with noise mitigation requirement to indusial noise which generated from adjacent workshops through the use of noise barrier at periphery of the Project Site. The selection of the recommended layout requires a balanced view of landscape and visual with other environmental factors which is considered in Section 2. A comparison of the environmental concern of the development options is shown on Table 11-3.

Scenario 1: Without the Project

The “Without the Project” scenario assumes that no permanent development will take place within the Project Site. Without the proposed development, it is assumed that the existing open car park for heavy duty vehicles will be continuously operating that implies no improvement on the existing unpleasant landscape features found in the core area of the Project Site including open storage activities and/or material dumping activities, weedy trees, the continuing operation or expansion of these activities in the Project Site will lead to further degradation of the adjoining nullahside rural character. Although existing tree and shrub planting along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road North serve as a visual buffer to these unpleasant features, these features are still dominant in the views of residents living along Ha San Wai Road and visitors along the Ngau Tam Mei Nullah. Besides, the continuing operation of existing activities does not fit into the planning intention for the area which supports low-rise/ low-density developments and tends to fade out the unpleasant open storage/ car parking and industrial uses in the environs.

Scenario 2 " With the Residential Development" contained the following three development layout options which derived at different time during planning applications.

Option A: Planning application approved scheme under A/YL-MP/170 (approved by Town Planning Board on 7 May 2010)

Option A is to develop the Project Site with 42 houses based on the approved S16 planning application (Application No. A/YL-MP/170). Low-rise residential development and its associated landscape proposals will replace existing unpleasant landscape features. A 1.5m wide planting zone is proposed eastern periphery of the Project Site along Ha Chuk Yuen Road, in combination of vegetation on sloping area, this planning and tree preservation proposals serve as visual mitigation to the proposed 8m high noise barrier wall. This noise barrier wall is designed with monotonous height along three sides of the Project Site for fully compliance with EPD noise mitigation requirement for industrial noise generated from the east of Ha Chuk Yuen Road and traffic noise along Kam Pok Road. Although the scheme have been approved on 7 May 2010 by Town Planning Board, the noise barrier design and planting proposal under the approved scheme are required to be further explored to minimise the visual intrusion of barrier wall and maximise the greening opportunities for the wall and within the development to address comments from Urban Design and Landscape Unit at Planning Department during the application.

Option B: Interim layout devised

Another development layout is formulated with the aim to address the technical requirements and further explores the design of noise barrier and associated planting proposal for the low-rise residential development which was not yet provided in Option A. Proposed number of houses reduced from 42 to 32 will enhance the permeability of the proposed development. A landscape and recreation core is provided under this development layout creating high quality recreation spaces for the use of future residents as well as enhancing local landscape quality and visual amenity. This residential landscape will visually benefit to the adjacent residents at Fairview Park and along Ha San Wai Road, planned residential and recreational users along Yau Pok Road and Kam Pok Road, and visitors along Ngau Tam Mei Nullah. Planting concept which utilised both native and ornamental species will extend from the proposed landscape core to internal streets of the proposed development and to the landscape buffer at periphery of the Project Site. This proposal will create a comprehensive landscape framework for the proposed development. A 5m wide landscape buffer is adopted in design of noise mitigation measure to minimise the visual impact. The height of the noise barrier varies from 9.5 to 6.5m along Ha Chuk Yuen Road, stepped height profile have been used in this layout option. Although the extent of proposed noise barrier is less than Option A, the barrier has a higher height profile than Option A. Even a screening buffer has been incorporated in front of the barrier, it is still visually dominant in the views of residential neighbourhoods.

Option B: Recommended Layout: Preferred Development Scheme (Planning application approved scheme under A/YL-MP/202 (approved by Town Planning Board on 7 February 2014)

This recommended layout is formulated with the aim to address the technical requirements and further explore the design of noise barrier and associated planting proposal which was not yet provided in Option B. The development density and the extent of noise barrier are the same as Option B. The site area have been slightly reduced in this development layout to exclude the potential works area for infrastructure works along Kam Pok Road which will be implemented by others. The reduction of site area implies less impact of roadside amenity along Kam Pok Road. The height of noise barrier is limited to maximum 10.1mPD

(approximately 200m long and 4.5m high along Ha Chuk Yuen Road). Besides, a semi-sunken temporary sewage treatment, the refuse and switch room along south-eastern boundary of the Site are designed to form the remaining portion of noise mitigation measures along Ha Chuk Yuen Road. 5 to 8m wide landscape buffer, in combination of tree planting and preserved trees, is designed at the outerside of the noise barrier. The planting strip extends along the periphery of the Site to screen the 2.5m high fence wall as well as proposed houses. 32 numbers of proposed 2-storey houses are 6.6m high which the building height is compatible to the existing and planned developments in the surrounding context. Same as Option B, the proposed residential landscape will visually benefit the adjacent residents at Fairview Park and along Ha San Wai Road, planned residential and recreational users. This integrated design approach of noise barrier and built structures and the introduction of landscape buffer/continuous planting strip mentioned above would further minimise the visual impact and would be better integrated with the surrounding landscape character when compared to Interim layout. Lower height profile of noise barrier and wider landscape buffer in this option enhanced the screening effect when compared to Option A and B, hence it is considered as a Preferred Development layout.

11.4.2 Option Evaluation

Of the development scenarios and layout options mentioned above, the Recommended Development Layout prefers from both landscape and visual impact perspectives through the reduction in the number of houses, responsive house disposition which maximised the degree of visual access from east to west through the proposed development, the variation of built form and noise barrier design creating architectural interest and introduction of wider landscape buffer in the existing rural context and better integration of existing landscape buffer along Kam Pok Road and Ha Chuk Yuen Road.

Table 11-3 Comparison of Alternative Development Options and Layouts

Evaluation Criteria	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A Previous Approved Scheme (Application No. A/YL-MP/170)	Option B	Option B: Recommended Layout (Approved Scheme under Planning Application A/YL-MP/202)
Site Area	38,400m^2	37,930m^2(Approx.)	37,930m^2(Approx.)	37,645m^2(Approx.) Reduction in site area.
Site Coverage	67.4% of open yard for car parking/open storage/ temporary structures/ green nursery, 23.8% roadside amenity area surrounding the site along Kam Pok Road and Ha Chuk Yuen Road and 8.8% abandon fishpond located at south-eastern corner of the site.	Max 20%	Max 20%	Max. 20%
Number of House	N/A	42 Average house size from 139.35 to 278.70 m^2	32 Average house size from 206.99 to 340.95 m^2	32 Average house size from 206.99 to 340.95 m^2
Number of Storeys	Existing single storey of temporary structures, car parking and open container storage.	2 storeys	2 storeys	2 storeys
Building Height	Less than 5m high	6.6m	6.6m	6.6m
Height of Noise Mitigation along Ha Chuk Yuen Road	N/A	7.5m high barrier + 0.5m high cantilever penal Monotonous height	6.3 to 9.3m high barrier + 0.2m high noise reducer	4.5 m high barrier + integrated design approach with sewage treatment plant with a height of not more than 10.4mPD.
Building Orientation	Scattered Temporary Structures	*Single Loop Layout*	*Focal Point Layout*	*Focal Point Layout*

Evaluation Criteria	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A Previous Approved Scheme (Application No. A/YL-MP/170)	Option B	Option B: Recommended Layout (Approved Scheme under Planning Application A/YL-MP/202)
		Club house facilities and communal recreation areas located at entrance of the Site. Houses distributed alongside of single loop internal road layout. Extent of private premises up to the edge of site boundary. .	Club house facilities and communal recreation focused in central portion of the site. Houses distributed in the northern and southern portions of the site along east-west orientated internal roads. Landscape buffer along the edge of the Site.	Club house facilities and communal recreational areas focused in central portion of the site. Houses distributed in the northern and southern portions of the site along east-west orientated internal roads. Larger houses distributed along north-eastern portion of the site. Landscape buffer along the edge of the Site.
View Corridors	No major visual corridor provided.	No major visual corridor provided.	No major visual corridor provided.	No major visual corridor provided.
Visual Mass of Structure and Permeability	Given to the low existing building height profile, temporary structures within the Site are screened by amenity planting along Kam Pok Road and Ha Chuk Yuen Road	Small average flat sizes. Less communal landscape and recreation areas. Average size private garden areas.	Smaller flat size mix, less number of houses proposed. Less internal road coverage. Maximizes visual permeability through the provision of landscape and recreation core and disposition of the houses.	Larger flat size mix, least number of houses proposed. Smaller private garden areas, more communal space and landscape area. Less internal road coverage. Maximizes visual permeability through the provision of landscape and recreation core and disposition of the houses.

Evaluation Criteria	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A Previous Approved Scheme (Application No. A/YL-MP/170)	Option B	Option B: Recommended Layout (Approved Scheme under Planning Application A/YL-MP/202)
Landscape Impacts				
Impact on Existing Trees	No development / No Impact Weedy trees and existing trees with low amenity value remain on site.	Tree retention along Kam Pok Road on the slope along Ha Chuk Yuen Road. Moderate Tree Impact	More tree retention along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road. Less Tree Impact than Option A	More tree retention along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road when compared to Option A and B due to reduction of site area.
Landscape Resources	Impact on landscape resources : Roadside amenity: No Impact Fishpond (abandoned) : No Impact Open yard: No Impact	Impact on landscape resources : Roadside amenity: approx. 1.06 ha loss (Medium impact on existing trees): Significant Adverse Impact Fishpond (abandoned) : approx. 0.33 ha.: Moderate Adverse Open yard: 2.5 ha : Moderate Adverse Impact	Impact on landscape resources : Roadside amenity: approx. 0.9 ha loss(Less impact on existing trees) : Moderate Adverse Impact Fishpond (abandoned): approx. 0.33 ha Moderate Adverse Impact Open yard: 2.5 ha : Moderate Adverse Impact	Impact on landscape resources : Roadside amenity: approx. 0.6 ha (Less impact on existing trees) : Moderate Adverse Impact Fishpond (abandoned): approx. 0.33 ha Moderate Adverse Impact Open yard: 2.5 ha : Moderate Adverse Impact Least loss of roadside amenity due to reduction of site area when compared to Option A and B.
Landscape Character	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape : No Impact Indirect impacts: No Impact The site is largely hard paved for open car park, existing	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape: Insubstantial upon implementation of residential landscape proposals. No impact on surroundings low-rise and rural residential landscapes.	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape : Insubstantial impact upon implementation of residential landscape proposals Wider landscape buffer (5m wide) at the periphery of the site incorporated when compared to Option A. Better screening effect on noise barrier wall.	Impact on landscape character areas: Kam Pok Road Roadside Residential Landscape : Insubstantial impact upon implementation of residential landscape proposals Integrated design of noise mitigation with built structures instead of

Evaluation Criteria	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A Previous Approved Scheme (Application No. A/YL-MP/170)	Option B	Option B: Recommended Layout (Approved Scheme under Planning Application A/YL-MP/202)
	unpleasant landscape character will remain unchanged.		Articulated design of noise mitigation instead of monotonous design when compared to Option A. Removal of noise barrier along Kam Pok Road No impact on surroundings low-rise and rural residential landscapes..	monotonous panel design when compared to Option A and B. Lowest overall height of noise barrier when compared to the previous options. Wider landscape buffer (5-8m wide) at the most periphery of the site than Option A. Better screening effect on high noise barrier wall. No impact on surroundings low-rise and rural residential landscapes.
Visual Impacts	No impact. Visually unpleasant open car park occupied by heavy duty trucks and coaches and weedy trees remain on site, the visual quality is poor.	Relatively higher density of houses The longest extent of noise barrier along three sides of the site. Medium overall height of noise barrier when compared to the other option. For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience significant visual impact due to loss of roadside amenity and the introduction of noise barrier along all three sides of the site. Visual quality enhanced upon replacement of existing	Less density of houses Noise barrier required only along Ha Chuk Yuen Road. Option with the highest overall height of noise barrier. Design with articulated edges and stepped height profile. For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience moderate to significant visual impact due to loss of roadside amenity and the introduction of noise barrier. Less visual impact than Option A due to the reduction of the height and extent of noise barrier and number of proposed houses.	Less density of houses Similar noise barrier extent as Option B. Integrated noise mitigation with built structures, STP, further reduced the extent of noise barrier panel. The lowest noise barrier when compared to Option A and B For VSRs including residents living in the village settlements and low-rise residential developments surrounding the site will experience moderate to significant visual impact due to loss of roadside amenity and the introduction of noise barrier. Option with the least visual impact to the residential neighbourhoods due to further reduction of the height profile and extent of noise barrier.

Evaluation Criteria	Scenario 1: Without the Project	Scenario 2: With the Project		
		Option A Previous Approved Scheme (Application No. A/YL-MP/170)	Option B	Option B: Recommended Layout (Approved Scheme under Planning Application A/YL-MP/202)
		unpleasant use with residential landscape.	Visual quality enhanced upon replacement of existing unpleasant use with residential landscape.	Visual quality enhanced upon replacement of existing unpleasant use with residential landscape.

11.5 Review of Planning and Development Control Framework

A review of the existing planning studies and documents has been undertaken as part of the baseline study to gain an insight into the planned role of the site, its surrounding areas, and its landscape context and help to determine if the project fits into the wider existing and future landscape context. The assessment does not consider all of the areas zoned on the OZP but focuses on only those affected by the proposed works. The locations of these areas are shown on **Figures 11-1**. This review considered the following aspects of the identified planning designations:

- Zoning areas which would be physically affected by the proposals, that is where the implementation of the proposed works would lead to the actual loss of an area;
- The potential degradation of the landscape setting of an area which might affect the viability of its landscape planning designation but not result in a loss of zoning area;
- The visual amenity enjoyed by future residents or users; and
- The general fit of the proposals into this future landscape.

The assessment covers areas shown on the following Outline Zoning Plans:

- S/YL-KTN/9 Kam Tin North;
- S/YL-MP/6 Mai Po & Fairview Park;
- S/YL-NTM/12 Ngau Tam Mei; and
- S/YL-NSW/8 Nam Sang Wai

Table 11-4 indicates that proposed house development will have direct impact on a Residential (Group D) zone under Mai Po & Fairview Park OZP No. S/YL-MP/6. There is no impact on adjacent zonings under Kam Tin North OZP No. S/YL-KTN/9, Ngau Tam Mei OZP No. S/YL-NTM/12 and Nam Sang Wai OZP No. S/YL-NSW/8. Considered that the proposed residential development is low-rise and low-density which complied with the existing land uses and planning intention of future land uses in the context. Therefore the proposed works have no conflict and implication on existing or planned designations as shown in OZPs. Town Planning Board has approved the development scheme under Planning Application A/YL-MP/202 on 7 February 2014 which is the Preferred Development Scheme under this EIA.

Table 11-4 Review of Existing Planning and Development Control Framework

Land Use Zonings	Landscape Planning, Design and Conservation Intention of Zoning	Potential Impacts/Approx. Area Affected by the Proposed Works / Total Zoning Area	Mitigation Measures and Future Outlook of the Area with the Proposed Works
Outline Zoning Plan Number: S/YL-MP/6 Mai Po & Fairview Park			
Residential (Group D) (14.9Ha)	This zone is intended primarily for improvement and upgrading of existing temporary structures within the rural areas through redevelopment of existing temporary structures into permanent buildings. It is also intended for low-rise, low-density residential developments subject to planning permission from the Town Planning Board.	Approximately half of this zoning site will be acquired for the construction of the low-rise and low-density residential development. (3.8 Ha affected, 25.5% of the total zoning area) Magnitude: Small	The subject site is currently occupied by temporary open car park and open storage which are intended to be fading out in the area. The preferred scheme under the recent Section 16 planning application has been approved by Town Planning Board on 7 February 2014. As such, the proposed residential development is considered to be tolerable to the existing land use and planning intention for this area. Concurrent Projects within this OZP: Proposed Residential Development within "Residential (Group D)" zone at various lots in DD104, Yuen Long, N.T. (Study Brief No. ESB - 204/2009) - low-rise residential development (6.1Ha, 71 houses, 3-storeys + 1 basement) at the northern portion of this zoning has been approved by the Town Planning Board on 2013. EIA studies required under the EIAO to be carried out. Proposed Residential Cum Passive Recreation Development within "Recreation" Zone and "Residential (Group C)" Zone at Various Lots in DD 104, Yuen Long, N.T. (EIA Register No.: AEIAR-182/2014) - low-rise residential cum recreation development (9 Ha, 106 houses, 2-storeys) in the Recreation Zone (REC) to the east of Fairview Park along Yau Pok Road. Environmental Permit issued by EPD in 2014. Amendments to Statutory Plan under planning application no. TPB/Y/YL-MP/3 has been agreed by Town Planning Board in May 2016. Comprehensive Development and Wetland Protection near Yau Mei San Tsuen, Yuen Long (EIA Register No.: AEIAR-189/2015) - low-rise residential development with wetland restoration proposal (8.1Ha, 70 houses, 3-storeys) in the Comprehensive Development and Wetland Protection Area zone (OU) at Yau Mei San

Land Use Zonings	Landscape Planning, Design and Conservation Intention of Zoning	Potential Impacts/Approx. Area Affected by the Proposed Works / Total Zoning Area	Mitigation Measures and Future Outlook of the Area with the Proposed Works
			Tsuen. EIA was approved by EPD in 2015. Planning application is in progress pending for TPB approval. Given the existing and planned outlook of the Area are largely for low-rise residential developments, the proposed house development within the development site boundary will fit into the planning context.

11.6 Baseline Condition

11.6.1 Landscape Baseline

Baseline Condition

The baseline review of the existing landscape establishes the broad characteristics, identifies landscape resources, landscape character and visual amenity of the Study Area. This baseline review is based on desktop information and recent site visits, the findings will then be used to provide a characterization and elevation of the identified landscape resources and landscape character areas.

Figures 11-2 and 11-3-1 to 11-3-7 show the existing LRs found within the 500m Study Area with photographs of the LRs. **Figure 11-4** show the extent of the identified LCAs and **Figures 11-5-1 and 11-5-2** illustrate the quality of LCAs with site photographs.

Topography

The Study Area is characterized by the lowland rural and low-rise residential landscapes alongside of Ngau Tam Mei Drainage Channel which locates in the central portion of the Study Area. The proposed development site is a relatively flatland area of about 3 to 6.5mPD. It is occupied by open yard for temporary car parking, partly vacant and with a small portion of abandoned fishpond located at the southern portion of the site. The site is largely paved with concrete and compacted soil surface for the use of heavy vehicle parking. It is bounded by existing vegetated slopes along Fung Chuk Road and Ha Chuk Yuen Road and a roadside amenity strip along Kam Pok Road. These vegetated slopes form the major tree groups and vegetation within the site. The site is surrounding by Kam Pok Road (4.65 to 6mPD), Fung Chuk Road (3.5 to 5.5mPD), Ha Chuk Yuen Road (3.5mPD) and Ha San Wai Road (5mPD).

To the west of the proposed development site is an extensive low-rise residential development area, Fairview Park, associated with car parking areas, grassland and abandoned fields along Yau Pok Road. Some grassed areas are planned for recreation or residential uses under the OZPs. Fairview Park is an extensive low-rise and low density residential estate developed in the 1980s. Typical houses within the estate are approximately 3-storeys high with systematic internal access roads provided within the estate. Extensive grassland adjacent to Bethel High School which used to be a golf course which planned for future recreational use but is now vacant. Another piece of grassland located at the northern portion of Fairview Park is also vacant pending for residential and recreation developments as planned under the Mai Po & Fairview Park Outline Zoning Plan. The Ngau Tam Mei Drainage Channel is located to the east of Fairview Park. Vegetated slopes alongside of the nullah are covered by herbaceous vegetation and water plants. The nullah is bounded by Yau Pok Road and Kam Pok Road, newly established roadside planting is observed with tree and shrubs which are common in Hong Kong and was originally planted after the drainage improvement works. As the proposed development will not have any direct conflict on the nullah and its adjacent road, the channelside vegetation are largely preserved. The low-rise residential developments, open yards, abandoned agricultural fields together with Ngau Tam Mei Drainage Channel form the rural backdrop for the proposed residential development.

Moving to the north, northeast and east, the Study Area composes of scattered village settlements, extensive grassland, open yards, agricultural fields and San Tin Highway. The scattered village settlements including Chuk Yuen Tsuen, Ha San Wai Tsuen and Sheung Chuk Yuen which are located along the western side of Castle Peak Road (Tam Mi Section) and the eastern side of San Tin Highway. These village settlements are characterised by extensive groups of 3-storey village houses which are dominant landscape feature in the rural lowland landscape. Built form of these village settlements includes a combination of traditional dwellings although the majority of them have been replaced by a modern building design. The

settlements connect by narrow lanes and footpaths. Extensive grassland and abandoned/active agricultural fields are located to the north and northeast of the Study Area while some open yards with temporary open car parking, warehouses and container storage facilities are scattered to the west of Ha San Wai Road and along San Tin Highway. San Tin Highway is located in the eastern portion of the Study Area. It is the major road and highway connecting from Sheung Shui and Tuen Mun. Castle Peak Road (Tam Mei Section) and San Tam Road are two lane carriageway located alongside of San Tin Highway respectively.

To the south of the Study Area, there are some low-rise residential estates, fish ponds and open yards. The low-rise residential estates in this area include Helene Terrace, Royal Camellia, Kamease Garden, Greenery Garden and Villa Camellia. These low-rise residential estates are located along Fairview Park Boulevard while another residential estate - Man Yuen Chuen, is located at the northern portion of the Study Area. Similar with Fairview Park, these low-rise residential estates are mostly 2 to 4-storeys high with internal access roads provided within the estate. Planting is limited within these estates. An extensive fish pond area and some open yards are located to the southern periphery of the Study Area.

Vegetation

Inside the development site, the area was originally occupied by car parking, open container storage, green nursery and a small portion of abandoned fish pond. All tenancies have been terminated in 2011 and the Site is vacant pending for development. Given that the majority of the Site is hard paved (over two-thirds of the site area), existing trees and vegetation are only concentrated at the western, northern and eastern peripheries of the Site. The majority of them are planted on sloping areas along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road whilst some self-seeded weedy trees are found on the slope at the northern periphery of the Site. A total of 364 trees, which have a DBH over 95mm, were identified within the Site.

The majority of existing trees surveyed are relatively young and has an average DBH of less than 150mm. A combination of native, a few ornamental and pioneer species are densely planted on the sloping areas along Fung Chuk Road and Ha Chuk Yuen Road with an average planting distance of 3m centre to centre that creates a dense foliage greening effect for roadside and nullahside amenity.

Over 15% of existing trees (56 out of total 364 existing trees) are *Leucaena leucocephala*, (銀合歡), which are weedy trees. It is originally from tropical America which has become naturalised throughout the region. It is extremely vigorous, a prolific seed producer, the seeds are dispersed by rodents and granivorous birds and often colonises disturbed sites such as this one. It also regenerates rapidly from basal shoots after being cut hence has resulted in number of multi-stemmed trees within the site. Typically these trees form thickets of closely spaced stems and as a result many of the trees exhibit an average to poor form due largely to their growing conditions, i.e. grouped together competing for space and light, which has resulted in contorted and leaning trunks, unbalanced crowns and small size. These weedy trees show a spindly form, leaning, contorted trunk, and have poor health and condition. In addition, this species can often grow to be 95mm DBH within three to four years of becoming established. This fast growth rate and their existing condition often mean the trees are relatively unstable and the branches are quite brittle in strong winds. *Leucaena leucocephala* has been identified as a weed species which should be removed as part of development project where the opportunity exists. These weedy species shall be replaced with better quality ornamental or native tree species.

The remaining trees are recently planted on the gentle sloping areas along Fung Chuk Road and Ha Chuk Yuen Road for roadside and channelside for amenity purposes including *Bischofia javanica, Cleistocalyx operculata, Delonix regia, Ficus altissima, Ficus binnendijkii, Ficus microcarpa, Hibiscus tiliaceus, Khaya seneglensis, Spathodea campanulata and Syzygium cumini.* Given their dense planting condition, they exhibit a fair to poor form and

health condition which is evident of restricted or unbalance crown spread and some branches died back. They have a contribution to the local landscape and visual amenity in groups rather than individually.

Besides, some undersized tree mixes (with DBH of less than 95mm) along Kam Pok Road roadside amenity areas are excluded from this survey. They have recently been planted in light standard to whip size under Ngau Tam Mei Main Channel Works Phase 1. They are common roadside planting species including Bauhinia variegate, *Albizia lebbek, Bischofia javanica, Cinnamomum camphora, Ficus microcarpa, Lagerstroemia Speciosa, Liquidambar formosana, Melaleuca cajuputi subsp. cumingiana , Schefflera heptaphylla, Syzygium cumini and Syzygium jambos.* The majority of this planting strip will be preserved under the current scheme and will continue their contribution to the nullahside landscape.

A total of 23 species were identified as part of the survey including a combination of tree species native to Hong Kong and a number of exotic species. Some of which it is assumed were introduced by previous landowners or tenants and main channel improvement works, which have become naturalised. Among the 23 species, 9 species are native to Hong Kong and 10 species are exotic. The species which dominate in the site include *Leucaena leucocephala*, *Ficus altissima* and *Delonix regia*. The other species found on the site are limited to a smaller amount of specimens which are largely common roadside planting and a few woodland species.

No rare or protected tree species (based on Forests and Countryside Ordinance, Cap. 96) or Champion Trees (identified in the book Champion Trees in Urban Hong Kong') were found to exist on the site. In addition, none of the trees surveyed were found to meet the requirements for an Old and Valuable Tree ETWB TCW No. 29/2004 Registration of Old and Valuable Trees, and Guidelines for their Preservation).

The tree survey (including tree survey schedule and tree survey plans) are enclosed in **Appendix11-1.** The tree survey has been completed in broad accordance with LAO PN No. 7/2007, Tree Preservation and Tree Removal Application for Building Development in Private Projects, Development Bureau Technical Circular (Works) (DEVB TC(W)) No. 7/2015 on Tree Preservation, and DEVB TC(W) No. 6/2015 on Maintenance of Vegetation and Hard Landscape Features. This report outlines the approach and findings of the tree survey, the type and extent of vegetation that will be affected by the proposed works and the proposed treatment of this vegetation. During detailed design stage, the tree felling application with be prepared and circulated to the relevant government departments for approval.

11.6.2 Landscape Resources (LRs)

The important determinants of the landscape resources within the Study Area include a combination of major roads and highways, village settlements, roadside amenity, grassland, agricultural fields, fish ponds (abandoned), engineered water channels, flood storage and facilities, development areas and open yards. These landscape resources (LRs) are shown on **Figure 11.2** and their photographic record is provided on **Figures 11.3.1 to 11.3.7.** The following LRs are identified within the Study Area and **Table 11.5** provides an assessment of the sensitivity of each of the identified LRs:

LR1 Major Roads and Highways

The major roads and highways contained within the Study Area include San Tin Highway, San Tam Road, Castle Peak Road (Tam Mi Section), Kam Pok Road, Yau Pok Road, Ha Chuk Yuen Road, Ha San Wai Road, Fung Chuk Road, Fairview Park Boulevard and Fairview Park Road South. Among these roads, San Tin Highway, San Tam Road and Castle Peak Road (Tam Mi Section) are located to the east of the Study Area separated by Ha San Wai and Chuk Yuen Tsuen which are major highways/roads in NWNT.

LR1.1 San Tin Highway

San Tin Highway is a multi-lane road with busy traffic connecting Sheung Shui, Tuen Mun and Yuen Long. Castle Peak Road (Tam Mi Section) to the west and San Tam Road to the east run alongside San Tin Highway. No footpath is provided along the sides of San Tin Highway, only footbridges and subways are provided for connecting villages alongside of San Tin Highway. Due to the busy traffic on the road, a sectional concrete noise barrier and roadside plantations (refer to LR3.1) have been provided for noise mitigation, screening and greenery purposes. LR1.1 is a manmade feature, no tree or vegetation, and occupied by busy traffic and engineered structures, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.2 San Tam Road

San Tam Road is located to the east of San Tin Highway, similar to Castle Peak Road (Tam Mi Section), it is a two-lane road framed by roadside planting (refer to LR3.3), scattered village settlements, open yards and low-rise residential developments. Concrete footpath is provided on one side of the road. Tree planting is found in the verge between the footpath and open drainage channel. Heavy vehicle traffic along the road is frequent. LR1.2 is a manmade feature, no tree or vegetation, and occupied by busy traffic and engineered structures, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.3 Ha San Wai Road

Ha San Wai Road is located immediately to the south of the proposed development site. It is a two-lane road with a narrow concrete paved footpath leading to the scattered village houses, warehouses and container storage to the east of Ha San Wai. An engineered water channel runs parallel to the road with tree and shrubs planting (refer to LR 3.7). Low-rise residential houses including Helene Terrace and Villa Camellia set alongside of the existing engineered water channel. Heavy vehicle traffic along the road is frequent. LR1.3 is a manmade feature and occupied by busy traffic and engineered structures, no tree or vegetation found along the carriageway, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.4 Fairview Park Boulevard

Fairview Park Boulevard is the main access road to Fairview Park which is a low-rise residential development. Scattered village houses and low-rise residential buildings including Royal Camellia, Kamease Garden, Greenery Garden, Villa Camellia and Helene Terrace are located alongside the eastern section of Fairview Park Boulevard. Shrub planting, including *Excoecaria cochinchinensis, Ficus microcarpa 'Golden Yellow' and Ixora chinensis* etc., found in the central median of the eastern section of the road only whilst the section inside Fairview Park is aligned with some 30 numbers of street trees including amenity species such as *Bauhinia blakeana*. Condition of vegetation in this LR is fair. Heavy vehicle traffic is frequent in the eastern section as the road is served as main access to warehouses and open container storages in the area. LR1.4 is a manmade feature and occupied by busy traffic and engineered structures, a few young street trees found in this LR, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.5 Ha Chuk Yuen Road

Ha Chuk Yuen Road is located immediately along the eastern periphery of the proposed development. Similar to Ha San Wai Road, it is bounded by roadside sloping area (within the development site) and an engineered drainage channel along the other side of the road. The roadside sloping area is dominated by plantation (refer to LR3.6) whilst self-spread weedy trees, are found alongside of the engineered drainage channel. LR1.5 is a manmade feature, no tree or vegetation, and occupied engineered structures, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.6 Kam Pok Road

Kam Pok Road is located to the west of the proposed development alongside of Ngau Tam Mei Nullah. It is a two lane local road providing access to adjacent village settlements, open yards, development areas, agricultural fields and maintenance access for the engineered Ngau Tam Mei Nullah. Nullahside and roadside planting are planted for the previous nullah engineering works, and majority of them are undersized vegetation (refer to LR3.8). Footpath is available on one side. Heavy vehicle parking is common at the roadside. LR1.6 is a manmade feature and occupied by heavy vehicle parking, no tree or vegetation found along the carriageway, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.7 Yau Pok Road

Yau Pok Road is located along western side of Ngau Tam Mei Nullah, similar to Kam Pok Road, but it serves as maintenance access only for the Nullah. Planters (refer to LR3.4) are found along the road and they also serves as divider between the road, footpath and cycle track. LR1.7 is a manmade feature, no tree or vegetation and occupied by engineered structures, no vegetation found along the carriageway, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.8 Castle Peak Road (Tam Mi Section)

Castle Peak Road (Tam Mi Section) aligned with the western side of San Tin Highway. Traffic along this two-lane road is very busy as it is the major access road to adjacent development. Given the long history of Castle Peak Road, mature specimen/ OVTs are found on the very narrow footpath (refer to LR3.2). LR1.8 is a manmade feature, no tree or vegetation, and occupied by busy traffic and engineered structures, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR1.9 Fung Chuk Road

Similar to Ha San Wai Road, Fung Chuk Road is located immediately along the northern periphery of the development site. The road serves as access road to the Chuk Yuen Floodwater Pumping Station, traffic is very rare. Tree planting are found along its southern side (refer to LR3.5) which majority of them falls inside the development site. LR1.9 is a manmade feature, no tree or vegetation, it has a relatively low landscape and amenity value; it is able to accommodate modification and so it is considered to have a low sensitivity to change.

LR2 Village Settlements

Village settlements are scattered alongside of road corridors and the adjacent lowland areas. They are characterized by extensive groups of 3-storey town houses which form the settlement pattern within the lowland landscape. The existing building forms include a combination of traditional dwellings although the majority of the buildings has been replaced by modern house developments connected by narrow lanes and footpaths. The main concentrations of village settlements within the Study Area include Chuk Yuen Tsuen and Ha San Wai located to the west of Castle Peak Road (Tam Mi Section), which are closer to the development site, San Wai Tsuen and Sheung Chuk Yuen located to the east of San Tin Highway.

LR2.1 San Wai Tsuen Village Settlement

San Wai Tsuen village settlement is located to the east of San Tin Highway. It is comprised of scattered 3-storey village house and low-rise residential developments. Open carpark is found adjacent to San Tam Road. Only a few ornamental planting and fruit trees, approximately 50 trees, including *Archontophoenix alexandrae, Bauhinia variegate, Cairica papaya, Dimocarpus longan, Livistona chinensis*, *Mangifera indica and Senna siamea* etc., are found in this LR which is located inside the fenced off private garden of the houses. Given most of garden areas are fenced off, other vegetation is not obvious from views looking from public footpath. Tree planting locations are scattered, they are relatively young and have a fair condition. Given the nature of this LR and the relatively low vegetation coverage, LR2.1 is considered to have a relatively low landscape and amenity value and it is considered to have a relatively low sensitivity to further development.

LR2.2 Chuk Yuen Tsuen Village Settlement

Chuk Yuen Tsuen village settlement is located to the west of San Tin Highway. It can be accessed from Castle Peak Road (Tam Mi Section) and Ha Chuk Yuen Road. It is comprised of cluster of low-rise house developments. The typical village house setting is fading out from this LR. Construction activities dominate in this LR. Approximate 50 trees are found in this LR, species include *Cairica papaya, Casuarina equisetifolia, Delonix regia, Dimocarpus longan, Leucaena leucocephala and Macaranga tanarius* etc. Others vegetation found on piecemeal vacant areas in the village include self-seeded plants such as *Bidens pilosa, Cynodon dactylon, Ligustrum sinensis and Merremia hederacea* etc. Existing vegetation is scattered in random pattern, young to mature in age and have a fair condition. Given the nature of this LR and the relatively low vegetation coverage, LR2.2 is considered to have a relatively low landscape and amenity value and it is considered to have a relatively low sensitivity to further development.

LR2.3 Ha Sun Wai Tsuen Village Settlement

Ha Sun Wai Tsuen village settlement is located to the west of Castle Peak Road (Tam Mi Section). It is comprised of squatters and 2 to 3-storey houses and a village school. The village school have been renovated and a kindergarten is operating. Trees are found at the periphery of this LR. Approximately 50 trees are found in this LR, they are scattered in abandoned fields at the frontcourt of the village. Trees are relatively mature specimen and their condition is fair. Major tree species include *Archontophoenix alexandrae, Celtis sinensis, Clausena lansium, Dimocarpus longan, Ficus microcarpa, Plumeria rubra* etc. Others vegetation found in the abandoned fields including self-seeded plants such as *Bidens pilosa, Cynodon dactylon, Ligustrum sinensis and Merremia hederacea* etc. Condition of vegetation is fair. Graves and shines are also preserved along this section of Castle Peak Road. Given the nature of this LR, vegetation coverage and their maturity, LR2.3 is considered to have a medium landscape and

amenity value, it is less tolerant to change and hence it is considered to have a medium sensitivity to further development.

LR3 Roadside Amenity

As mentioned in LR1, this LR refers to the roadside planting along the transportation corridors of San Tin Highway, Castle Peak Road – Tam Mi Section, San Tam Road, Kam Pok Road, Yau Pok Road and some local roads within the Study Area. In addition, this LR also covers vegetation located on engineering slopes along both sides of water channel and nullah. Most of the vegetation is mature alongside of Castle Peak Road and San Tin Highway whilst vegetation planted alongside of Kam Pok Road, Yau Pok Road, Ha San Wai Road and Fung Chuk Road are relatively younger.

LR 3.1 San Tin Highway Roadside Amenity

This LR composed of roadside planting along San Tin Highway. Majority tree planting are pioneer species including *Acacia confusa*, *Casuarina equisetifolia, Eucalyptus citriodora, Eucalyptus tereticornis, Lagerstroemia speciosa, Livistona chinensis and Leucaena leucocephala etc.* Approximately 500 trees along the highway play an important role in the roadside amenity. Majority of them were originally planted when San Tin Highway was constructed almost 30 years ago, hence they have a higher maturity and their condition is fair in general. Tree coverage in these roadside planting areas is extensive, only a few and scattered amenity shrub planting are observed at the edge of the planting areas, species including *Ficus microcarpa cv. golden leaves, Murraya paniculata and Schefflera arboricola* etc. Vegetation is being managed and it is generally fair in condition. Given the nature of this LR, its contribution to the road corridor landscape, so it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.2 Castle Peak Road (Tam Mi Section) Roadside Amenity

Roadside planters are found along the eastern side of the road particular at the landing of footbridges across San Tin Highway. Larger planting area is found adjacent to the San Tin roundabout and an open drainage channel. The footpath on the other side of the road is very narrow but it is punctuated by mature street trees/OVT including species *Albizia lebbek, Aleurites moluccana and Melaleuca cajuputi subsp. cumingiana* . A registered OVT, No. LCSD YL/7 *Melaleuca cajuputi subsp. cumingiana* is located on footpath adjacent to Chuk Yuen Tsuen. The OVT is located far away from proposed development and will not be affected. These mature specimens were planted when the road developed over 50 years ago. Their aggressive root system is found pop-up from the footpath and disturbed the circulation space for pedestrian. On the contrary, tree and shrub inside the roadside planters or planting areas mentioned above are relatively young, dominant species including *Bahunina Blakeana, Bauhinia variegata, Bischofia javanica, Bombax malabaricum, Delonix regia, Ficus altissima, Figus binnendijkii, Ficus microcarpus and Largestroemia speciosa etc.* Approximately 100 trees are found in this LR, their condition is fair to good. A small amount of amenity shrub planting observed in roadside planting areas, species include *Excoecaria cochinchinensis, Ficus microcarpa cv. golden leaves, Murraya paniculata and Asparagus densiflorus 'Sprengeri' etc.* Vegetation is common for roadside planting and their condition is fair. Given the importance of this LR to the landscape and visual amenity of the road corridor, the maturity of these LRs are medium to high, it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.3 San Tam Road Roadside Amenity

This LR comprised of approximately 150 trees are found in the verge between the footpath and the open drainage channel and in planters adjacent to San Tin roundabout. Dominant species include *Ficus microcarpus and Ficus benjamina,* they are semi-mature specimen and have a fair to good condition. Tree coverage of these roadside planting areas is extensive, only managed grass cover, some shrub planting and a few self-seeded plants are observed, species include *Axonopus compressus, Cynodon dactylon and Calliandra haematocephala* etc.. Condition of vegetation is fair. Given the importance of this LR to the landscape and visual amenity of the road corridor, it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.4 Yau Pok Road Roadside Amenity

Yau Pok Road is the maintenance access which runs adjacent to the largest engineered water channel named Ngau Tam Mei within the study area. Approximately 300 trees are planted in this LR in combination with shrub planting, major species include *Peltophorum pterocarpum, Lagerstroemia speciosa* and *Syzygium cumini*, and shrubs, *Aglaia odorata, Allamanda cathartica, Calliandra haematocephala* and *Hibiscus rosa-sinensis* etc. They are common roadside plantation which is relatively young and have a fair condition. Vegetation has significant contribution to the roadside landscape in form of a group. Given the importance of this LR to the landscape and the visual amenity of the road corridor for cyclists and pedestrians, it is less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.5 Fung Chuk Road Roadside Amenity

Fung Chuk Road is located along the northern periphery of the proposed development site. Newly established tree and shrub planting including *Delonix regia, Cleistocalyx operculata, Spathodea campanulata, Ficus binnendijkii, Ficus altissima, Khaya seneglensis, Melaleuca cajuputi subsp. cumingiana* and *Schefflera arboricola*, are found on slope and in the verge opposite the site. They are planted in dense condition. These 210 trees and vegetation have a fair condition and their maturity is medium. Given the importance of this LR to the landscape and visual amenity of the road corridor it is considered that it is less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.6 Ha Chuk Yuen Road Roadside Amenity

Ha Chuk Yuen Road is located along the eastern periphery of the proposed development site. Roadside tree planting extends to the other side of the road and to the northern section of Ha Chuk Yuen Road. The roadside sloping area adjacent to the site, and the amenity area along the northern section of the road are dominated by *Hibiscus tiliaceus, Khaya seneglensis, Melaleuca cajuputi subsp. cumingiana and Spathodea campanulata* which are plantation and *Leucaena leucocephala,* a self-spread weedy tree, are found alongside of the engineered nullah. Approximately 400 trees found in this LR have fair condition and they are young to mature specimens. They have contribution to the roadside amenity in form of a group. Other amenity shrub planting are observed, species include *Calliandra haematocephala* and *Ficus microcarpa cv. golden leaves, Hibiscus rosa-sinensis* and *Murraya paniculata* etc.. Condition of vegetation is fair. Given the importance of this LR to the landscape and visual amenity of the road corridor it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.7 Ha San Wai Road Roadside Amenity

Ha San Wai Road is located to the south of the proposed development site. An engineered water channel runs parallel to the road with tree and shrubs planting in between, dominant tree species are *Melaleuca cajuputi subsp. cumingiana and Calliandra haematocephala*. Approximately 80 exotic trees are found in this LR. They have a fair condition and relatively mature. Amenity shrub, *Calliandra haematocephala*, is observed in the area and its condition is fair. They serve as screening buffer for residents living alongside of water channel. Given the importance of this LR to the landscape and visual amenity of adjacent residents it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR3.8 Kam Pok Road Roadside Amenity

Kam Pok Road is located to the west of the proposed development site and it is one of the major roads and maintenance access along the engineered water channel named Ngau Tam Mei. Nullahside and roadside planting are newly planted for years after implementation of the nullah engineering works, hence majority of them are young specimen including trees, *Bischofia javanica, Lagerstroemia speciosa, Spathodea campanulata* and *Syzygium cumini*, and shrubs, *Aglaia odorata, Allamanda cathartica, Calliandra haematocephala* and *Hibiscus rosa-sinensis*. Approximately 300 trees are found in this LR, their condition is fair. Condition of shrub planting is fair. Given the importance of this LR to the landscape and visual amenity of the road corridor it is considered to have less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR4 Grassland

LR4.1 Yau Tam Mei Tsuen Grassland

It is a small piece of grassland/ abandoned field across the road from the Sheung Chuk Yuen Tsuen open yard. 15 nos. of *Leucaena leucocephala* are found at its periphery. These are self-seeded weedy trees and have a low amenity value. Dominant grass species including *Bidens pilosa, Cynodon dactylon, Merremia hederacea and Panicum maximum* etc. are observed in the area. Condition of these self-seed grass and trees are fair to poor. Given the low amenity value of this LR it is able to accommodate change and hence this LR has a low sensitivity to change.

LR4.2 Chuk Yuen Tsuen Grassland

Located between Ha Chuk Yuen Road and San Tin Highway, the large coverage of the grassland distributed on the east of the Ha Chuk Yuen Road, it is a vacant site covered by grass. Only self-seed grass cover is observed, major species include *Cynodon dactylon, Imperata cylindrica and Panicum maximum* etc.. Condition of the self-seed grass is poor. The whole area is subject to village extension and house developments under the current “V” zone on the OZP. Given the low amenity value of this LR it is able to accommodate change and hence this LR has a low sensitivity to change.

LR4.3 Fairview Park Road Golf Course (abandoned)

Another large piece of grassland located to the southeast of Bethel High School within Fairview Park which was originally used for a golf practicing ground but it is now abandoned, it is pending for future recreational and residential developments. Managed grass cover species, *Axonopus compressus,* is dominant. Given the low amenity value of this LR it is able to accommodate change and hence this LR has a low sensitivity to change.

LR4.4 Yau Pok Road North Grassland

This LR covers a vacant site located to the east of Fairview Park. The area is largely covered by self-seeded grass, species include *Cynodon dactylon and Imperata cylindrica*. Approximately 50 nos. of trees are located at the edge of the LR, major tree species include *Araucaria heterophylla, Celtis sinensis, Dimocarpus longan L., Litchi chinensis, Macaranga tanarius, Mangifera indica and Melia azedarach* etc. Condition of tree and vegetation is fair. It is considered to have a high ability to accommodate change therefore this LR has a low sensitivity to change.

LR4.5 Kam Pok Road North Grassland

This LR covers a vacant site located to the north of Fung Chuk Road Floodwater Storage and Facilities. The area is largely covered by self-seeded grass, major species include *Cynodon dactylon*. Approximately 15 nos. of trees, including major tree species *Celtis sinensis, Delonix regia and Macaranga tanarius* etc., are observed. Condition of trees is good and vegetation is fair. It is considered to have a high ability to accommodate change therefore this LR has a low sensitivity to change.

LR4.6 Kam Pok Road East Grassland

This LR covers a triangular piece of land abutting to Kam Pok Road East. It is vacant and is pending for development. The area is largely covered by self-seed grass, species include *Cynodon dactylon and Urochloa mutica* etc.. 10 nos. of self-seeded weedy trees observed, tree species include *Leucaena leucocephala and Melia azedarach* etc.. Condition of trees and vegetation are fair. It is considered to have a high ability to accommodate change therefore this LR has a low sensitivity to change.

LR5 Agricultural Fields

LR5.1 Ha Chuk Yuen Road North Agricultural Field

This LR covers a piece of active agricultural field at road junction of Kam Pok Road and Ha Chuk Yuen Road. Approximately 30 nos. of fruit trees are found in this LR adjacent to the paddy field. The field is cultivating vegetables for commercial purposes. Tree species include *Cairica papaya, Clausena lansium, Dimocarpus longan and Litchi chinensis*. They are relatively young and have a fair condition. Vegetables including *brassica chinensis and Lactuca sativa* etc. are grown for cultivation purposes and changed seasonally according to the market needs. The amenity of this LR is fair to good, it is able to accommodate change, and hence this LR has a medium sensitivity to change.

LR5.2 Yau Pok Road North Agricultural Field

Yau Pok Road North Agricultural Field is a remnant field within the planned residential development site. Some *Saccharum officinarum* (sugarcane) is growing in the field. The active agricultural activities have been faced out. Given that the landscape and amenity value of is generally considered to be low, it is able to accommodate change and hence this LR has a low sensitivity to change.

LR6 Fish Ponds (Abandoned)

Fish pond found within the Study Area is not extensive and have been abandoned for a long time due to the declination of the fishing industry in Hong Kong, more and more fish ponds

have been filled in for open container storage facilities or abandoned pending for developments. Vegetation is seldom found on fish pond bunds.

LR6.1 Ha San Wai Road North Fish Pond

This LR is a small size abandoned fish pond located within the proposed development site. This pond is abandoned and previously disturbed by dumped materials. The bund is largely bare soil and part of it covered by grass, species include *Bidens pilosa, Urochloa mutica and Panicum maximum* etc. and its condition is poor. Given this LR has been disturbed and in a small scale, the landscape and amenity value of is low, it is able to accommodate change and hence this LR has a low sensitivity to change.

LR6.2 Man Yuen Chuen East Fish Ponds

This LR is much larger than LR 6.1, it is comprised of several abandoned ponds located in the south of the Study Area between Kam Pok Road and San Tin Highway. Only a few self-seeded *Macaranga tanarius* and less than 10 nos. of trees are found on bund. The bund is also covered by self-seeded grass, species include *Bidens pilosa, Urochloa mutica and Panicum maximum* etc.. Condition of trees and vegetation is fair to poor condition. Given the scale, condition and amenity value of this LR, it is considered to have less tolerant to accommodate change and it is considered to have a medium sensitivity to change.

LR6.3 Chuk Yuen Tsuen South Ponds

This LR covers two abandoned ponds and pond bunds are covered by tall grass and a few trees. A few self-seeded *Macaranga tanarius* and less than 10 nos. of fruit trees, such as *Dimocarpus longan* ae found on the bunds. The bunds are covered by self-seed grass cover, major species include *Cynodon dactylon, Imperata cylindrica and Panicum maximum* etc. Condition of trees and vegetation is fair. Given this LR has been disturbed and in a small scale, the landscape and amenity value of is low, it is able to accommodate change and hence this LR has a low sensitivity to change.

LR7 Engineered Water Channels

LR7.1 San Tam Road Engineered Water Channel

This LR is a narrow manmade channel. It is located between existing developments and verge along the footpath. The channel is covered by shortcrete sloping surface. Given this is a manmade feature, largely hard finished, no tree or vegetation, it has a low landscape and amenity value, it is considered able to accommodate change and hence this LR has a low sensitivity to change.

LR7.2 Ha San Wai Road Engineered Water Channel

Concrete box structured channel along Ha San Wai Road and residential developments along Fairview Park Boulevard. Some tree planting found as LR3.7 in the verge between the road and adjacent developments. Given this is a manmade feature, no tree or vegetation, largely hard finished, it has a low landscape and amenity value, it is considered able to accommodate change and hence this LR has a low sensitivity to change.

LR7.3 Ha Chuk Yuen Road Engineered Water Channel

Ha Chuk Yuen Road channel intersects with the Ha San Wai Road water channel and going through the Ha Chuk Yuen Road open yards. Similar to LR7.2, it is a box concrete structure.

LR3.6 roadside planting runs parallel with the water channel, tree and shrub planting disguised it functional appearance. Given this is a manmade feature, no tree or vegetation, largely hard finished, it has a low landscape and amenity value, it is considered able to accommodate change and hence this LR has a low sensitivity to change.

LR7.4 Ngau Tam Mei Engineered Water Channel

Ngau Tam Mei water channel is the main engineered water channel within the Study Area. It is located to the west of the proposed development site. It is a manmade concrete paved watercourse located between Kam Pok Road and Yau Pok Road. Water plant species include *Alocasia macrorrhiza, Axonopus sp., Commelina nudiflora, Commelina nudiflora, Conyza Canadensis, Ludwigia perennis, Pennisetum purpureum* and *Wedelia triloba* etc. These plants significantly mitigate the unpleasant manmade appearance of the nullah and form a major component of the riverside landscape in combination with the roadside amenity tree planting along Kam Pok Road and Yau Pok Road which mentioned above in LRs 3.8 and 3.4 roadside amenity. Condition of vegetation is fair to good. Although this is a manmade feature, it is largely covered with plants, it has a medium landscape and amenity value in combination with water body and plants, it is considered less tolerant to accommodate change and hence this LR has a medium sensitivity to change.

LR7.5 Fairview Park Engineered Water Channel

Engineered water channel, concrete box like structure, runs along the periphery of the Fairview Park. This is a storm drain discharge to the Ngau Tam Mei Channel. No vegetation covered. Given this is a manmade feature, largely hard finished, it has a low landscape and amenity value, it is considered able to accommodate change and hence this LR has a low sensitivity to change.

LR8 Fung Chuk Road Flood Storage and Facilities

The floodwater storage and facilities (Chuk Yuen Floodwater Pumping Station) occupies a relatively small area within the Study Area. A planned low-rise residential development is located to the north of this Station and proposed development site located to its south. It is a fenced off area which comprises of a single storey pumping station and a series of retention ponds along Fung Chuk Road. No vegetation is found within the facilities but some *Melaleuca cajuputi subsp. cumingiana,* less than 20 numbers are found at the periphery of the Station and some weedy trees are found within the retention pond area. These trees are relatively young and have fair to poor condition. Given its unpleasant appearance, it is manmade feature, its amenity value is relatively low and has high tolerant to further changes, hence LR8 is considered to have a relatively low sensitivity to change.

LR9 Development Areas

Low-rise residential developments occupy a relatively extensive area within the assessment area alongside of Ngau Tam Mei Channel. This resource contains a combination of low-rise residential developments which are commonly found in NWNT. Density of these developments is usually very high where only a few patches of vegetation are found within the developments.

LR9.1 Fairview Park Boulevard North Low-rise Residential Development Area

These 3-storey house developments dominate the eastern section of Fairview Park Boulevard, only a few palms, including species *Roystonea regia, Chrysalidocarpus lutescens and Phoenix*

hanceana etc., and small trees and shrubs including *Ficus microcarpa 'Golden Yellow', Mangifera indica, Plumeria rubra, Sabina chinese cv kaizuca and Bougainvillea glabra* etc., are observed within these developments with approximately 30 numbers of trees. These amenity trees and vegetation are relatively young and have a fair condition. They have very little contribution to the local landscape because they are fenced off and planted in the private garden of individual dwellings within the development. Given this LR is highly urbanised, its amenity value is relatively low due to limited green coverage and has high tolerant to further changes, hence LR9.1 is considered to have a relatively low sensitivity to change.

LR9.2 Fairview Park Boulevard South Development Area

This resource is located on the south side of Fairview Park Boulevard. Similar to LR9.1, this LR comprised of smaller scale house developments, workshops and vacant sites pending for developments. It has almost the same density as Fairview Park Boulevard North. Approximately 50 amenity trees scattered within individual development, species include *Roystonea regia, Cinnamomum camphora* and *Plumeria rubra* etc., they are relatively young and have a fair condition. Some small palms and shrubs, species including *Ficus microcarpa 'Golden Yellow', Phoenix hanceana, Sabina chinese cv kaizuca and Bougainvillea glabra,* are observed. They are fenced off and planted in the private garden of individual dwellings within the developments. Condition of vegetation is fair. Given this LR is highly urbanised, its amenity value is relatively low due to limited green coverage and has high tolerant to further changes, hence this LR is considered to have a relatively low sensitivity to change.

LR9.3 Fairview Park Low-rise Residential Development Area

This LR comprised of high density 2-storey house development within Fairview Park. Small trees and pot planting are found inside individual dwelling. Some 200 trees are found in this LR. Major species include *Archontophoenix alexandrae, Callistemon viminalis, Ficus benjamina, Glyptostrobus pensilis, Phoenix roebellini and Plumeria rubra etc.* They are relatively young and have a fair condition. Given most of garden areas are fenced off, other vegetation are not obvious from views looking from public footpath. Given the urbanised nature of this resource, the scale and significance in the local context, this LR is considered to have a medium ability to accommodate change, hence it is considered to have a medium sensitivity to change.

LR10 Open Yards

Open Yards is one of the major unpleasant landscape resource occupied by open container storage, warehouses and workshops. They are largely distributed along major road and highway.

LR10.1 Sheung Chuk Yuen Open Yards

This LR is comprised of a large scale warehouse for heavy vehicle repairing and relevant waste material storage. 1 to 2- storey temporary structures are found in this LR. No vegetation is found. Given its unpleasant appearance, it is highly industrialised, its amenity value is relatively low and has high tolerant to further changes, hence LR10.1 is considered to have a relatively low sensitivity to change.

LR10.2 Chuk Yuen Tsuen Open Yards

Similar to LR10.1, this LR comprised of warehouses for storage and selling of waste metal and open container storage. They are located to the north and the east of Chuk Yuen Tsuen adjacent to Castle Peak Road (Tam Mi Section). No vegetation is found. Given its unpleasant

appearance, it is highly industrialised, its amenity value is relatively low and has high tolerant to further changes, hence LR10.1 is considered to have a relatively low sensitivity to change.

LR10.3 Ha Chuk Yuen Road Open Yards

This is a raised platform bounded by Ha Chuk Yuen Road, Fung Chuk Road and Ha San Wai Road. This LR covers the proposed development site. It was previous used for car parking for heavy vehicles and coaches, construction material storage area and green nursery. Now the area is largely abandoned and is pending for development. Only 4 numbers of *Ficus microcarpa* found within this LR. They are have a multi-trunk and leaning form, poor health condition and decay on the main trunk. A few self-seeded grass and weeds covered small portion of the area, major species including *Panicum maximum* and *Leucaena leucocephala* etc.. Condition of vegetation is poor. Given this LR has been highly disturbed, its amenity value is relatively low and has high tolerant to further changes, hence LR10.3 is considered to have a relatively low sensitivity to change.

LR10.4 Yau Pok Road South Open Yards

This LR is located adjacent to Yau Pok Road to the south of the Fairview Park. It is currently used for logistic supporting services, covered storage area dominated the area. Approximately 50 nos. of the trees are observed, majority of the trees are located along the fence wall of individual premises including major species *Callistemon viminalis Celtis sinensis , Ficus benjamina, Lagerstroemia speciose, Leucaena leucocephala, Livistona chinensis and Macaranga tanarius var. tomentosa* etc.. Tree condition is fair. Other vegetation is not obvious. Given its unpleasant appearance, no vegetation coverage, its amenity value is relatively low and has high tolerant to further changes, hence LR10.4 is considered to have a relatively low sensitivity to change.

LR10.5 Kam Pok Road South Open Yards

This LR is located at the junction of Kam Pok Road and Kam Pok Road East. The area is hard paved with temporary built structures for car showroom. Approximately 10 nos. of *Leucaena leucocephala* are found outside and along the western fence wall. Approximately 20 nos. of *Sabina chinese cv kaizuca* are observed in planters alongsides of the fence wall of the workshop abutting Kam Pok Road. These topiary junipers condition are fair. Given the nature of this resource, it is considered to have a high ability to accommodate change therefore this LR has a low sensitivity to change.

LR10.6 Yau Pok Road North Open Yards

Not use.

LR10.7 Kam Pok Road North Open Yards

Not use.

For the purposes of this assessment the landscape resources are represented by the existing land coverage. The condition of these landscape resources is also important in determining the landscape quality of the Study Area and its sensitivity to change as described above. Therefore the preservation and enhancement of the existing landscape resources is important to the successful integration of the proposals within the landscape context of the Study Area. Magnitude of change of these LRs and landscape impact are assessed under **Section 11-7**.

Table 11-5 Sensitivity of landscape resources (LRs)

I.D. No.	Landscape Resources (LRs)	Criteria								Sensitivity
		Area	Approx. No. of Trees	Other Vegetation	Quality	Importance/ Rarity	Ability to accommodate change	Local / Regional Significance	Maturity	
LR1.1	San Tin Highway	4.87 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.2	San Tam Road	0.72ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.3	Ha San Wai Road	0.41 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.4	Fairview Park Boulevard	1.32 ha	30	Shrubs in central median	Low	Low	High	Low/Low	Low	Low
LR1.5	Ha Chuk Yuen Road	0.34 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.6	Kam Pok Road	1.05 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.7	Yau Pok Road	0.73 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.8	Castle Peak Road (Tam Mi Section)	0.86 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR1.9	Fung Chuk Road	0.12 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR2.1	San Wai Tsuen Village Settlement	5.30 ha	50	Not obvious	Low	Low	High	Low/Low	Low	Low
LR2.2	Chuk Yuen Tsuen Village Settlement	5.95 ha	50	Self-seed grass, groundcover and small shrub.	Low	Low	High	Low/Low	Low	Low
LR2.3	Ha Sun Wai Tsuen Village Settlement	1.82 ha	50	Self-seed grass, groundcover and small shrub.	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.1	San Tin Highway Roadside Amenity	1.15 ha	500	A few amenity shrub planting	Medium	Medium	Medium	Medium/Low	High	Medium
LR3.2	Castle Peak Road (Tam Mi Section) Roadside Amenity	0.33 ha	100	Roadside amenity	Medium	Medium	Medium	Medium/Low	High	Medium

I.D. No.	Landscape Resources (LRs)	Criteria								Sensitivity
		Area	Approx. No. of Trees	Other Vegetation	Quality	Importance/ Rarity	Ability to accommodate change	Local / Regional Significance	Maturity	
			One registered OVT	shrub planting						
LR3.3	San Tam Road Roadside Amenity	3.10 ha	150	Managed grass cover and shrubs and a few self-seeded plants.	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.4	Yau Pok Road Roadside Amenity	1.96 ha	300	Amenity shrub planting.	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.5	Fung Chuk Road Roadside Amenity	0.58 ha	210	Amenity shrub planting.	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.6	Ha Chuk Yuen Road Roadside Amenity	0.24 ha	400	Amenity shrub planting	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.7	Ha San Wai Road Roadside Amenity	0.62 ha	80	Amenity shrub planting	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR3.8	Kam Pok Road Roadside Amenity	3.06 ha	300	Amenity shrub planting	Medium	Medium	Medium	Medium/Medium	Medium	Medium
LR4.1	Yau Tam Mei Tsuen Grassland	0.33 ha	15	Self-seeded grass cover	Low	Low	High	Low/Low	Low	Low
LR4.2	Chuk Yuen Tsuen Grassland	2.92 ha	0	Self-seeded grass cover	Low	Low	High	Low/Low	Low	Low
LR4.3	Fairview Park Road Golf Course (abandoned)	8.41 ha	0	Managed grass cover	Low	Low	High	Low/Low	Low	Low

I.D. No.	Landscape Resources (LRs)	Criteria								Sensitivity
		Area	Approx. No. of Trees	Other Vegetation	Quality	Importance/ Rarity	Ability to accommodate change	Local / Regional Significance	Maturity	
LR4.4	Yau Pok Road North Grassland	6.4 ha	50	Self-seeded grass cover	Low	Low	High	Low/Low	Low	Low
LR4.5	Kam Pok Road North Grassland	6.59 ha	15	Self-seeded grass cover	Low	Low	High	Low/Low	Low	Low
LR4.6	Kam Pok Road East Grassland	0.51 ha	10	Self-seeded grass cover	Low	Low	High	Low/Low	Low	Low
LR5.1	Ha Chuk Yuen Road North Agricultural Field	0.51 ha	30	Vegetable	Medium	Low	Medium	Medium/Low	Medium	Medium
LR5.2	Yau Pok Road North Agricultural Field	0.34 ha	0	A few sugar cane	Medium	Low	High	Low/Low	Low	Low
LR6.1	Ha San Wai Road North Fish Pond (Abandoned)	0.34 ha	0	Self-seeded grass cover	Low	Low	Medium	Low/Low	Low	Low
LR6.2	Man Yuen Chuen East Fish Ponds	6.98 ha	10	Self-seeded grass cover	Medium	Medium	Medium	Medium/Low	Medium	Medium
LR6.3	Chuk Yuen Tsuen South Ponds	0.28ha	15	Self-seeded grass cover the bunds	Low	Low	Medium	Low/Low	Low	Low
LR7.1	San Tam Road Engineered Water Channel	0.33 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR7.2	Ha San Wai Road Engineered Water Channel	0.56 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR7.3	Ha Chuk Yuen Road Engineered Water Channel	0.46 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR7.4	Ngau Tam Mei Engineered Water Channel	2.92 ha	0	Waterplants observed on channel embankment.	Medium	Medium	Medium	Medium/Low	Medium	Medium
LR7.5	Fairview Park Engineered Water Channel	1.92 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR8	Fung Chuk Road Flood Storage and Facilities	0.74 ha	30	Nil	Low	Low	High	Low/Low	Low	Low
LR9.1	Fairview Park Boulevard North Low-rise Residential Development Area	2.78 ha	30	Small palms and shrub	Low	Low	High	Low/Low	Low	Low
LR9.2	Fairview Park Boulevard South Development Area	8.21 ha	50	Small palms and shrub	Low	Low	High	Low/Low	Low	Low

I.D. No.	Landscape Resources (LRs)	Criteria								Sensitivity
		Area	Approx. No. of Trees	Other Vegetation	Quality	Importance/ Rarity	Ability to accommodate change	Local / Regional Significance	Maturity	
LR9.3	Fairview Park Low-rise Residential Development Area	30 ha	200	Not obvious	Medium	Low	Medium	Medium/Low	Low	Medium
LR10.1	Sheung Chuk Yuen Open Yards	0.74 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR10.2	Chuk Yuen Tsuen Open Yards	0.91 ha	0	Nil	Low	Low	High	Low/Low	Low	Low
LR10.3	Ha Chuk Yuen Road Open Yards	7.00 ha	4	Self-seeded grass cover and weeds	Low	Low	High	Low/Low	Low	Low
LR10.4	Yau Pok Road South Open Yards	4.50 ha	50	Not obvious	Low	Low	High	Low/Low	Low	Low
LR10.5	Kam Pok Road South Open Yards	1.20 ha	10	Junipers	Low	Low	High	Low/Low	Low	Low
LR10.6	Not use									
LR10.7	Not use									

11.6.3 Landscape Character Areas (LCAs)

The landscape character of the Study Area is characterized by a combination of lowland village landscape surrounded by active/abandoned agricultural fields, grassland, extensive open storage/warehouses and low-rise residential areas bisected by the course of Ngau Tam Mei Drainage Channel from north to south. The Study Area composes of Fairview Park low-rise extensive residential landscape, Yau Pok Road nullahside rural landscape, Kam Pok Road nullahside rural landscape, San Tam Road rural residential lowland landscape, Kam Pok Road low-rise residential landscape and Yau Pok Road open storage and warehouse landscape. Detailed descriptions of these LCAs are listed below. LCAs are mapped on **Figure 11-4** and their photographic record is provided on **Figure 11-5-1 to 11-5-2. Table 11-6** provides an assessment of the sensitivity of each of the identified LCAs. Magnitude of change of these LCAs and landscape impact are assessed in **Section 11.7** of this report.

LCA1 Fairview Park Low-rise Extensive Residential Landscape

This LCA is located to the west of Ngau Tam Mei Drainage Channel. It's character comprises of landscape elements including extensive numbers of 2-storey houses associated with internal access roads and car/coach parking areas, community facilities, shopping centre, club house, primary and secondary schools, roadside amenity planting, engineered water channel surrounding the whole development and an abandoned golf practicing ground which now covered by grass and weeds. Given this landscape character area is largely urbanised and manmade nature, it has a relatively high ability to accommodate change, it is considered that the sensitivity to change of this LCA is low.

LCA2 Yau Pok Road Nullahside Rural Landscape

This LCA is located to the west of Ngau Tam Mei Drainage Channel and occupies the north-western portion of the Study Area. This area is largely covered by grass and vacant pending for planned residential and recreational developments. The site was previously use for agriculture activities, a very small scale of crop cultivation is left in the northern portion of this LCA. Only a few trees found at the edge and inside the LCA and along Yau Pok Road roadside amenity area. The landscape character is pending to change following the completion of future developments, the landscape quality is low as it has been highly disturbed, hence it is relatively high ability to accommodate change, it is considered that the sensitivity to change of this LCA is low.

LCA3 Kam Pok Road Nullahside Rural Landscape

This LCA has a similar character to LCA2. This area is located in-between Ngau Tam Mei Channel and Chuk Yuen Tsuen, it largely comprises of grasslands and active agricultural fields which cover only one-tenth of the area. The area to the east and west of Ha Chuk Yuen Road is largely vacant pending for low-rise residential developments and extension of village settlement respectively, only a few trees preserved within the area, these future developments will change the existing rural landscape character. Two small scale abandoned ponds are found at the southern edge of this LCA. Trees are found in roadside amenity area along Kam Pok Road and Hai Chuk Yuen Road whilst a few of trees are scattered inside the villages and surrounding the remnant ponds. Fung Chuk Road Floodwater Storage and Facilities with the associated retention ponds is located at the south-western portion of this LCA, very little vegetation is found at the periphery of this fenced off area. It is an infrastructure element in the landscape context. Given the planned changes of the landscape context, and existing infrastructure landscape elements, amenity value of this LCA is relatively low, and it has a high ability to accommodate change, hence its sensitivity to change is low.

LCA4 San Tam Road Rural Residential Lowland Landscape

This LCA covers the area at the lower slope of Kai Kung Leng which was already interrupted by San Tin Highway, Castle Peak Road (Tam Mi Section) bisecting Chuk Yuen Tsuen and San Wai Tsuen into upper and lower portions. Roads and highway dominate the scenery of this landscape character. Mature roadside planting comprise of common pioneer species which are found all along the highway, these planting are planted as mitigation measures when the roads were constructed. Given the proximity of the major road and highway, the development of warehouses and open container storage facilities are popular in the roadside area, and so the village settlements are further set back from these unpleasant landscape elements. Village settlements in this LCA comprise of clusters of 3-storey houses including Ha San Wai, Chuk Yuen Tsuen and Sheung Chuk Yuen. Given the quality and nature landscape elements and characters mentioned above, the area is highly disturbed by infrastructure and open storage and warehouse activities, the amenity value of this LCA is relatively low and the ability to accommodate change is medium, hence this LCA has a low sensitivity to change.

LCA5 Kam Pok Road Low-rise Residential Landscape

This LCA covers the areas to the north and south of Fairview Park Boulevard. The proposed development site is located in the northern portion of this LCA. The development site is surrounded by roads, drainage channels, warehouses and open container storage facilities. The southern portion of this LCA are characterised by low-rise residential developments and clusters of ponds. Ponds are preserved and covered over one-third of the area of this LCA. The western periphery of this LCA is bounded by Ngau Tam Mei engineered water channel. Vegetation is concentrated in planting areas along roads and channel which were originally planted as landscape mitigation purposes for previous river training works. Fairview Park Boulevard is very busy road, frequently used by heavy duty vehicles, as it is major access to the adjacent warehouses and open container storage facilities in the area. Kam Pok Road has less traffic frequent but heavy vehicle parking is always observed. A few trees are found on the bunds of the ponds in the southern portion. Given that a large proportion of this area is characterised by urbanised elements, the landscape and amenity value of this LCA is relatively low, the ability of this LCA to accommodate change is considered to be high and its sensitivity to change is low.

LCA6 Yau Pok Road Open Storage and Warehouse Landscape

This LCA covers the area to the south of Fairview Park. It is largely occupied by open container storage facilities and warehouses which are visually unpleasant elements, its amenity value is low. Some trees are observed at the eastern edge of the LCA inside the fenced off individual premises. The ability of this LCA to accommodate change is high and hence this LCA has a low sensitivity to change.

Table 11-6 Sensitivity of Landscape Character Areas (LCAs)

I.D. No.	Landscape Resources (LRs)	Criteria						Sensitivity
		Area	Quality	Importance/ Rarity	Ability to accommodate change	Local / Regional Significance	Maturity	
LCA1	Fairview Park Low-rise Extensive Residential Landscape	36.44 ha	Low	Low	Medium	Low	Medium	Low
LCA2	Yau Pok Road Nullaside Rural Landscape	9.15 ha	Low	Low	High	Low	Low	Low
LCA3	Kam Pok Road Nullahside Rural Landscape	18.04 ha	Low	Low	High	Low	Low	Low
LCA4	San Tam Road Rural Residential Lowland Landscape	31.40 ha	Low	Low	Medium	Low	Medium	Low
LCA5	Kam Pok Road Low-rise Residential Landscape	26.04 ha	Low	Low	Medium	Low	Low	Low
LCA6	Yau Pok Road Open Storage and Warehouse Landscape	6.49 ha	Low	Low	High	Low	Low	Low

11.6.4 Visual Baseline

Existing Visual Context

Visual Envelope and Zones of Visual Influence

The visual envelope, the area from which the proposed development would be seen, is shaped by a combination of adjacent lowland rural landscape, vegetation alongside the Ngau Tam Mei Nullah and the surrounding low-rise residential / village settlements. It extends to low-rise residential developments alongside Fairview Park Boulevard in the south, open container storage facilities and warehouses adjacent to Ha San Wai in the east, Fairview Park low-rise residential development, Bethel High School and planned recreational areas (currently abandoned) in the west, agricultural fields, Chuk Yuen Road Floodwater Storage and Facilities and a planned low-rise residential development site in the north.

There are glimpse views of the proposed development from houses located along the eastern edge of Fairview Park across the flat expanse of the grassland areas (abandoned / planned recreational areas) however these low level views are largely screened by a combination of roadside and nullahside vegetation, tall shrubs / grass and the intervening structures in the foreground of the proposed development site.

The residents and villagers in lowland settlements located in proximity to the proposed development site are key VSRs, including those living in Helene Terrance, Ha San Wai Village and Chuk Yuen Tsuen. These VSRs might only have glimpse views of the proposed development because the majority of their low-level views to the proposed site is largely obstructed by the existing topography or vegetation in their foreground. They might have views of the upper part of the future development when looking up above the surrounding landscape features. Owing to their visual context dominated by the existing topography or vegetation, the visual mitigation will come from the preservation of the existing landform and vegetation, the overall layout, the scale and disposition of the proposed development and the integration of the landscape features and surrounding landscape context.

Other than the above permanent VSRs, vehicle travellers and pedestrians along Fairview Park Boulevard, Ha San Wai Road, Yau Pok Road, Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road, staff at Chuk Yuen Floodwater Storage and Facilities and future users of planned recreational facilities in the areas to the east of Fairview Park, will have overview at a higher level or partial views of the proposed development. Owing to their transient nature, the visual mitigation will come from the integration of the proposed development with its local landscape context. As other planned development proposals adjacent to the site are being studied, the visual envelope (VE) and potential VSRs is subject to change. The extent of the visual envelope and the zones of visual influence are presented in **Figure 11-6**. Photographic record of VSRs is put in **Figures 11-7-1 to 11-7-4**.

Visually Sensitive Receivers

Visually Sensitive Receivers (VSRs) identified within the ZVI are grouped by receivers who have views of the proposed development based on the preliminary assumption discussed in the previous sections, are sensitive to change and are likely to be subjected to adverse impacts as a result of the proposed development. The sensitivity of a particular VSR is influenced by its location (sensitivity tends to decrease with distance from the proposed scheme), direction and nature of the view relative to the scheme (an open and full views will be more sensitive to change than a partial of glimpse view), and VSR type. The VSRs are

represented by both transient or permanent receivers and their populations range from large to small.

The principal VSRs within the Study Area are the existing and planned residents of developments and villagers and recreational users in lowland settlements, vehicle travellers and other infrastructural facilities whom have a view of the proposed development. The selected VSRs listed below are representative of the views available to people at each location of the proposals. **Table11-7** describes the sensitivity of the selected VSRs within the ZVI, the quality of their existing views and their ability to accommodate change. Table 11-12 identifies the magnitude of change and the potential impacts on their visual amenity and the residual impact with recommended landscape mitigation measures fully established. The potential visual impacts are mapped in **Figure 11-10.**

PVSR 1	Residents of Planned Low-rise House Development at Fung Chuk Road North
VSR 2	Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond
VSR 3	Vehicular Travellers and Pedestrians along Fung Chuk Road
VSR 4	Villagers of Chuk Yuen Tsuen and Hang Fook Gardens
VSR 5	Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road
VSR 6.1	Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen
VSR 6.2	Villagers of Ha San Wai and Area Reserved for Village Extension
VSR 7	Residents of Low-rise House Development along Ha San Wai Road
VSR 8	Residents of Low-rise House Development along Fairview Park Boulevard
VSR 9	Vehicular Travellers and Pedestrians along Fairview Park Road South
VSR 10	Residents of Low-rise House Development at Fairview Park
VSR 11	Vehicular Travellers and Pedestrians alongside of Ngau Tam Mei Drainage Channel
PVSR12A	Future Residents of Planned Recreation Zone to the east of Fairview Park
PVSR12B	Future Recreational Users of Planned Recreation Zone to the east of Fairview Park

PVSR 1 Residents of Planned Low-rise House Development at Fung Chuk Road North

These VSRs are located to the east of Ngau Tam Mei Drainage Channel and to the north of Chuk Yuen Floodwater Storage and Facilities who have panoramic views towards Ngau Tam Mei Channel, Fairview Park and Chuk Yuen Tsuen. Due to the screening effect of a combination of roadside vegetation at Fung Chuk Road and intervening structures in pumping station and fence wall around the development, they will only have glimpse views of the roof of the proposed development. The quality of their existing views is good, and their main views are focused within the development. Views towards the proposed development in their further south are only available to a relatively few number of VSRs living at the southern periphery with the views blocked by the pumping station in the foreground. Given the disrupted views of these VSRs, their visual context and quality, view is permanent in their living place, hence the sensitivity to change of these VSRs is high.

VSR 2 Workers at Chuk Yuen Floodwater Storage and Facilities

These VSRs are staff and users of Chuk Yuen Floodwater Storage and Facilities whose views at low-level are dominated by the retention ponds and pumping facilities in the foreground and planting along Fung Chuk Road in the background. These VSRs will have a partial view to the upper level of the proposed development. The quality of their existing views is poor and views looking towards the proposed development are generally only available to very few people. Given their restricted views, the infrastructural visual context, hence their sensitivity to change is low.

VSR 3 Vehicular Travellers and Pedestrians along Fung Chuk Road

Visual context of these VSRs is constrained by the road corridor, roadside planting and Chuk Yuen Floodwater Storage and Facilities. These VSRs would have glimpse views towards the proposed development through gap between vegetation in roadside planting areas. Due to the screening effect of a combination of roadside vegetation and intervening structures located adjacent to the proposed development site, only glimpse views of the proposed development are available to these VSRs. These VSRs are very few in number and their visual quality is fair. Given the quality of visual context and transient nature of these VSRs, their viewing location is in proximity to the proposed development, hence their sensitivity to change is medium.

VSR 4 Villagers of Chuk Yuen Tsuen and Hang Fook Gardens

These VSRs are villagers living in Chuk Yuen Tsuen which is bounded by Ha Chuk Yuen Road and San Tin Highway. Their visual context is contained by the adjacent village houses due to density of village development and highway structures, the quality of their view is intervened by unpleasant warehouses and open container storage facilities inside the village. Scattered vegetation and only a few trees can be found in small public squares adjacent to the village community office or ancestor hall. Given to their constrained visual context, only villagers living at the western periphery of the village will have a partial view of the upper level of the proposed development, their low level views looking towards the site are intervened by the existing topography and dense mature vegetation along Ha Chuk Yuen Road. These VSRs are small in number and their visual quality is good, however their visual quality is subject to change according to future extension of village settlement in their foreground. Given their visual quality and permanent nature, further extension of village settlement, hence their sensitivity to change is high.

VSR 5 Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road

Visual context of these VSRs is framed by roadside planting. These VSRs would have glimpse views towards Chuk Yuen Tsuen and the proposed development through gaps and spaces between vegetation in roadside planting areas. These VSRs are very few in number and their visual quality is fair. Given the quality of the visual context and transient nature of these VSRs, confined views along road corridor, their viewing location is in proximity to the proposed development, hence their sensitivity to change is medium.

VSR 6.1 Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen

Views of these VSRs are confined within warehouses and open container storage facilities due to the extensive material storage and enclosed built structure. These are typical visually unpleasant landscape features in NWNT. No vegetation is found within these areas. Workers who are occasionally standing at the western periphery of the warehouses and open container

storage facilities might have glimpse views of the upper level of the proposed development through the dense vegetation along Ha Chuk Yuen Road. These VSRs are small in number and their visual quality is poor. Given their visual quality and transient nature, hence their sensitivity to change is low.

VSR 6.2 Villagers of Ha San Wai and Area Reserved for Village Extension

These VSRs are villagers living in Ha San Wai, where the majority of the village context is dominated by warehouses and open container storage facilities in the west and bounded by San Tin Highway in the east. Similar to villagers in Chuk Yuen Tsuen, their views are contained by the adjacent village houses due to the density of village development, open storage and warehouses and highway structures surrounding the village. Scattered vegetation and only a few trees can be found within the village. Given their constrained visual context, only villagers living at the western periphery of the village will have a glimpse view of the proposed development through gap between warehouses in their foreground. These VSRs are small in number and their visual quality is poor. Given their poor visual quality and permanent in nature, intervening visually distracting uses in the village, and further extension of village blocking their views towards proposed development, hence their sensitivity to change is low.

VSR 7 Residents of Low-rise House Development along Ha San Wai Road

These VSRs are located to the south of Ha San Wai Road living in 3-storey town houses. Their development frontage is facing Fairview Park Boulevard. Low level views from their backyards are constrained by the engineered water channel and trees along the water channel in the foreground. Only residents living on the top floor of the houses looking northwest will have glimpse views of the proposed development through gap between the roadside vegetation along Ha San Wai Road. The visual context of these VSRs focus towards the south which is their development frontage, the screening effect of the existing vegetation and that the view is permanent in nature, hence their sensitivity to change is medium.

VSR 8 Residents of Low-rise House Development along Fairview Park Boulevard

These VSRs are located to the south of Fairview Park Boulevard living in 3-storey town houses, views from their development frontage towards the proposed development site are intervened by busy traffic along Fairview Park Boulevard. Low level views are characterised by retail shops, billboards, planting and solid fence walls of individual developments. Only a few residents living on the top floor of the houses and looking northwest might have glimpse views of the proposed development intervening by houses in the north. The visual context of these VSRs focus along Fairview Park Boulevard which is their development frontage, the screening effect of existing vegetation and built environment and that the view is permanent in nature, hence their sensitivity to change is medium.

VSR 9 Vehicular Travellers and Pedestrians along Fairview Park Road South

Visual context of these VSRs is framed by roadside developments, open view along Ngau Tam Mei Water Channel is only available at the entrance of Fairview Park. These VSRs, majority of which are drivers on the road with a few pedestrians, will have an overview of the proposed development in transient nature when approaching Fairview Park looking towards the north-eastern direction. These VSRs are intermediate in number and their visual quality is fair. Given their visual quality and their transient in nature, quality of views, their sensitivity to change is low.

VSR 10 Residents of Low-rise House Development at Fairview Park

Given the density of this low-rise development, views of these VSRs are largely confined within the development. Open views looking out towards the surrounding rural landscape are only available to those residents living at the periphery of Fairview Park. Only residents living on the top floor at the eastern periphery of Fairview Park will have partial views of the proposed development as their foreground views are intervened by fence walls, vegetation on grassland and nullahside vegetation. Visual context of these VSRs is fair and they are intermediate in numbers. Given their topography and the screening effect of the existing vegetation and built environment and that the view is permanent in nature, hence their sensitivity to change is medium.

VSR 11 Vehicular Travellers and Pedestrians alongside of Ngau Tam Mei Drainage Channel

Visual context of these VSRs is framed by roadside and nullahside planting, open views along Ngau Tam Mei Water Channel and the adjoining low-rise residential and rural landscapes are available at frequent locations. These VSRs are drivers on the road with a few pedestrians. Visual quality of their transient view is good. Given their visual quality and transient nature, quality of views, their sensitivity to change is medium.

PVSR12A Future Residents of Planned Recreation Zone to the east of Fairview Park

These planned VSRs are residents of the future recreational facilities located immediately between Fairview Park and Ngau Tam Mei Water Channel. Given these VSRs are located at a lower elevation than the roads along the Channel, their low level views looking towards the proposed development are screened by the channelside vegetation as well as the future planting proposals within this residential development. Their western views are bounded by the development edge of Fairview Park. The visual context is subject to change according to future design of development layout. Visual context of these VSRs is fair and invert looking into the landscape area within the development. Given their topography and screening effect of the existing vegetation and surrounding built environment and that the view is permanent in nature, hence their sensitivity to change is medium.

PVSR12B Future Recreational Users of Planned Recreation Zone to the east of Fairview Park

These planned VSRs are users of future recreational facilities located immediately between Fairview Park and Ngau Tam Mei Water Channel. Given these VSRs are located at a lower elevation than the roads along the Channel, their low level views looking towards the proposed development are screened by the channelside vegetation as well as the future planting proposals within the recreational facilities. Their western views are bounded by the development edge of Fairview Park. The visual context is subject to change according to future development of the design of these facilities. The scale of reserved land for recreational purposes under the statutory plan is relatively large, it is assumed the number of recreational users are intermediate. Visual context of these VSRs is fair. Given their topography and screening effect of the existing vegetation and surrounding built environment and that the view is transient in nature, hence their sensitivity to change is medium.

Table 11-7 Sensitivity of Visually Sensitive Receivers (VSRs)

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
PVSR1	Residents of Planned Low-rise House Development at Fung Chuk Road North	Fair	Available/Fair The alternative views available to these VSRs are invert looking into the landscape areas within the development and private garden of individual dwellings. Views to the proposed development are largely intervened by the Chuk Yuen Pumping Station in the foreground.	Permanent / Intermediate Only future residents living at the southern periphery of this planned development will have glimpse views towards the upper level of the proposed development.	3 yrs. and Occasional	Partial Only glimpse views of the upper level of the proposed development might be available due to the screening effect of a combination of roadside vegetation along Fung Chuk Road and intervened by built structures.	High
VSR2	Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond	Poor	Available/Poor Restricted views within the pumping station and associated facilities. Such infrastructural landscape is extended along Fung Chuk Road where its intervened by mature roadside vegetation.	Transient / Few	3 yrs. and Occasional These VSRs will have glimpse views to the upper level of the proposed development intervened by roadside vegetation at Fung Chuk Road.	Partial	Low

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
VSR3	Vehicular Travellers and Pedestrians along Fung Chuk Road	Fair	Available/Fair Views are confined by roadside vegetation. Immediate views to the proposed development through the vegetation and disturbed views to open yards in the east.	Transient / Few	3 yrs. and Occasional, Dynamic These VSRs will have glimpse views of the proposed development through the existing roadside vegetation.	Partial	Medium
VSR4	Villagers of Chuk Yuen Tsuen and Hang Fook Gardens	Good	Available/Fair Views of these VSRs are largely confined within the village settlements. Those VSRs living at the western periphery of the villages have views which extend to the grassland and warehouses located to the west and south in the foreground and mature vegetation along Ha Chuk Yuen Road in the background.	Permanent / Intermediate	3 yrs. and Frequent These VSRs will have glimpse views of the upper level of the proposed development whilst the majority of the proposed development is screened by mature vegetation along Ha Chuk Yuen Road. Views of these VSRs towards the proposed development are subject to change upon implementation of village settlement extension in their foreground.	Partial	High

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
VSR5	Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road	Fair	Available/ Fair Views are confined by roadside vegetation and engineered water channel alongside the road. Immediate views to the proposed development through the vegetation. Glimpse views of Chuk Yuen Tsuen and warehouses at Ha San Wai are available only through the roadside vegetation. Chuk Yuen Pumping Station is one of the major unpleasant elements in the views of these VSRs.	Transient / Few	3 yrs. and Occasional, Dynamic These VSRs will have glimpse views of the proposed development through existing roadside vegetation.	Partial	Medium
VSR6.1	Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen	Poor	Available/Poor Views are confined within the warehouses due to its nature. Views looking towards the south are bounded by Ha San Wai village settlements. Those workers occasionally in the open areas to the west of the warehouses will have glimpse views of the upper level of the proposed development, their low level views are largely screened by existing roadside vegetation.	Transient / Small	3 yrs and Occasional due to their nature and internal views are subject to change according to material storage.	Partial	Low
VSR6.2	Villagers of Ha San Wai	Poor	Available/Poor Views are largely confined by village houses and warehouses and open container storage facilities along Ha San Wai Road and San Tin Highway. Views north towards the proposed development	Permanent / Small	3 yrs. and Frequent These VSRs will have glimpse views of the upper level of the proposed development whilst low level views are	Partial	Low

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
			are largely intervened by warehouses mentioned above.		intervened by warehouses and open storage facilities in the foreground.		
VSR7	Residents of Low-rise House Development along Ha San Wai Road	Fair	Available/Fair These VSRs are located to the south of Ha San Wai Road living in 3-storey town houses. Their development frontage faces Fairview Park Boulevard. Views looking north towards the proposed development are intervened by the engineered water channel and roadside vegetation.	Permanent / Few	3 yrs. and Frequent These VSRs will have glimpse views of the proposed development through existing roadside vegetation in their foreground.	Partial	Medium
VSR8	Residents of Low-rise House Development along Fairview Park Boulevard	Fair	Available/Poor These VSRs are located to the south of Fairview Park Boulevard living in 3-storey town houses, views from their development frontage towards the development site are intervened by busy traffic, planting along the road and opposite house developments. Low level views are characterised by retail shops, billboards, planting and solid fence wall of individual development.	Permanent / Small	3 yrs. and Frequent These VSRs looking northwest might have glimpse views of the proposed development through space between houses in the north.	Partial	Medium
VSR9	Vehicular Travellers and Pedestrians along Fairview Park Road South	Fair	Available/Fair Visual context of these VSRs is framed by roadside developments; open view along the Ngau Tam Mei Water Channel is only available at the entrance of Fairview Park.	Transient / Intermediate	3 yrs. and Occasional, Dynamic These VSRs will have an overview of the proposed development in transient nature when	Partial	Low

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
					approaching Fairview Park and looking towards north-eastern direction.		
VSR10	Residents of Low-rise House Development at Fairview Park	Fair	Available/Fair Views of these VSRs are largely confined within the development. Open views looking out towards the surrounding rural landscape are only available to those residents living at the periphery of Fairview Park.	Permanent / Intermediate	3 yrs. and Frequent VSRs located at the eastern periphery of Fairview Park will have partial views of the proposed development as their foreground views are intervened by fence walls in the foreground, vegetation on grassland and agricultural fields and channelside vegetation in the middle ground.	Partial	Medium
VSR11	Vehicular Travellers and Pedestrians alongside of Ngau Tam Mei Drainage Channel	Good	Available/Fair Visual context of these VSRs is framed by roadside and channelside plantation, open views along the Ngau Tam Mei Water Channel and adjoining low-rise residential and rural landscapes are available at frequent locations.	Transient / Small	3 yrs. and Occasional, Dynamic These VSRs will have transient views of the proposed development when approaching the Site.	Partial	Medium
PVSR12 A	Future Residents of Planned Recreation	Fair	Available/Fair These planned VSRs are future residents in a house development located	Permanent / Intermediate	3 yrs. and Frequent. Existing views are subject to change due	Partial	Medium

I.D. No.	Visually Sensitive Receivers (VSRs)	Criteria					Sensitivity/ Quality of VSR
		Quality of View	Availability and Amenity of Alternative Views	Type (Permanent or Transient)/ No. of VSRs (Few/Small/ Intermediate/ Large)	Duration and Frequency of Views to proposed Works	Degree of Visibility	
	Zone to the east of Fairview Park		immediately between Fairview Park and the Ngau Tam Mei Water Channel. Given these VSRs are located at a lower elevation than the roads along the Channel, their low level views looking towards the proposed development are screened by channelside vegetation as well as future planting proposals within the recreational facilities. Their western views are bounded by the development edge of Fairview Park.		to future planned recreational development. These VSRs will have glimpse views of the proposed development through channelside planting in the foreground.		
PVSR12B	Future Recreational Users of Planned Recreation Zone to the east of Fairview Park	Fair	Available/Fair These planned VSRs are users of future recreational facilities located immediately between Fairview Park and the Ngau Tam Mei Water Channel. Given these VSRs are located at a lower elevation than the roads along the Channel, their low level views looking towards the proposed development are screened by channelside vegetation as well as future planting proposals within the recreational facilities. Their western views are bounded by the development edge of Fairview Park.	Transient / Intermediate	3 yrs. and Occasional. Existing views are subject to change due to future planned recreational development. These VSRs will have glimpse views of the proposed development through channelside planting in the foreground.	Partial	Medium

11.7 Identification and Evaluation of Environmental Impact

11.7.1 Source of Potential Impact

Proposed residential development comprises of site formation and building works and construction of noise mitigation measures. Potential landscape and visual impacts would be restricted to above ground construction works.

During the construction stage, potential temporary landscape and visual Impacts would arise from:

- Site formation Works - levelling the site to accommodate house development associated with internal road network, landscape areas, and minor slope regarding works at periphery of the site involved.
- Construction of 32 numbers of 2-storey houses (max. 6.6m high) and a club house (one storey).
- Construction of utilities facilities including a sewage treatment plant (at 10.4mPD high as part of noise mitigation measures).
- Construction of noise barrier (4.5m high) of 10.1mPD high at Ha Chuk Yuen Road and fence wall (2.5m high) at Ha San Wai Road, Kam Pok Road and Fung Chuk Road integrated with landscape buffer/landscape berm.
- Contractor's temporary works sites, including site accommodation, material storage and parking areas.

During the operation stage, potential landscape and visual Impacts would be related to the following visible above ground structures:

- Density, scale, massing and design of proposed houses, recreation facilities and other above ground utilities facilities and their compatibility of surrounding landscape context.
- Scale, alignment and treatment of proposed noise barrier and fence wall and their compatibility of surrounding landscape context.
- Residual impacts from loss of trees and vegetation during the construction stage.

11.7.2 Impact on Existing Trees

A preliminary tree survey broadly in accordance with LAO PN No. 7/2007 has been undertaken by ADI which forms part of the assessment of the existing conditions and potential impacts to this landscape resource. This tree survey contained in **Appendix 11-1** involves the identification of individual trees within or adjacent to the works area. Although there is some other existing trees and one registered OVT, No. LCSD YL/7 *Melaleuca cajuputi subsp. cumingiana* located on footpath adjacent to Chuk Yuen Tsuen within the 500m LVIA study boundary, they are not in conflict with the proposed works, and hence the tree survey has been limited to the works area and not the whole LVIA Study Area. The survey includes the identification of individual trees, their species, size, health condition, form, and amenity value.

The assessment found approximately 364 trees within and closed to the Development Site Boundary. 56 *Leucanena leucocephala* (銀合歡), undesirable weedy species are found within the site. There is no dead trees are found in the survey. As previously mentioned, the majority of trees found in this survey are located at the vegetated slopes along Kam Pok Road, Fung Chuk Road and Ha Chuk Yuen Road while only a few trees are located on the platform which was previously used for car parking. No rare or protected tree species (based on Forests and Countryside Ordinance, Cap. 96) or Champion Trees (identified in the book Champion Trees in Urban Hong Kong') were found to exist on site. In addition, none of the trees surveyed were found to meet the

requirements for an Old and Valuable Tree ETWB TCW No. 29/2004 Registration of Old and Valuable Trees, and Guidelines for their Preservation).

The areas of existing tree group which will be potentially affected by the proposed works are listed as follows:

- Amenity tree planting within the vegetated slopes along Fung Chuk Road are in direct conflict with the proposed low-rise residential development;
- Existing trees located at the vegetated slopes along Ha Chuk Yuen Road will be slightly affected by the construction of noise barrier. Crown pruning of some of these trees maybe required;
- Existing trees at the southern portion of the proposed development site will be in conflict with the proposed development scheme;
- Existing trees located along the western periphery of the proposed development site will be in conflict with the construction works.

11.7.3 Tree Retention

The proposed development scheme has been designed to avoid any impact to the existing trees as far as possible and so minimises impacts on the landscape character and amenity of the Study Area. Based on the findings of the preliminary tree survey, it is estimated that approximately 190 trees (52%) can be retained in their current locations.

11.7.4 Tree Transplantation Proposals

It is inevitable that despite the objective of preserving trees wherever possible that some trees will be in conflict with the proposed works. These trees are first considered for preservation through transplantation to a recipient site where they can still contribute to the landscape and visual amenity of the local area. In terms of assessing the feasibility for transplanting the existing trees, a number of factors have been considered including their form, health and amenity value. Also considered, are the existence of rare and /or protected and /or native species, the accessibility for machinery required for transplantation; age; and the availability and the technical feasibility of providing recipient sites. Based on the preliminary tree survey and with consideration for the factors described above, it is recommended that approximately 84 (23%) of the existing trees are suitable for transplantation.

The tree transplantation will be undertaken prior to the commencement of the proposed works. The trees identified for transplantation include those of fair to good form and health condition, having contribution to the local landscape context, relatively younger and accessible by machinery. Tree species, such *Bombax ceiba and Roystonea regia* also have a higher predicted survival rate after transplantation than other species. Wherever possible native species such as *Ficus spp*. which have a relatively high ecological and landscape value and are resilient to disturbance are also recommended for transplantation. This transplanting proposal is subject to review at detailed design stage and to submit for government department's approval.

11.7.5 Tree Felling Proposals

Given the scale of the proposed works and the need for temporary works areas, there will be impacts on existing trees. The trees in conflict with the proposals are first considered for transplantation. Where this is not possible, the trees will be recommended for felling and as such it would not be feasible to retain or transplant approximately 90 (25%) existing trees. However for the majority of trees affected are *Leucanena leucocephala* (銀合歡), which is an undesirable weedy species that has a low individual ecological and amenity value. All dead trees and undesirable species, *Leucanena leucocephala* are proposed to be removed following good horticultural practices to avoid spreading of undesirable tree species and to ensure public safety adjacent to dead trees.

11.7.6 Compensatory Planting Principles

Compensatory planting forms a major part of landscape mitigation measures. The planting principles will concentrate on planting new trees in the proposed amenity areas along the internal access in between the residential houses, and provide infill planting between the retained and transplanted trees; and on the existing slope areas. Planting of more broadleaf tree species will be considered where space allows for healthy tree establishment, this planting concept would create comfortable shaded areas for pedestrians and visitors within the proposed development.

After the removal of *Leucanena leucocephala* on the sloping area to the north of the site, the sloping area will be slightly regarded to a gentler gradient for receiving some of the transplanted trees. These trees will improve the amenity of the slope and areas along edge of the site and provide instant greening effect to the proposed development.

Based on a preliminary estimation, the above planting proposal would achieve a replanting ratio of minimum 1:1 in terms of quantity and quality. This tree replanting ratio would compensate minimum as the number of tree loss within or adjacent to the works area. The retention of existing trees through their preservation in-situ and transplanting and the successful establishment of the newly planted trees will enhance amenity within the proposed development site. The species selection will utilise a range of native, ornamental and amenity tree species in general in proposed gardens and landscape buffer. In addition, bird-attracting and butterfly-attracting species will be introduced within and surrounding the proposed landscape pond to further enhance the landscape and ecological value of the site. These proposals will be subject to further development during the detailed design stage of the project.

As mentioned above, the findings and recommendations of the preliminary tree survey report are subject to the completion of a detailed tree survey and assessment and the preparation of a felling application in accordance with LAO PN No.7/2007. This will be conducted during the detailed design stage of the project and submitted to Lands Department for approval.

11.7.7 Impact on Existing Landscape Resources

A Landscape Impact Assessment has been undertaken to define the nature and scale of the potential landscape impacts associated with the proposed development. The potential landscape impacts are discussed specifically in terms of the existing landscape character and resources. Broad mitigation measures have been identified and the effectiveness and landscape opportunities have also been explored. The acceptability of the development proposal will derive from the scale of potential residual impacts and the ability of the proposals to mitigate them to acceptable levels.

The assessment findings will inform the future development proposal at the next stage. The conceptual development proposal will be formulated through an iterative design process, further refined and developed to accommodate the design requirements, and to minimise the predicted residual landscape impacts. As the development proposal is being further refined the broad assessment assumes the worst case scenario.

11.7.8 Potential Impacts on Trees

Refer to description of tree impact within the development site above and **Table 11-8** and **11-9**, proposed development will have slight to moderate impacts on existing trees in roadside amenity areas along Fung Chuk Road (LR3.5) and Kam Pok Road (LR3.8) due to site formation works and construction of noise mitigation and fence wall. Majority roadside trees on slope along Ha Chuk Yuen Road (LR3.8) will be preserved. A few trees on the open yards within the site (LR10.3) require tree felling due to site formation and building works.

11.7.9 Predicted Potential Impacts on Existing Landscape Resources

The predicted potential impacts on Landscape Resources of the Study Area during construction and operational period would be as follows:

- Landscape impacts on the existing open yards and open container storage and car parks which are largely hard paved as a result of site formation works;
- Landscape impacts on abandoned fishpond as a result of site formation works;
- Landscape impact on roadside amenity plantation surrounding the development site which are relatively young in age and densely planted, they make contribution to the roadside landscape in form of group rather than individually;
- Loss of existing trees which are largely located in amenity areas of Fung Chuk Road and Kam Pok Road. A large proportion of these trees are *Leucanena leucocephala,* an undesirable weedy species which has low individual ecological and amenity value.

Based on potential landscape impacts mentioned above as a result of proposed development, **Table 11-8** presents the magnitude of change on individual LRs and summarised in the following sections.

Large

According to the assessment results in **Table 11-8**, having considered the determinants listed under assessment methodology, a small scale of abandoned and disturbed pond within the development site (approx. 0.34 ha) will be replaced by house development. LR6.1 Ha San Wai Road North Fish Pond (Abandoned) would have a substantial change of quantity and quality.

Intermediate

LR3.5 Fung Chuk Road Roadside Amenity and LR10.3 Ha Chuk Yuen Road Open Yards within the Study Area would have an intermediate change as a result of site formation for the proposed development.

Small

There would be a small change in LR3.8 Kam Pok Road Roadside Amenity within the Study Area. The loss of these LRs is not substantial as a result of site formation works within the development site and tree preservation proposal at the periphery of the development site.

Negligible

No LRs would have a negligible change.

No Change

Proposed development will not affect the remaining LRs within the Study Area

Table 11-9 presents the predicted unmitigated and mitigated (Day 1 and Yr. 10/residual) impacts on the existing landscape resources resulting from the proposed development during the construction and operational phases of the project. These impacts are also mapped on **Figure 11-8.** The mitigated (residual) impacts are assessed during the design year for the purpose of this study and it is taken at Yr. 10 after the development opening when the proposed mitigation planting is deemed to have reached a level of maturity, which is sufficient for it to perform the design objectives. Significance of thresholds of unmitigated impact are summarised as follows:

Unmitigated Impact

Significant Impact Significance

No LRs within the Study Area would have significant impact due to the scale of proposed development and its compatibility to existing landscape context.

Moderate Impact Significance

Only four LRs within the development site will be in conflict with the proposed works including LR3.5 Fung Chuk Road Roadside Amenity, LR3.8 Kam Pok Road Roadside Amenity and LR6.1 Ha San Wai Road North Fish Pond (Abandoned) and LR10.3 Ha Chuk Yuen Road Open Yards, which have a low to medium sensitivity, and the magnitude of change as a result of the proposed development on these LRs have a range from small to large, these LRs therefore would experience a moderate unmitigated impact due to loss of landscape resources including existing trees, a small abandoned fishpond and open yard (hard paved areas of the site) as a result of site formation for the proposed development.

The loss of LRs will be mitigated through the reinstatement of roadside amenity, introduction of landscape gardens within the development, preserved and created new landscape buffer and planting strip at the periphery of the development site and preservation of existing trees in their current location or through transplanting etc.

No Impact

With exception of LRs mentioned above, the proposed development and its associated works would not have any impact on all the remaining LRs outside the development site.

The assessment contained in **Table 11-9** concluded that the proposed development would have a moderate impact on only four LRs within the Study Area, whilst the majority of LRs within the assessment area remain unchanged. Through the introduction of new landscape buffer and landscape areas within the proposed development, in combination with the tree preservation proposals, these mitigation measures will mitigate the loss of landscape resources, will restore and enhance the disturbed landscape context which is currently covered by hard paved areas. The Conceptual Landscape Master Plan and landscape sections shown in **Figures 11-11-1 and 11-11-2** illustrate the application of landscape mitigation measures. **Figure 11-11-3 to 11-11-5** show the proposed integrated design of new landscape buffer/berm and noise mitigation at the periphery of the site as that will alleviate the potential impact on the affected LRs. **Figure 11-11-6** shows the provision of landscape pond for enhancement. The recommended landscape mitigation measures and residual impact on these LRs is further discussed in **Sections 11-13** and **11-14**.

Table 11-8 Potential magnitude of change for landscape resources

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A/Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible /Small/ Intermediate/ Large)
LR1.1 San Tin Highway	No direct impact on San Tin Highway as the proposed development will be located away from this LR.	0/4.87 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.2 San Tam Road	No direct impact on San Tam Road as the proposed development will be located away from this LR.	0/0.72 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.3 Ha San Wai Road	No direct impact on Ha San Wai Road as the proposed development will be located away from this LR.	0/0.41 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.4 Fairview Park Boulevard	No direct impact on Fairview Park Boulevard as the proposed development will be located away from this LR.	0/1.32 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.5 Ha Chuk Yuen Road	No direct impact on Ha Chuk Yuen Road as the proposed development will be located away from this LR.	0/0.34 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR1.6 Kam Pok Road	No direct impact on Kam Pok Road as the proposed development will be located away from this LR.	0/1.05 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.7 Yau Pok Road	No direct impact on Yau Pok Road as the proposed development will be located away from this LR.	0/0.73 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.8 Castle Peak Road (Tam Mi Section)	No direct impact on Castle Peak Road (Tam Mi Section) as the proposed development will be located away from this LR.	0/0.86 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR1.9 Fung Chuk Road	No direct impact on Fung Chuk Road as the proposed development will be located away from this LR.	0/0.12 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR2.1 San Wai Tsuen Village Settlement	No direct impact on San Wai Tsuen Village Settlement as the proposed development will be located away from this LR.	0/5.30 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR2.2 Chuk Yuen Tsuen Village Settlement	No direct impact on Chuk Yuen Tsuen Village Settlement as the proposed development will be located away from this LR.	0/5.95 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR2.3 Ha Sun Wai Tsuen Village Settlement	No direct impact on Ha Sun Wai Tsuen Village Settlement as the proposed development will be located away from this LR.	0/1.82 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR3.1 San Tin Highway Roadside Amenity	No direct impact on San Tin Highway Roadside Amenity as the proposed development will be located away from this LR.	0/1.15 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR3.2 Castle Peak Road (Tam Mi Section) Roadside Amenity	No direct impact on Castle Peak Road (Tam Mi Section) Roadside Amenity as the proposed development will be located away from this LR.	0/0.33 ha 0% No tree Loss OVT not affected	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR3.3 San Tam Road Roadside Amenity	No direct impact on San Tam Road Roadside Amenity as the proposed development will be located away from this LR.	0/3.10 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR3.4 Yau Pok Road Roadside Amenity	No direct impact on Yau Pok Road Roadside Amenity as the proposed development will be located away from this LR.	0/1.96 ha 0% No tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR3.5 Fung Chuk Road Roadside Amenity	Loss of roadside plantation at Fung Chuk Road due site formation of proposed development. Loss of existing roadside amenity will be reinstated.	0.2/0.58 ha 34% 55F/76T /210	Medium	Medium	Permanent	Medium	Intermediate	Intermediate
LR3.6 Ha Chuk Yuen Road Roadside Amenity	No direct impact on Ha Chuk Yuen Road Roadside Amenity as the proposed development will be located away from this LR.	0/0.24 ha 0% No Tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR3.7 Ha San Wai Road Roadside Amenity	No direct impact on Ha San Wai Road Roadside Amenity as the proposed development will be located away from this LR.	0/0.62 ha 0% No Tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change
LR3.8 Kam Pok Road Roadside Amenity	Loss of roadside plantation at Kam Pok Road due site formation of proposed development. Loss of existing roadside amenity will be reinstated.	0.38/3.06 ha 12% 31F/8T /210	Medium	Small	permanent	High	Small	Small
LR4.1 Yau Tam Mei Tsuen Grassland	No direct impact on Yau Tam Mei Tsuen Grassland as the proposed development will be located away from this LR.	0/0.33 ha 0% No Tree Loss	N/A	N/A	NA/ NA	NA/ NA	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR4.2 Chuk Yuen Tsuen Grassland	No direct impact on Chuk Yuen Tsuen Grassland as the proposed development will be located away from this LR.	0/2.92 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR4.3 Ha Chuk Yuen Road North Grassland	No direct impact on Ha Chuk Yuen Road North Grassland as the proposed development will be located away from this LR.	0/8.41 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR4.4 Yau Pok Road North Grassland	No direct impact on Yau Pok Road North Grassland as the proposed development will be located away from this LR.	0/6.4 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR4.5 Kam Pok Road North Grassland	No direct impact on Kam Pok Road North Grassland as the proposed development will be located away from this LR.	0/6.59 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR4.6 Kam Pok Road East Grassland	No direct impact on Kam Pok Road East Grassland as the proposed development will be located away from this LR.	0/0.51 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR5.1 Ha Chuk Yuen Road North Agricultural Field	No direct impact on Ha Chuk Yuen Road North Agricultural Field as the proposed development will be located away from this LR.	0/0.51 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR5.2 Yau Pok Road North Agricultural Field	No direct impact on Yau Pok Road North Agricultural Field as the proposed development will be located away from this LR.	0/0.34 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR6.1 Ha San Wai Road North Fish Pond (Abandoned)	Loss of an abandoned fish pond due to site formation of proposed development.	0.34/0.34 ha 100% No Tree Loss	Low	Large	permanent	Low	Large	Large
LR6.2 Man Yuen Chuen East Fish Ponds	No direct impact on Man Yuen Chuen East Fish Ponds as the proposed development will be located away from this LR.	0/6.98 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR6.3 Chuk Yuen Tsuen South Ponds	No direct impact on Chuk Yuen Tsuen South Ponds as the proposed development will be located away from this LR.	0/0.28 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR7.1 San Tam Road Engineered Water Channel	No direct impact on San Tam Road Engineered Water Channel as the proposed development will be located away from this LR.	0/0.33 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR7.2 Ha San Wai Road Engineered Water Channel	No direct impact on Ha San Wai Road Engineered Water Channel as the proposed development will be located away from this LR.	0/0.56 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR7.3 Ha Chuk Yuen Road Engineered Water Channel	No direct impact on Ha Chuk Yuen Road Engineered Water Channel as the proposed development will be located away from this LR.	0/0.46 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR7.4 Ngau Tam Mei Engineered Water Channel	No direct impact on Ngau Tam Mei Engineered Water Channel as the proposed development will be located away from this LR.	0/2.92 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR8 Fung Chuk Road Flood Storage and Facilities	No direct impact on Fung Chuk Road Flood Storage and Facilities as the proposed development will be located away from this LR.	0/0.74 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR9.1 Fairview Park Boulevard North Low-rise Residential Development Area	No direct impact on Fairview Park Boulevard North Low-rise Residential Development Area as the proposed development will be located away from this LR.	0/2.78 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR9.2 Fairview Park Boulevard South Development Area	No direct impact on Fairview Park Boulevard South Development Area as the proposed development will be located away from this LR.	0/8.21ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR9.3 Fairview Park Low-rise Residential Development Area	No direct impact on Fairview Park Low-rise Residential Development Area as the proposed development will be located away from this LR.	0/30 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR10.1 Sheung Chuk Yuen Open Yards	No direct impact on Sheung Chuk Yuen Open Yards as the proposed development will be located away from this LR.	0/0.74 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR10.2 Chuk Yuen Tsuen Open Yards	No direct impact on Chuk Yuen Tsuen Open Yards as the proposed development will be located away from this LR.	0/0.91 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR10.3 Ha Chuk Yuen Road Open Yards	Loss of hard paved open yards, which was previously occupied by warehouses, open container storage facilities and car parking, due to site formation of proposed development.	2.67/7.00 ha 38% 4F/0T/4	Medium	Medium	Medium/Long	High	Intermediate	Intermediate
LR10.4 Yau Pok Road South Open Yards	No direct impact on Yau Pok Road Open Yards as the proposed development will be located away from this LR.	0/4.5 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change
LR10.5 Kam Pok Road South Open Yards	No direct impact on Kam Pok Road Open Yards as the proposed development will be located away from this LR.	0/1.20 ha 0% No Tree Loss	N/A	N/A	N/A /N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/Total Area of Resources (Ha); No. of Trees to be Felled (F) or Transplanted (T)/Existing Trees	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A /Low/ Medium/ High)	Construction (Negligible/Small/ Intermediate/ Large)	Operation (Negligible/Small/ Intermediate/ Large)
LR10.6 Yau Pok Road North Open Yards	Not use.							
LR10.7 Kam Pok Road North Open Yards	Not use.							

Table 11-9 Existing Landscape Resources and Predicted Impacts

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR1.1 San Tin Highway	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.2 San Tam Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.3 Ha San Wai Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.4 Fairview Park Boulevard	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.5 Ha Chuk Yuen Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.6 Kam Pok Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.7 Yau Pok Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.8 Castle Peak Road (Tam Mi Section)	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR1.9 Fung Chuk Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR2.1 San Wai Tsuen Village Settlement	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR2.2 Chuk Yuen Tsuen Village Settlement	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR2.3 Ha Sun Wai Tsuen Village Settlement	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR3.1 San Tin Highway Roadside Amenity	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR3.2 Castle Peak Road Tam Mi Section) Roadside Amenity	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR3.3 San Tam Road Roadside Amenity	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR3.4 Yau Pok Road Roadside Amenity	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR3.5 Fung Chuk Road Roadside Amenity	Medium	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP3, CP4, OP1, OP2, OP6	Slight Adverse	Slight Adverse	Insubstantial
LR3.6 Ha Chuk Yuen Road	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
Roadside Amenity									
LR3.7 Ha San Wai Road Roadside Amenity	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR3.8 Kam Pok Road Roadside Amenity	Medium	Small	Small	Moderate Adverse	Moderate Adverse	CP1, CP3, CP4, OP1, OP2, OP6	Slight Adverse	Slight Adverse	Insubstantial
LR4.1 Yau Tam Mei Tsuen Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR4.2 Chuk Yuen Tsuen Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR4.3 Ha Chuk Yuen Road North Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR4.4 Yau Pok Road North Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR4.5 Kam Pok Road North Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR4.6 Kam Pok Road East Grassland	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR5.1 Ha Chuk Yuen Road North Agricultural Field	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR5.2 Yau Pok Road North Agricultural Field	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR6.1 Ha San Wai Road North Fish Pond (Abandoned)	Low	Large	Large	Moderate Adverse	Moderate Adverse	CP3,OP2, OP7	Moderate Adverse	Moderate Adverse	Slight Adverse
LR6.2 Man Yuen Chuen East Fish Ponds	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR6.3 Chuk Yuen Tsuen South Ponds	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR7.1 San Tam Road Engineered Water Channel	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR7.2 Ha San Wai Road Engineered Water Channel	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR7.3 Ha Chuk Yuen Road	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
Engineered Water Channel									
LR7.4 Ngau Tam Mei Engineered Water Channel	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR7.5 Farview Park Engineered Water Channel	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR8 Fung Chuk Road Floodwater Storage & Facilities	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR9.1 Fairview Park Boulevard North Low-rise Residential	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
Development Area									
LR9.2 Fairview Park Boulevard South Development Area	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR9.3 Fairview Park Low-rise Residential Development Area	Medium	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR10.1 Sheung Chuk Yuen Open Yards	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR10.2 Chuk Yuen Tsuen Open Yards	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (Nil/Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LR10.3 Ha Chuk Yuen Road Open Yards	Low	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP3,OP1, OP2	Slight Adverse	Slight Adverse	Slight Beneficial
LR10.4 Yau Pok Road Open Yards	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR10.5 Kam Pok Road Open Yards	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LR10.6 Yau Pok Road North Open Yards	Not use								
LR10.7 Kam Pok Road North Open Yards	Not use								

11.7.10 Predicted Potential Impacts on Existing Landscape Character

Due to the scale of the proposed development, and its density and building height profile, limited loss of landscape resources and responsive building design to its adjourning low-rise developments, village and rural landscape characters, there are likely to be some adverse impacts on local landscape character, however it would not be substantial as existing visually unpleasant open storage and warehouses or infrastructure uses will be replaced by quality residential landscape and new tree planting.

The predicted potential impacts on Landscape Character Areas of the Study Area during construction and operational period would be as follows:

- Removal of visual detracting landscape elements such as warehouses, open container storage facilities and car parking within the Study Area would enhance the visual amenity along the Ngau Tam Mei Nullah.
- Temporary loss of roadside plantation during construction.
- Introduction of noise mitigation measures.

Table 11.10 describes the source of impacts as a result of proposed development and presents the magnitude of change on individual LCAs. Magnitude of change on individual LCAs is listed as follows:

Intermediate

According to the assessment criteria set up in the assessment methodology and the results in **Table 11-10**, given the scale of the proposed development and characters of the adjacent landscape context, certain extent of perceptible change on landscape characters as a result of the loss of landscape resources limited within the development site within Kam Pok Road Low-rise Residential Landscape (LCA5), the magnitude of change of this LCAs is intermediate.

No change

No change on the remaining LCAs within the assessment area as a result of proposed development, their landscape characters remains unchanged.

Given the replacement of visual detracting uses with residential development associated with landscape proposals, the character of the proposed development would fit into its adjacent low-rise residential and rural landscape context, the remaining LCAs, particularly for LCA1 Fairview Park Low-rise Extensive Residential Landscape, LCA2 Yau Pok Road and LCA3 Kam Pok Road Nullahside Landscape would be indirectly enhanced by the proposed development. It should be noted that the majority of LCA2 and LCA3 are subject to the implementation of planned recreational and low-rise developments immediately to the north of the development site hence the proposed development would enhance both existing and planned landscape characters within the Study Area.

Table 11-11 presents the predicted unmitigated and mitigated (residual) impacts on the existing landscape character areas resulting from the proposed development during the construction and operational phases. These impacts are also mapped on **Figure 11.9**. The mitigated (residual) impacts are assessed during the design year for the purpose of this study and taken as being between 10 and 15 years after the schemes opening when the proposed mitigation planting is deemed to have reached a level of maturity, which is sufficient for it to perform the design objectives. The predicted mitigated (residual) impacts are further discussed in **Section 11-11**.

Table 11-11 presents the predicted unmitigated impacts and are discussed in the following sections.

- *LCA5 Kam Pok Road Low-rise Residential Landscape* – Given this LCA comprises of low-rise residential developments along Kam Pok Road and Fairview Park Boulevard and open storage and warehouses along Kam Pok Road and Ha San Wai Road. Vegetation and greening is seldom found within these existing developments. Frequent heavy duty vehicular traffic along the roads and uses within this LCA are major visual detracting landscape elements. Replacement of existing uses with residential development would better fit into the existing and planned residential landscape context along Ngau Tam Mei Channel. Furthermore, the landscape proposal for this residential development will further enhance the local landscape character. Given the low sensitivity of this LCA and the intermediate change on the local landscape character as a result of the proposed development, this LCA will be subject to a moderate adverse unmitigated impact due to loss of landscape resources and change of landscape character during the construction and operational phases of the project.

- Given there is no change of landscape resources and elements within the remaining LCAs, no impact on these LCAs. However the nature of the proposed development and its associated landscape proposals would fit into the planned residential developments in LCA2 and LCA3 in a long term and would benefit the quality of the existing channelside and planned residential landscape characters within the Study Area. The quality and amenity of LCA1, LCA2 and LCA3 adjacent to the development site would be benefit by this residential development.

Table 11-10 Potential Magnitude of Change for Landscape Character Areas (LCAs)

ID	Description of Impacts	Loss (Ha)/ Total Area of Resources (Ha)	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A/Low/ Medium/ High)	Construction (No change/ Negligible/ Small/ Intermediate/ Large)	Operation (No change/ Negligible/ Small/ Intermediate/ Large)
LCA1 Fairview Park Low-rise Extensive Residential Landscape	No direct impact on Fairview Park residential development as the proposed development will be located away from this LCA. Replacement of existing use with residential development within the development site adjacent to this LCA would fit into the residential landscape context in the longer term.	0/36.44 ha 0%	N/A	N/A	N/A/ N/A	N/A	No change	No change
LCA2 Yau Pok Road Nullahside Rural Landscape	No direct impact on nullahside landscape resources and elements as the proposed development will be located away from this LCA. Replacement of existing use with residential development within the development site adjacent to this LCA would fit into the existing nullahside and planned residential development landscape context in the longer term.	0/9.15 ha 0%	N/A	N/A	N/A/ N/A	N/A	No change	No change
LCA3 Kam Pok Road Nullahside Rural Landscape	No direct impact on nullahside landscape resources and elements as the proposed development will be located away from this LCA. Planned low-rise residential development within this LCA adjacent to Chuk Yuen Pumping Station together with the proposed development would fit into the nullahside and planned residential	0/18.04 ha 0%	N/A	N/A	N/A/ N/A	N/A	No change	No change

ID	Description of Impacts	Loss (Ha)/ Total Area of Resources (Ha)	Determinants for Magnitude of Change				Magnitude of Change	
			Compatibility (N/A/Low/ Medium/ High)	Scale (N/A/Small/ Intermediate /Large)	Duration of Impact (Construction/ Operation)	Reversibility (N/A/Low/ Medium/ High)	Construction (No change/ Negligible/ Small/ Intermediate/ Large)	Operation (No change/ Negligible/ Small/ Intermediate/ Large)
	development landscape context in the longer term.							
LCA4 San Tam Road Rural Residential Lowland Landscape	No direct impact on vegetation along San Tin Highway and within village settlements of Chuk Yuen and San Wai Tsuen as the proposed development will be located away from this LCA.	0/31.40 ha 0%	N/A	N/A	N/A/ N/A	N/A	No change	No change
LCA5 Kam Pok Road Low-rise Residential Landscape	The proposed development site occupies less than 15% of this LCA. Replacement of existing use with residential development within the development site adjacent to this LCA would fit into the residential landscape context in the longer term.	3.75/26.04 ha 14%	High	Small	Permanent	Medium	Intermediate	Intermediate
LCA6 Yau Pok Road Open Storage and Warehouse Landscape	No direct impact on the warehouses and material storage area as the proposed development will be located away from this LCA.	0/6.49 ha 0%	N/A	N/A	N/A/ N/A	N/A	No change	No change

Table 11-11 Existing Landscape Character Areas (LCAs) and Predicted Impacts

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (No change/ Negligible /Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LCA1 Fairview Park Low-rise Extensive Residential Landscape	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LCA2 Yau Pok Road Nullahside Rural Landscape	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LCA3 Kam Pok Road Nullahside Rural Landscape	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil
LCA4 San Tam Road Rural Residential Lowland Landscape	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

ID	Sensitivity (Low / Medium/ High)	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures	Significance Threshold (Mitigated)		
		Construction (No change/ Negligible /Small / Intermediate /Large)	Operation (No change/ Negligible /Small / Intermediate/ Large)	Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)		Construction Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	Operation Nil, Insubstantial, Slight, Moderate and Significant (adverse or beneficial)	
								Day 1	Year 10 (Residual)
LCA5 Kam Pok Road Low-rise Residential Landscape	Low	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP3, CP4, OP1,OP2, OP5, OP6 and OP7	Slight Adverse	Slight Adverse	Slight Beneficial
LCA6 Yau Pok Road open storage and warehouse Landscape	Low	No change	No change	Nil	Nil	N/A	Nil	Nil	Nil

11.7.11 Visual Impact

The potential visual impacts (unmitigated) on identified VSRs resulting from the proposed development during the construction and operational phases of the Project are summarised in the following sections and listed in **Table 11-12**. These impacts are also mapped on **Figure 11-10**. The mitigated (residual) impacts are assessed during the design year which for the purpose of this study is taken as being between 10 and 15 years after the schemes opening when the proposed mitigation planting is deemed to have reached a level of maturity, which is sufficient for it to perform the design objectives. The residual impacts (mitigated) are discussed under **Section 11-11**.

Significant Impact Significance

Although some visual amenity of VSRs will be spared impact due to implementation of the proposed development, there are likely to be some significant adverse impacts on the visual amenity of some VSRs in the absence of mitigation measures during construction and operation phases due to their location in proximity to the development site, such as Vehicular travellers and pedestrians along Fung Chuk Road (VSR 3), Ha Chuk Yuen Road (VSR5) and alongside of Ngau Tam Mei Drainage Channel (VSR11). They are few in numbers and transient in nature. Previous open storage and warehouse and car parking uses faded out from the context and the visual amenity looking towards the site from these transient VSR will be changed to low-rise residential development, the proposed landscape area and noise mitigation measures at the periphery of the site will be dominant in their views. Residents of Low-rise House Development along Ha San Wai Road (VSR 7), who live at the northern boundary, will have glimpse view of proposed development through the trees and built structures along Ha San Wai Road and will be subjected to a large change of visual context and amenity with the temporary loss of roadside landscape areas and vegetated sloping areas, their proximity to the works and the introduction of the house development and noise barrier or fence wall. However, the majority of the works areas will be reinstated with provision for new landscape gardens and landscape buffer within the proposed development.

Moderate Impact Significance

Due to the viewing distance further away from the proposed development, nature of VSRs and their extent of views are usually intervened by built structures or vegetation in their foreground or middle ground, VSRs such as, Residents and/or Villagers of Chuk Yuen Tsuen and Hang Fook Gardens (VSR 4), Ha San Wai (VSR6.2), in low-rise house developments along Fairview Park Boulevard (VSR 8), and at Fairview Park (VSR 10) will be subjected to a small to intermediate change of visual context and amenity due to the introduction of house development. It should be noted that their views looking towards the development site have been disturbed or screened by intervening built environment and/ or existing vegetation in the foreground. It should be noted that viewshed of these VSRs are largely confined within the development.

Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond (VSR 2) and Warehouses and Open Container Storage at Ha San Wai Tsuen (VSR 6.1) and vehicular travellers and pedestrians along Fairview Park Road South (VSR 9) will subject to an intermediate change of their confined visual context, they are located in proximity to the proposed development.

However, the majority of the works areas will be reinstated with provision for new landscape gardens and landscape buffer within the proposed development. The proposed houses and noise barrier are designed with a responsive height profile and aesthetic appearance to the existing context. Their visual amenity contained by urbanised or infrastructural landscapes would be subjected to intermediate change. Hence these permanent / transient VSRs mentioned above would experience a moderate unmitigated impact in the absence of mitigation measures during the construction and operation phase.

Visual context of some future residents and recreational uses of planned low-rise house developments at Fung Chuk Road North (PVSR 1) and planned recreation zone to the east of Fairview Park (PVSR12A&12B) will subject to an intermediate change if the proposed development comes after the above planned development. These planned developments form a major component of the residential landscape character along the Ngau Tam Mei Nullah.

Slight or Insubstantial Impact Significance

Referring to the assessment result, no VSR within the ZVI will experience a slight or insubstantial impact without the implementation of landscape mitigation measures during construction and operation phases of the proposed development.

Table 11-12 Visually Sensitive Receivers and Predicted Impacts

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
PVSR 1 Residents of Planned Low-rise House Development at Fung Chuk Road North	High	118m These VSRs enjoy extended views along Ngau Tam Mei Channel and constrained views within the planned house development and partial views towards Chuk Yuen Tsuen. Only VSRs living at the southern periphery will have partial views of the proposed development through spaces between the pumping station and facilities in their foreground. Given views looking towards the proposed development have been largely blocked by pumping station and roadside planting along Fung Chuk Road, there is no further blockage of view as a result of the proposed development. No blockage of view.	High Low-rise residential developments.	Intermediate	Irreversible	3yrs / permanent	Intermediate / Intermediate Given intervening built structures and roadside planting in the foreground of these VSRs, the proposed development will not be a major component in the lowland context.	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3,OP6	Slight Adverse	Slight Adverse	Insubstantial Further to the establishment of tree preservation proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
VSR 2 Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond	Low	50m Visual context of these VSRs is largely contained by pumping utilities, open views to the south across flooding ponds towards roadside planting along Ha Chuk Yuen Road. These VSRs will have glimpse views of the upper level of the proposed houses through vegetation along Fung Chuk Road. No blockage of view.	High	Intermediate	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given their nature and visual quality, the disrupted visibility of these VSRs, proximity to the proposed development, the proposed development is a relatively major component in in their view.	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3,OP6	Slight Adverse	Slight Adverse	Insubstantial Further to the establishment of tree preservation proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.
VSR 3 Vehicular Travellers and Pedestrians along Fung Chuk Road	Medium	Immediate Views of these VSRs are confined by roadside planting and pumping facilities along the road. Partial views of the proposed development through spaces between vegetation. No blockage of view.	Medium	Large	Irreversible	3yrs / permanent	Large / Large Due to the removal of temporary roadside vegetation and slope regarding works.	Significant Adverse	Significant Adverse	CP1, CP2, CP5, OP3,OP4, OP5, OP6	Moderate Adverse	Moderate Adverse	Slight Adverse Further to the establishment of tree preservation and transplanting proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
VSR 4 Villagers of Chuk Yuen Tsuen and Hang Fook Gardens **Photomontage refer to Figure 11.12.7 &8**	High	200m Views of these transient VSRs extend to roadside planting along Ha Chuk Yuen Road. Low level views of the proposed development and noise barrier will be screened by roadside vegetation. Existing views is subject to change further to extension of village settlement in their foreground. Existing views towards proposed development will be replaced by landscape area with noise mitigation and upper floor of the proposed house development.	Medium	Intermediate	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given intervened roadside planting in the foreground of the proposed development and will not be a major component in the lowland context.	Moderate Adverse	Moderate Adverse	CP2, OP3,OP4,	Slight Adverse	Slight Adverse	Insubstantial Further to establishment of tree preservation and new tree planting along Ha Chuk Yuen Road, visual intrusion of the proposed development and noise barrier will be effectively alleviated. View of these VSR towards proposed development will be blocked by village extension.
VSR 5 Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road Photomontages refer to **Figures 11.12.5,6,9&10**	Medium	Immediate Views of these VSRs are confined by roadside planting and engineered water channel along the road. Partial views of the proposed development through spaces between vegetation. No blockage of view.	Medium	Large	Irreversible	3yrs / permanent	Large / Large Due to removal of temporary roadside vegetation and slope regarding works.	Significant Adverse	Significant Adverse	CP1, CP2, CP5, OP3,OP4, OP5, OP6	Moderate Adverse	Moderate Adverse	Slight Adverse Further to the establishment of tree preservation proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
VSR 6.1 Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen **Photomontage refer to Figures 11.12.7 &8**	Low	115m Visual context of these VSRs is largely contained within warehouses, open storage and workshops. These VSRs will have glimpse views of the upper level of the proposed development occasionally at spaces outside the workshops. Existing views to the abandoned yards will be replaced by landscape area with noise mitigation and the sewage treatment plant of the proposed development.	High	Intermediate	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given their nature and visual quality, the disrupted visibility of these VSRs, proximity to the proposed development, the proposed development is a relatively major component in in their view.	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3,OP4, OP5, OP6	Slight Adverse	Slight Adverse	Insubstantial Further to the establishment of tree preservation proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.
VSR 6.2 Villagers of Ha San Wai Photomontage refer to **Figures 11.12.11 &12**	Low	230m Visual context of these VSRs are largely confined by existing uses along Ha San Wai Road and San Tin Highway. Low level views of the proposed development are largely screened by intervening built structures in the middle ground. These VSRs will have partial views of the top of noise barrier. Landscape area with noise mitigation and the sewage treatment plant of proposed development visually intruded in the background of their views behind the warehouses along Ha San Wai Road	Medium	Intermediate	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given intervening built structures and roadside planting in the foreground of these VSRs, the proposed development will not be a major component in the lowland context.	Moderate Adverse	Moderate Adverse	CP2, OP3, OP4, OP5, OP6	Slight Adverse	Slight Adverse	Insubstantial Responsive design of the building height profile and massing and innovative design of noise barrier. Upon full establishment of new tree planting proposals in landscape buffer, visual impact will be alleviated

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
VSR 7 Residents of Low-rise House Development along Ha San Wai Road Photomontage refer to **Figures 11.12.13&14**	Medium	10m Major views of these VSRs are fronting Fairview Boulevard. Views from their backyard looking towards the proposed development are intervened by engineered water channels and roadside vegetation. No blockage of existing view.	Medium	Large	Irreversible	3yrs / permanent	Large/ Large Given the proximity to the proposed development, intervening built structures and roadside planting in the foreground of these VSRs, the proposed development will not be a major component in the lowland context.	Significant Adverse	Significant Adverse	CP1, CP2, OP3, OP4, OP5, OP6	Moderate Adverse	Moderate Adverse	Slight Adverse Responsive design of the building height profile and massing and innovative design of noise barrier. Upon full establishment of transplanting proposals in landscape area of Ha San Wai Road, visual impact will be alleviated
VSR 8 Residents of Low-rise House Development along Fairview Park Boulevard	Medium	5m Major views of these VSRs are fronting Fairview Boulevard. Views looking towards the proposed development are large screened by busy traffic and residential development alongside the road. No blockage of existing view.	High	Small	Irreversible	3yrs / permanent	Small/ Small Given intervening built structures in the foreground of these VSRs, the proposed development will not be a major component in the lowland context.	Moderate Adverse	Moderate Adverse	CP2, OP3, OP4, OP5	Slight Adverse	Slight Adverse	Insubstantial Responsive design of the building height profile and massing and innovative design of noise barrier. Upon fully established of transplanting proposal in landscape area of Ha San Wai Road, visual impact will be alleviated
VSR 9 Vehicular Travellers and Pedestrians along Fairview Park Road South Photomontage refer to **Figures 11.12.15&16**	Low	115m Visual context of these VSRs extends along the road and Ngau Tam Mei Nullah. Overview of the proposed development when approaching the entrance of Fairview Park. No blockage of existing view.	Medium	Intermediate	Irreversible	3yrs / permanent	Intermediate / Intermediate Given the proximity to the proposed development and nature of their view, the proposed development is not a major component in their dynamic views.	Moderate Adverse	Moderate Adverse	CP2, OP3, OP4, OP5	Slight Adverse	Slight Adverse	Insubstantial Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
VSR 10 Residents of Low-rise House Development at Fairview Park Refer to vantage point photograph **Figure 11.10.7 & 11.10.8**	Medium	800m Only residents living at elevated floors of the houses at the eastern periphery of this development will have glimpse views of the proposed development, views are largely intervened by extensive grassland in their foreground and vegetation along the channel. No blockage of existing view.	High	Intermediate	Irreversible	3yrs / permanent	Intermediate / Intermediate Given intervening built structures in the foreground of these VSRs, the proposed development will not be a major component in the lowland context.	Moderate Adverse	Moderate Adverse	CP1, OP6	Slight Adverse	Slight Adverse	Insubstantial Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated
VSR 11 Vehicular Travellers and Pedestrians alongside of Ngau Tam Mei Drainage Channel Photomontage refer to **Figure 11.12.17&18**	Medium	80m Visual context of these VSRs extends along the road and Ngau Tam Mei Nullah. Overview of the proposed development intervened by channelside vegetation. No blockage of existing view.	Medium	Large	Irreversible	3yrs / permanent	Large/ Large Given their open views extend along Ngau Tam Mei Nullah and location in proximity to the proposed development, it forms a major component in their views but intervened by channelside vegetation.	Significant Adverse	Significant Adverse	CP2, OP3, OP4, OP5	Moderate Adverse	Moderate Adverse	Slight Adverse Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated
PVSR 12A Future Residents of Planned Recreation Zone to the east of Fairview Park	Medium	100m Visual context of these VSRs confined within the planned residential development. Glimpse views of the proposed development intervened by channelside vegetation. No blockage of existing view	Medium	Large	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given their open views extend along Ngau Tam Mei Channel and location in proximity to the proposed development, it forms a major component in their views but intervened by channelside vegetation.	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3 , OP5, OP6	Slight Adverse	Slight Adverse	Slight Beneficial Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated

ID	Sensitivity	Determinants for Magnitude of Change					Magnitude of Change (Construction /Operation Phase)	Impact Significance Threshold (Unmitigated)		Mitigation Measures	Impact Significance Threshold (Mitigated)		
		Viewing Distance (m) / Blockage of View	Compatibility with Surrounding Landscape	Scale	Reversibility	Duration Construction/ Operation		Construction	Operation		Construction	Operation	
												Day 1	Year 10
PVSR 12B Future Recreational Users of Planned Recreation Zone to the east of Fairview Park	Medium	100m Visual context of these VSRs confined with the planned recreational facilities. Glimpse views of the proposed development intervened by channelside vegetation. No blockage of existing view.	Medium	Intermediate	Irreversible	3yrs / permanent	Intermediate/ Intermediate Given their open views extend along Ngau Tam Mei Channel and location in proximity to the proposed development, it forms a major component in their views but intervened by channelside vegetation.	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3,OP5, OP6	Slight Adverse	Slight Adverse	Slight Beneficial Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated

11.8 Cumulative Impacts

This section reviews the projects planned currently in progress or planned within the Study Area, such as Yuen Long and Kam Tin Sewerage and Sewage Disposal, Construction of Cycle Tracks and the Associated Supporting Facilities From Sha Po Tsuen to Shek Sheung River, planned residential developments and permitted New Territories exempted house developments, which will result in landscape and visual cumulative impacts including the degradation of landscape character and visual amenity during construction, the loss of landscape resources and change of local landscape characters.

Construction of a section of gravity trunk sewer under Yuen Long and Kam Tin Sewerage and Sewage Disposal Works and Cycle Tracks Works along Ngau Tam Mei Channel and Yau Pok Road respectively will be constructed in future. Although these works do not have a direct landscape impact on the proposed development, however visual amenity of VSRs located to the west of the development site have been degraded during the construction of the above works, hence the cumulative impact as a result of further development at Kam Pok Road would not be substantial.

Besides, there are three planned developments approved by Town Planning Board and/ or under the EIAO, which include low-rise house development to the north of Chuk Yuen Pumping Station (71 nos. of 3-storey houses+ 1 basement)), low-rise residential cum recreation (106 houses, 2-storeys) in the Recreation Zone (REC) to the east of Fairview Park along Yau Pok Road, and low-rise residential development with wetland restoration proposal (70 houses, 3-storeys) in the Comprehensive Development and Wetland Protection Area zone (OU) at Yau Mei San Tsuen. Scale of proposed development under this EIA is relatively small, hence cumulative impact would not be substantial.

Besides, within the village settlements at Ha Chuk Yuen and Ha San Wai, some proposed land and pond filling for permitted New Territories exempted house developments are undertaken. Given to the scale of building works is comparatively small, the cumulative impact as a result of further development at Kam Pok Road would not be substantial.

These potential planned VSRs are considered in the visual impact assessment. Their construction programme will be earlier or very much in line with the proposed development under this EIA, the existing open storage and warehouse landscape will fade out and the remaining scattered abandoned fish ponds will be replaced by residential or village developments, hence the proposed development under this EIA will fit into the planned landscape context upon completion of the above concurrent projects.

Mitigation measures to address the potential cumulative impacts would be incorporated into the design of each of the approved projects. The resulting changes to the existing landscape character, landscape resources and visual amenity have been taken into account in the baseline assessment. Cumulative impacts from these projects are therefore taken into account through their inclusion in the baseline conditions for this EIA.

11.9 Mitigation of Adverse Environmental Impact

11.9.1 General

The landscape mitigation measures described in this report are at a level which both demonstrate their effectiveness to alleviate the potential landscape and visual impacts identified in the assessment and also to allow the proposals to be carried forward during the detailed design stage. The measures are designed to address both the construction and operational phases of the project. More detailed landscape and compensatory planting proposals will be developed during the detailed design of this project and will seek approval from the relevant departments at that stage.

The landscape and visual mitigation measures are described both in a generic sense for measures, which apply to the works area and in terms of the proposed landscape strategy for the proposed development. The aims of the mitigation measures are to:

- Alleviate where possible those landscape and visual impacts which are unavoidable through the review of alternative schemes and method of site formation and slope regarding works.
- Establish a coherent and integrated landscape strategy creating a framework which draws together visually disparate components of the proposed scheme and where possible reduces their visual prominence and enhances the integration of the structures within their landscape setting.
- Enhance the existing landscape character and visual amenity of the surrounding areas.
- Provide a co-ordinated approach between the noise, ecological and landscape mitigation proposals where there is an interface.

The Landscape Master Plan, Landscape Sections, Design of Landscape Berms and Provision of Landscape Pond presented in **Figures 11-11-1 to 11-11-6** demonstrate the main landscape and visual mitigation strategies and the application of design mitigation measures including an integrated architectural and engineering and landscape design approach, compensatory and new roadside planting proposals, slope treatment and design of landscape berms, pond and gardens. It is recommended that the Environmental, Monitoring and Audit Requirements (EM&A) for landscape resources such as existing trees described in **Section 11.14** of this report is undertaken during the detailed design stage and both the construction and operational phases of the Project.

11.9.2 Primary Mitigation Measures

In accordance with the EIAO-TM, the hierarchy for landscape and visual impact mitigation is first avoidance of impact, then minimisation of impact and finally compensation of impact. As has been described in the Project description in this report, the current scheme have been undertaken to fulfil the following objectives:

- Minimisation of potential impacts on landscape resources such as existing trees by review of house disposition and alignment of noise barrier and fence wall, and building set back to preserve existing roadside amenity areas as far as technically feasible.
- Restoration and enhancement of existing landscapes through planting of ornamental trees with a combination of varies stock sizes in proposed landscape gardens within the development, and broadleaf native trees in new and preserved landscape buffer at the periphery of the site. This will create an instant greening effect, be apparent in the enhancement of both ecology and landscape context and relief the appearance of noise mitigation measures.
- Review provision of landscaped areas within the development to ensure that sufficient space is reserved for compensatory planting and other landscape works.

In accordance with the EIAO-TM, mitigation measures for the construction and operational phases of the project have been designed to minimise predicted landscape and visual impacts, and to compensate for loss of landscape resources, enhance the landscape and visual context as far as is possible given the Project constraints.

11.9.3 Landscape Master Plan

The design objectives for the Landscape Master Plan are to:

- Integrate the proposed development from a landscape and visual perspective with the existing and planned landscape context.
- Soften the form of the built environment including the boundary wall and noise mitigation measures through the use of green measures. Integrate preserved, transplanted and new

tree planting to form a continuous landscape buffer/berm along periphery of the Site for screening of the built structures.
- Respond to the character of the architectural scheme and its rural and low-rise residential context with an aesthetically appropriate landscape treatment.
- Create a distinctive and high quality landscape setting for the featured communal gardens associated with clubhouse facilities.
- Maximise the opportunities for outdoor passive recreational facilities to promote a sense of social interaction and neighbourhood cohesion.
- Utilise ornamental and/or flowering tree and shrub species with an interesting form, colour and foliage texture to enrich the landscape experience and provide architectural highlights.
- Enhance the sustainability of the proposals through for example of the use of a green roof system on top of sewage treatment plant.
- Provide compensation for the loss of existing trees.
- Maximise opportunities for greening through planting of new trees and shrubs to enhance the landscape and ecology value of context.
- Provision of adequate open space for future residents in accordance with the requirements of HKPSG Chapter 4, Recreation, Open Space and Greening for the provision of local open space with the objective of providing high quality active and passive recreational facilities that will satisfy the needs of the residents; and
- Provision of adequate greening coverage in accordance with recent Building Department Practices Notes no. ATP-152 Sustainable Building Design Guidelines.

The landscape design shown on **Figure 11-11-1 and 11-11-6** will be subject to review during the detailed design stage of the Project, however the following seeks to establish some general principles that are important in establishing the landscape as part of the general mitigation for the development. Landscape Master Plan is at this stage indicative and shows the type of elements which form the basis of the design.

- Entrance Plaza - The landscape of the main site entrance at Kam Pok Road has been designed as a small plaza lined with feature/ avenue trees and shrubs planting with decorative paving towards the roundabout to create a threshold between the development and its context. Establishing the character and quality of the development at the point of entry and creating a sense of arrival.

- Streetscape Design – Introduction of new tree and shrub planting to create visual interests at street level, enhancing the green character of the development and to visually soften the form of the built environment in view from pedestrian. Broadleaf tree planting provides comfortable shaded walking environment within the development.

- Landscape Buffer Treatment – Allows building setback from northern, eastern and western site boundary to preserve and create a continuous 5 to 8m wide landscape buffer/landscape berm. (**Figures 11-11-3 to 11-11-5** refer). This buffer will retain a number of existing trees and vegetation, in combination of transplanted trees and new tree planting, that would create an instant greening effect effectively screened proposed boundary wall (2.5m high), sewage treatment plant of +10.4mPD and noise barrier of +10.1mPD. Introduction of a combination of tree species already found in context will create a naturalistic effect integrated with the rural landscape. Shade tolerant shrub and ground cover, preferably native species will be planted under trees that would reinforce the naturalistic effect.

- Residential Landscape/Recreation Core – the core extends from the main site entrance to Clubhouse and to adjacent landscaped areas accommodating both active and passive recreation areas for the enjoyment of future residents. It forms a social and landscape focus of this residential development. And then to more intimate and tranquil courtyard gardens.

Planting design will utilise a naturalistic approach crating a relaxing environment for resident to enjoy the nature whilst overlook their children in the play area.

- Landscape Pond – a landscape pond (wet garden) within the Project Site during operation phase. It will enhance the amenity, ecological and landscape value of the site with planting of a combination of bird-attracting and butterfly-attracting plant species within and surrounding the pond area. Fauna, including birds and butterflies, living in the surrounding areas may extend their livelihood activities to the proposed water body and planting area.

- Green roof **-** In addition to at grade planting areas, multi-levelled greening measure is considered on roof of utility facilities such as plant room or sewage treatment plant as far as technically feasible. Introduction of grass, shrub or trailing plant on the roof will disguise the functional appearance of these facilities and maximise visible greenery within the development.

- Landscape softworks – The landscape design will, where practicable, maximise the opportunities for tree and shrub planting to create a high quality of living environment and maintain the local rural landscape character. The basis for the proposed planting scheme would be to provide a green and comfortable environment. The planting proposal in proposed gardens and landscape buffer, which will utilise a combination of native and ornamental species, in addition bird-attracting and butterfly-attracting plant species will be introduced within and surrounding the landscape pond to further enhance the landscape and ecological value of the Site. For example, plants producing berry will enhance the food resources of birds. Nectar plants will also provide food resources for butterflies. Both fauna groups will benefit from landscape planting. The planting of trees will also provide roosting habitats for birds. The plant selection will also consider the form, colour and foliage texture and also include species which are designed architectural highlights. The following bird-attracting and butterfly-attracting plant species will be incorporated into the detailed planting design of the landscape pond:

  Trees (bird-attracting): *Celtis sinensis Cinnamomum camphora, Elaeocarpus hainanensis, Ficus benjamina, Ilex rotunda, Osmanthus fragrans, Pongamia pinnata, Schefflera octophylla, Sterculia lanceolata and Syzygium jambos* etc.
  Shrubs (bird-attracting): *Rhaphiolepis indica Rhodomyrtus tomentosa, Psychotria rubra and Litsea rotundifolia* etc.
  Butterfly attracting plant species: *Maesa perlarius, Rhodomyrtus tomentosa, Gardenia jasminoides, Lantana camara and Melastoma candidum* etc..
  Water plant species: *Cyperus alternifolius, Hedychium coronarium, Nymphaea rubra and Sagittaria sagtittifolia* etc.

11.9.4 Secondary Mitigation Measures

A series of mitigation measures designed to alleviate impact and where possible compensate for loss of landscape resources, change of landscape character and visual amenity for VSRs resulting from the construction and operational phases of the project. The implementation, funding, and management and maintenance for the landscape areas associated with the proposed works will be undertaken by project proponent.

The proposed landscape and visual impact mitigation measures are summarised in **Tables 11-13 and 11-16**, and illustrated in **Figures 11-11-1 to 11-11-6 and 11-12-1 to 11-12-18**.

11.9.5 Construction Phase Landscape Mitigation Measures

The proposed landscape impact mitigation measures in the construction phase are summarized in **Table 11-13**. Details requirements are also provided below.

Table 11-13 Proposed Construction Phase Landscape Mitigation Measures

Mitigation Code	Mitigation Measure
CP1	*Preservation of Existing Vegetation* - The proposed works shall avoid disturbance to the existing trees and vegetation as far as practicable within the works areas. The tree preservation proposals shall be coordinated with the layout and design of the engineering and architectural works. It is recommended that a full tree survey and felling application shall be undertaken and submitted for approval by the relevant government departments in accordance with LAO PN No. 7/2007 Tree Preservation and Tree Removal Application for Building Development in Private Projects during the detailed design phase of the Project. All preserved trees shall be protected by means of fencing where appropriate to prevent potential damage to tree canopies and root zones from vehicles and storage of materials. Specifications for tree protection measures will be formulated at detailed design stage and to be implemented by contractors before site formation/ construction works commenced.
CP3	*Implementation of Mitigation Planting and Planting Species Selection* - Replanting of existing / disturbed vegetation will be undertaken at the earliest possible stage of the construction phase of the Project. Predominantly native and / or ornamental plant species shall be utilised. Proposed mitigation planting will not only be limited to conventional amenity planting, but also consider alternative greening measures such as vertical greening for screening and softening of the built structures and green roof on built structures for enhancing the visual amenity. Small shrubs, climbing plants, lawn and groundcovers shall be used in specific locations where technically feasible.
CP4	*Transplantation of Existing Trees* – Some specimens which have relatively higher amenity value will be considered for transplanting. The final recipient site will be in planting areas within the proposed development. These trees continue their contribution to the local landscape context as well as the future residential landscape. The transplanting proposal is subject to review at detailed design stage and seeks for the approval from the relevant government departments in accordance with LAO PN No. 7/2007 Tree Preservation and Tree Removal Application for Building Development in Private Projects. The implementation programme for the proposed works will reserve enough time for the advanced tree transplanting preparation works to enhance the survival of the transplanted trees.

11.9.6 Operational Phase Landscape Mitigation Measures

The proposed landscape impact mitigation measures in the operational phase are summarized in **Table 11-14**. Detailed requirements are also provided below.

Table 11-14 Proposed Operational Phase Landscape Mitigation Measures

Mitigation Code	Mitigation Measure
OP1	*Roadside and Amenity Planting* – The planting proposals will utilise native and ornamental species and broadleaf trees in combination of shade tolerant shrub planting and climbing plants in proposed landscape buffer surrounding the site to soften the horizontal emphasis of proposed noise barrier and fence wall. It will form a continuous landscape buffer at the periphery of the development site in combination with tree preservation proposal. Enough soil depth of 1200mm will be reserved for tree planting area to ensure healthy planting establishment. High clearance tree planting will be utilised alongside of internal road and not to interfere the EVA requirement. The implementation of new planting shall be undertaken as soon as technically feasible after completion of building works to ensure the effectiveness of this mitigation during operational stage.

Mitigation Code	Mitigation Measure
	(**Figure 11-11-1** refers).
OP2	*Compensatory Planting Proposals* – As the works are largely located within rural and low-rise development areas and alongside existing roads, the planting proposals have sought to utilise all of the available space for new tree and shrub planting to create a comprehensive landscape framework which is connected to areas of retained and preserved vegetation and designed to integrate the proposals within their future landscape setting. The new planting will be maintained in accordance with good horticultural practice in order to realise the objectives of the mitigation measures. This includes the replacement of defective plant species in the new planting areas to enhance the aesthetic, landscape and ecological quality of the proposals. Both native and ornamental species will be utilised. The compensatory planting proposal will be developed at detailed design stage in accordance with the requirements listed in the LAO PN No. 7/2007 'Tree Preservation and Tree Removal Application for Building Development in Private Project'. New tree planting will utilise heavy standard size trees at selected area as accent, standard to light standard size trees in general landscape and roadside planting areas. Smaller planting stock will be used on slope and landscape buffer. **Figure 11-11-1** shows the indicative tree planting locations that will create an instant greening and screening effect to the proposed development. Based on a preliminary estimation, the planting proposal would achieve a replanting ratio of minimum 1:1 in terms of quantity and quality upon the completion of proposed development. The development has sought to preserve 274 existing trees (75.2%) through retention in their current locations or tree transplanting and plant 126 compensatory trees and 65 amenity trees. Upon the completion of the tree preservation and planting proposal, proposed development could accommodate 465 trees in combination of tree preservation and new tree planting; there is a net gain of 101 trees within the proposed development. The above recommendations are subject to change at detailed design stage. The findings and recommendations on existing trees are subject to review at detailed design stage and a tree felling and transplanting application will be prepared in accordance with LAO PN 7/2007 Tree Preservation and Tree Removal Application for Building Development in Private Projects and submitted to DLO for approval. The planting proposal in proposed gardens and landscape buffer, which will utilise a combination of native and ornamental species, in addition bird-attracting and butterfly-attracting plant species will be introduced within and surrounding the landscape pond to further enhance the landscape and ecological value of the Site. For example, plants producing berry will enhance the food resources of birds. Nectar plants will also provide food resources for butterflies. Both fauna groups will benefit from landscape planting. The planting of trees will also provide roosting habitats for birds. There would be improvement in the environmental condition considering that the Project Site only supports low plant diversity and covered by mainly exotic species (including the invasive plant *Leucaena leucocephala*) in existing condition.
OP5	*Design of Engineering Structure* – Alternative greening measures including greening on the roof and/or vertical greening on the structures and on regarded sloping areas will be used wherever possible to disguise their function appearance in both medium and long distance views and maximise the greening opportunities. Tree preservation, new tree planting and alternative greening measures on and adjacent to the engineering structures will create an instant greening effect soften the visual mass. (**Figures 11-11-2 to 11-11-5** refer).
OP6	*Creation of Landscape Buffer* - Native and ornamental tree and shrub planting and climbing plants will be utilised for the creation of landscape buffer (5-8m wide)along noise barrier and sewage treatment plant at Ha Chuk Yuen Road as well as Kam Pok and Fung Chuk Road to enhance the aesthetic and landscape diversity of the local context. These measures provide screening effect to the noise mitigation measures and fence wall of proposed development.

Mitigation Code	Mitigation Measure
	Treatment of Slopes should be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to create a more natural appearance blending into the local rural landscape. (**Figures 11-11-2 to 11-11-5** refer).
OP7	*Provision of Landscape Pond* – a landscape pond (wet garden) (110m^2) will be designed within the Project Site. It will enhance the amenity and landscape value by planting a combination of native and ornamental, bird-attracting and butterfly-attracting plant species within and surrounding the pond area. Fauna, including birds and butterflies, living in the surrounding areas may extend their livelihood activities to the proposed water body and planting area. (**Figures 11-11-1 and 11-11-6** refer).

11.9.7 Construction Phase Visual Mitigation Measures

The proposed visual impact mitigation measures in the operational phase are summarized in Table 11.15. Detailed requirements are also provided below.

Table 11-15 Proposed Construction Phase Visual Mitigation Measures

Mitigation Code	Mitigation Measure
CP1	*Preservation of Existing Vegetation* – The tree preservation proposals will coordinate with the layout and design of the engineering and architectural layout at detailed design stage. The preservation of existing trees will provide instant greening and screening effect for the works.
CP2	*Works Area and Temporary Works Areas* – The landscape of the works areas will be restored to their original condition or enhanced through the introduction of new amenity planting areas or open spaces following the completion of the construction phase. The construction sequence and construction programme will be optimized in order to minimise the duration of impact. Construction site controls will be enforced including the storage of materials, the location and appearance of site accommodation and site storage; and the careful design of site lighting to prevent light spillage. Hoarding designed with recessive colour will be set up around the construction site providing screening effect for the construction works. The site office or temporary above-ground structures will be sited at less visual prominent locations.
CP5	*Coordination with Concurrent Projects* - Coordinated implementation programme with concurrent projects to minimise potential impacts and where possible reduce the period of disturbance.

11.9.8 Operational Phase Visual Mitigation Measures

The proposed visual impact mitigation measures in the operational phase are summarized in Table 11.16. Detailed requirements are also provided below.

Table 11-16 Proposed Operational Phase Visual Mitigation Measures

Mitigation Code	Mitigation Measure
OP3	*Responsive Design of Buildings* - The design of the proposed building structures, road network and utility facilities will incorporate features as part of visual mitigation measures including: *Integrated design approach* Responsive design of built structures considered the location of houses and utilities structures. The disposition and height profile of the houses and above ground utilities structures respond to the existing context. Design measures include the creation of setbacks, articulating the development frontage and incorporation of view corridors/breezeway, avoid abrupt transitions between the existing and proposed built environment, reduce the apparent visual mass to enhance the sense of visual integration with the existing low-rise development context. *Building Treatment* The architectural design seeks to reduce the apparent visual mass of the structures further through the use of recessive colour palette. Incorporation of alternative greening measures such as green roof /vertical greening on built structures where condition allows and particularly at where fronting to the public realm. Non-reflective finishes also recommended to reduce the potential glare effect. **(Figures 11-12-1 to 11-12-18 refer)**
OP4	*Noise Mitigation Structures* – To implement the noise barriers along Ha Chuk Yuen Road. The design of noise barrier should reduce the visual effect of the structure through the use of form, materials and textures colours. Setting back with articulated alignment from the site boundary to create a continuous landscape buffer (5-8m wide) with both preserved and new planted trees forming an instant screening effect to the engineering structures. Introduction of landscape berms, by virtue of its height and natural form, would reduce the perceived scale and height of the noise barriers. Integrated the proposed sewage treatment plant with noise barrier to reduce the engineering mass making the appearance blending into the rural setting. The design of engineering structures should avoid unnecessary visual cluster, this would be achieved through the co-ordination of the various engineering disciplines involved to arrive at innovative design solutions. (**Figures 11-12-1 to 11-12-18** refer)
OP5	*Design of Engineering Structure* – Particularly attention on the design, the appearance and construction methods of the structures of proposed engineering structures such as fence wall, noise barrier, sewage treatment plant and regarded sloping areas etc. The landscape consultants will work in liaison with the engineers on the aesthetic aspects of the structures and their relationship with the landscape. Alternative greening measures including greening on the roof and/or vertical greening on the structures and on regarded sloping areas will be used wherever possible to disguise their function appearance in both medium and long distance views and maximise the greening opportunities. Tree preservation, new tree planting and alternative greening measures on and adjacent to the engineering structures will create an instant greening effect soften the visual mass. (**Figures 11-12-1 to 11-12-18** refer)

Mitigation Code	Mitigation Measure
OP6	*Creation of Landscape Buffer*- Native and ornamental tree and shrub planting and climbing plants will be utilised for the creation of landscape buffer along noise barrier and sewage treatment plant at Ha Chuk Yuen Road to enhance the aesthetic and landscape diversity of the local context. Appropriate height and form of the landscape buffer/ berm to integrate with the noise mitigation measures and provide screening effect to the built structures. Treatment of Slopes should be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to create a more natural appearance blending into the local rural landscape. The creation of landscape buffer at the periphery of the site, the height and form of the landscape berms and planting proposals have key role in mitigating the visual mass of the external fence walls of 2.5m high, the sewage treatment plant of roof at 10.4mPD and the noise barriers of height at 10.1mPD high. (**Figures 11-12-1 to 11-12-18** refer)

11.10 Programme and Funding Arrangement for Landscape and Visual Mitigation Measures

The landscape works will closely follow the completion of setting out the planting areas. The design year for the purpose of this study is taken as approximately 10 to 15 years after the scheme opening when the planting fill established. The implementation schedule of mitigation measures is presented in **Section 14** in this report and also presented in the EM&A Manual.

The agencies responsible for the funding, implementation, management and maintenance of the mitigation measures are identified in **Tables 11-17** and **14-1**.

Table 11-17 Landscape and Visual Mitigation Measures/Works Funding and Implementation

Construction Phase Landscape Mitigation Measures

ID No.	Landscape Mitigation Measure	Funding Agency	Implementation Agency
CP1	*Preservation of Existing Vegetation*	Project Proponent	Project Architect/ Landscape Architect/ Contractor
CP3	*Implementation of Mitigation Planting and Planting Species Selection*	Project Proponent	Project Architect/ Landscape Architect/ Contractor
CP4	*Transplantation of Existing Trees*	Project Proponent	Project Architect/ Landscape Architect/ Contractor

Operational Phase Landscape Mitigation Measures

ID No.	Landscape Mitigation Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OP1	*Roadside and Amenity Planting*	Project Proponent	Project Landscape Architects/ Contractor	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP2	*Compensatory Planting Proposals*	Project Proponent	Project Landscape Architects/ Contractor	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP5	*Design of Engineering Structure*	Project Proponent	Project Landscape Architects/ Contractor	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP6	*Creation of Landscape Buffer*	Project Proponent	Project Landscape Architects/ Contractor	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP7	*Provision of Landscape Pond*	Project Proponent	Project Landscape Architects/ Contractor	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent

Construction Phase Visual Mitigation Measures

ID No.	Visual Mitigation Measure	Funding Agency	Implementation Agency
CP1	*Preservation of Existing Vegetation*	Project Proponent	Project Engineers/ Architects/ Landscape Architects/ Contractor
CP2	*Works Area and Temporary Works Areas*	Project Proponent	Project Architect/ Contractor
CP5	*Coordination with Concurrent Projects - Coordinated implementation programme with concurrent projects to minimise potential impacts and where possible reduce the period of disturbance.*	Project Proponent	Project Engineers/ Architects/ Landscape Architects/ Contractor

Operation Phase Visual Mitigation Measures

ID No.	Visual Mitigation Measure	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
OP3	*Responsive Design of Buildings*	Project Proponent	Project Landscape Architects	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP4	*Noise Mitigation Structures*	Project Proponent	Project Engineers/ Architects	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP5	*Design of Engineering Structure*	Project Proponent	Project Engineers/ Architects/ Landscape Architects	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent
OP6	*Creation of Landscape Buffer*	Project Proponent	Project Engineers/ Architects/ Landscape Architects	Project Proponent/ Property Management Agent	Project Proponent/ Property Management Agent

11.11 Evaluation of Residual Impact

11.11.1 General

Overall, in terms of residual landscape and visual impacts the main effects will primarily result from the replacement of the existing open storage and warehouse landscapes with residential development, disturbance to roadside amenity and loss of existing trees. As the work site will be reinstated or enhanced through provision of landscape proposals for the development, it is evident that the predicted impacts will be alleviated upon full establishment of landscape and visual mitigation measures.

For the most part, the landscape character of the Study Area will not be degraded when compared to the existing condition after the full establishment of the recommended mitigation measures, as:

- Responsive scale and building height profile integrated with rural context will be adopted.
- Integration as far as technically feasible new built structures with existing or planned adjacent developments.
- Responsive noise barrier design and alignment and other engineering structures integrated with the new and preserved landscape buffer and landscape gardens within the development.
- Provision of landscaped gardens and landscape buffer within the development to enhance the local landscape context and visual amenity.
- Incorporation of green roofs on built structures as far as technically feasible.
- Tree preservation and new tree planting proposals, where space allows, will be implemented within and at the periphery of the development site.

The planting proposals also form part of the compensatory planting proposals for the loss of landscape resources, it will benefit the future landscape and ecology context within the Study Area.

11.11.2 Residual Impact on Landscape Resources (Yr10)

Landscape mitigation measures recommended and mitigated (residual/Yr10) impact for individual LRs assessed in **Table 11-9** and summarised as follows.

Landscape resources include LR3.5 Fung Chuk Road Roadside Amenity, LR3.8 Kam Pok Road Roadside Amenity and LR6.1 Ha San Wai Road North Fish Pond (Abandoned) and LR10.3 Ha Chuk Yuen Road Open Yards, which have a low to medium sensitivity, and the magnitude of change as a result of the proposed development on these LRs have a range from small to intermediate, these LRs therefore would experience a moderate impact due to temporary loss of landscape resources as a result of site formation for the proposed development.

Slight Impact Significance

The moderate impacts (Unmitigated, Day 1 construction and operation) on LR6.1 Ha San Wai Road North Fish Pond (Abandoned) will be alleviated to slight adverse (Yr10). The loss of LR mitigated through the establishment of the mitigation measures discussed in **Section 11.9** including creation of new landscape areas within the development including provision of landscape pond where condition allows.

Insubstantial Impact Significance

The moderate impacts on LRs including LR3.5 Fung Chuk Road Roadside Amenity, LR3.8 Kam Pok Road Roadside Amenity and LR10.3 Ha Chuk Yuen Road Open Yards will be alleviated to slight adverse (Day 1 construction and operation) to Insubstantial (Yr10). The loss of LRs mitigated through full establishment of the mitigation measures discussed in **Section 11.9** including preservation/ reinstatement of existing roadside amenity with new tree planting, reinstatement of roadside slope with both native and amenity species integrated with preserved trees, creation of new landscape areas within the development and landscape berms at the periphery of the site and other forms of greening measures adjacent to engineering structures where condition allows.

11.11.3 Residual Tree Impact

Referring to **Section 11.7.6**, the planting proposal would achieve a replanting ratio of not less than 1:1 in terms of quantity and quality. Based on preliminary estimation, in combination with tree retention and transplanting, compensatory planting and new amenity tree planting, there is a net gain of new amenity trees when compared to the existing trees found on site. This tree replanting ratio would compensate minimum as the number of tree loss. The retention of existing trees in-situ or through transplanting in combination of the establishment of the newly planted trees will enhance amenity within the proposed development site and benefit to the neighbourhood landscape context. The species selection will utilise a range of native, ornamental and amenity tree species. The planting proposal is subject to further development during the detailed design stage of the Project.

As mentioned above, the findings and recommendations of the preliminary tree survey report are subject to review for the preparation of a formal felling application in accordance with LAO PN No.7/2007. The application will be conducted during the detailed design stage of the Project and submit to Lands Department for approval.

11.11.4 Residual Impact on Landscape Character Areas

Landscape and visual mitigation measures recommended and mitigated (residual) impact for individual LCAs assessed in **Table 11-11** and summarised as follows.

Insubstantial Impact Significance

The unmitigated moderate impact on LCA5 Kam Pok Road Low-rise Residential Landscape due to the temporary loss of roadside planting, abandoned fishpond and open yards and replacement of open storage and warehouse to residential landscape character will be

alleviated to a slight level during the construction and operation phases (Day 1) of the project, the impact will be further reduced to a Insubstantial level during operation phase (Year 10) of the Project upon full establishment of the landscape and visual mitigation measures particularly the planting proposals. Replacement of the existing uses with residential development would fit into the existing channelside and planned residential landscape context.

In addition, there are many planned residential and recreational developments undertaken surrounding the site along the Ngau Tam Mei Channel. Although the proposed development do not have direct impact on the LCA1 Fairview Park Low-rise Extensive Residential Landscape, LCA2 Yau Pok Road Nullaside Rural Landscape and LCA3 Kam Pok Road Nullahside Rural Landscape, the change of local landscape character due to the above planned developments in combination with the proposed development in LCA5 will replace the visually unpleasant uses in the context, enhance and benefit the existing landscape and visual quality of the Study Area.

11.11.5 Impact on Visual Amenity (Year 10)

Landscape and visual mitigation measures recommended and mitigated (residual) impact for individual VSRs assessed in **Table 11-12** and summarised as follows.

Residual Impact Significance during Construction Phase

Due to the scale of the residential development, planned residential and recreational development in adjacent areas and general planning intention for replacing the visually detracting uses in the New Territories, mitigation measures implemented during construction including preservation of existing trees, responsive hoarding, tidy site management and careful planning of the construction program, responsive construction method, the predicted level of impacts on the views of the majority of VSRs would be alleviated to a moderate to slight.

Residual Impact Significance during Operation Phase

Moderate to Slight Adverse Impact Significance

The visual amenity of VSRs in proximity to the development site, such as VSR 3 Vehicular Travellers and Pedestrians along Fung Chuk Road, VSR 5 Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road, VSR 7 Residents of Low-rise House Development along Ha San Wai Road and VSR 11 Vehicular Travellers and Pedestrians alongside Ngau Tam Mei Drainage Channel will be changed significantly due to the introduction of the house development, site formation works, sewage treatment plant, noise barrier and temporary loss of roadside amenity. This potential visual intrusion resulting from built structures will be alleviated to an extent through responsive building disposition, building height profile, architectural and engineering design; and the restoration of the disturbed areas with new amenity tree and shrub planting and in the continuous landscape buffer/landscape berm at the periphery of the site, and the use of a green roof on the sewage treatment plant. These mitigations create high quality landscape areas for the enjoyment of future residents as well as provide enhanced visual amenity in the wider context of Ngau Tam Mei nullahside rural and low-rise development context. Although these measures might not fully screen the built structures, the measures will effectively soften the development mass and create a greater sense of visual integration and enhance the overall landscape of Ngau Tam Mei. With full establishment of landscape and visual mitigation measures, the significant impact on the visual amenity of these VSRs mentioned above will be mitigated to moderate during operation phase (Day 1) and slight adverse during operation phase (Year 10).

Slight to Insubstantial Impact Significance

Works areas will be restored following the completion of the building works with residential proposals. Good quality residential landscape and continuous landscape buffer/ new tree planting will be established and the responsive design of built structures will be adopted. Through the implementation of the proposed mitigation strategies replacing visually detracting elements in the visual context with quality architectural and landscape components, the effect of visual intrusion of the house development will be reduced. The moderate visual impacts on VSRs, including PVSR 1 Residents of Planned Low-rise House Development at Fung Chuk Road North, VSR 2 Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond, VSR 4 Villagers of Chuk Yuen Tsuen and Hang Fook Gardens, VSR 6.1 Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen, VSR 6.2 Villagers of Ha San Wai, VSR 8 Residents of Low-rise House Development along Fairview Park Boulevard, VSR 9 Vehicular Travellers and Pedestrians along Fairview Park Road South and VSR 10 Residents of Low-rise House Development at Fairview Park, will be mitigated to an extent to slight during operation phase (Day 1) and insubstantial during operation phase (Year 10) following the full establishment of the recommended mitigation measures.

Slight Beneficial Impact Significance

The moderate visual impacts on VSRs in planned residential and/or recreational developments along the Channel, including PVSR 12A Future Residents of Planned Recreation Zone to the east of Fairview Park and PVSR 12B Future Recreational Users of Planned Recreation Zone to the east of Fairview Park, will be mitigated to an extent to slight level during operation phase (Day 1). The implementation of the planned developments in combination of proposed development under this EIA and their associated landscape enhancement proposals will fade out the unpleasant uses in the context and will benefit the visual quality and amenity of VSRs along the Channel during operation phase (Year 10) following the full establishment of the recommended mitigation measures.

11.11.6 Photomontages

A series of computer generated images or photomontages have been prepared for the proposed works demonstrating a worst case scenario for the identified VSRs and are presented in **Figures 11-12-1** to **11-12-18**. The photomontages of the proposed development show the existing conditions, Day 1 of Operational Phase after the completion of the construction phase in the absence of mitigation measures and Day 1 of Operational Phase with mitigation measures. Year 10 of Operational Phase with mitigation measures to demonstrate the predicted residual impacts, which would exist in the design year during the operational phase taken as between 10 and 15 years after the completion of the construction phase.

Photographs are used to demonstrate the existing view. The photomontages of those views cannot cover the whole development in one single shot due to the effects of perspective and so are presented as a series of individual images.

Vantage Point A

(Looking southeast towards the development site from Yau Pok Road representing views from transient VSRs along Ngau Tam Mei Drainage Channel (VSR11), Future Residential and Recreational Users of Planned Recreation Zone to the east of Fairview Park (PVS12A&B) and Workers at Chuk Yuen Pumping Station and Storage Pond (VSR2), and permanent VSRs Residents of Planned Low-rise House Development at Fung Chuk Road North (PVSR1) and Fairview Park (VSR10).

This vantage point (**Figures 11-12-1 and 11-12-2** refer) shows the proposed development at street level of Yau Pok Road across the Ngau Tam Mei Channel. The viewpoint is located

approximately 120m from the proposed development. Low level views of these VSRs are dominated by vegetation alongside Ngau Tam Mei Channel, Kam Pok Road and Chuk Yuen Pumping Station. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the potential change of visual amenity of visitors to the Ngau Tam Mei Channel, vehicle travellers and pedestrian along Yau Pok Road and Kam Pok Road.

The image shows the proposed development in an oblique angle in relation to the adjacent channelside landscape and demonstrates the effectiveness of the proposed landscape visual mitigation measures. The existing low-level views along the Channel are intervened by the channelside vegetation. These vegetation outside the development site will be preserved. Although unavoidable a few existing trees along the western periphery of the site required to be removed due to site formation and building works, compensatory tree will be in filled along the landscape buffer to mitigate the impact.

The mitigation measures perceived in the image including responsive architectural design and building height profile and creation of landscape buffer along Kam Pok Road. Climbing plants will be added at the base of the boundary wall as to further soften the development mass. The proposed mitigation measures would alleviate the potential visual impacts on these VSRs to insubstantial significance, restore and enhance the roadside and channelside visual amenity.

Vantage Point B

(Looking southeast towards the development site from a channel crossing connecting Yau Pok Road and Kam Pok Road representing views from transient VSRs along Ngau Tam Mei Drainage Channel (VSR11), Future Residents and Recreational Users of Planned Recreation Zone to the east of Fairview Park (PVS12), and permanent VSRs Residents of Fairview Park (VSR10).

This vantage point (**Figures 11-12-3 and 11-12-4** refer), similar to vantage point A, is located approximately 25m from the proposed development. Low level views of these VSRs are dominated by vegetation alongside the Ngau Tam Mei Channel and Kam Pok Road. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the potential change of visual amenity of visitors to the Ngau Tam Mei Channel, vehicle travellers and pedestrian along Yau Pok Road and Kam Pok Road.

The image shows the proposed development in an oblique angle in relation to the adjacent nullahside landscape and demonstrates the effectiveness of the proposed landscape mitigation measures. The existing low-level views along the Channel are intervened by the channelside vegetation. These vegetation outside the development site will be preserved. Although unavoidable a few existing trees along the western periphery of the site required to be removed due to site formation and building works, compensatory tree will be in filled along the landscape buffer to mitigate the impact.

The mitigation measures perceive in the image including responsive and integrated architectural design and creation of landscape buffer along Kam Pok Road. Climbing plants will be added at the base of the boundary wall as to further soften the development mass. Low-rise development profile responds to its neighbourhood development such as Fairview Park which located opposite to the site across the Channel. Upon full establishment of new tree planting in the landscape buffer in combination of preserved trees within the development site along Kam Pok Road, screening effect on the development mass is apparent in this view. The proposed mitigation measures would alleviate the potential visual impacts on these VSRs to slight level, restore and enhance the roadside and channelside visual amenity.

Vantage Point C

(Looking southwest towards the development site at street level at the junction of Fung Chuk Road and Ha Chuk Yuen Road representing views from transient VSRs along Ha

Chuk Yuen Road (VSR5) and Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond (VSR2))

This vantage point (**Figures 11-12-5 and 11-12-6** refer) is located immediately adjacent to the proposed development at street level of Ha Chuk Yuen Road. Views of these VSRs are confined by roadside vegetation, pumping station and engineered water channel. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the potential change of the visual amenity of vehicle travellers and pedestrians along Fung Chuk Road and Ha Chuk Yuen Road and workers in pumping station.

This image shows the proposed development in an oblique angle behind the existing trees and demonstrates the effectiveness of the proposed landscape and visual mitigation measures. The amenity area at the junction of Fung Chuk Road and Ha Chuk Yuen Road is located outside the site and will be preserved. In combination of tree preservation on slope along the eastern periphery of the site, only glimpse views of noise barrier and top of houses can be seen from this view.

The mitigation measures perceive in the view including responsive low profile architectural design, responsive noise barrier design and alignment, tree preservation and creation of new landscape buffer. Transplanted trees in the landscape buffer in combination of preserved trees will create an instant greening effect and form a continuous landscape buffer from Fung Chuk Road to Ha Chuk Yuen Road. Upon fully establishment of tree preservation and planting proposals in the proposed landscape buffer at the northern periphery of the site, proposed development is hardly to be seen in the view. Visual impacts on the VSRs will be alleviated to slight to insubstantial level.

Vantage Point D

(Looking southwest towards the development site at street level adjacent to Hang Fook Gardens of Chuk Yuen Tsuen representing views from transient/permanent VSRs in Warehouses and Open Container Storage at Ha San Wai (VSR6.1) and Villagers of Chuk Yuen Tsuen and Hang Fook Gardens (VSR4))

This vantage point (**Figures 11-12-7 and 11-12-8** refer) is located approximately 175m from the proposed development at street level adjacent to Hang Fook Gardens. Views of these VSRs extend west across vacant land pending village extension with mature trees along Ha Chuk Yuen Road in the background. Viewshed to the south is blocked by warehouses adjacent to Ha San Wai, these are visually detracting elements in their visual context.

This image demonstrates the potential change of visual amenity of views available to the residents of Hang Fook Gardens and workers in the warehouses. It should be noted that this visual context will be changed upon the implementation of village extension. The image shows the proposed house development and noise barrier behind trees along Ha Chuk Yuen Road and demonstrates the effectiveness of the proposed landscape and visual mitigation measures. Only glimpse view of the houses and noise barrier can be seen behind the existing trees through adopting a responsive height profile. Landscape buffer along Ha Chuk Yuen Road with combination of preserved trees and in-filled trees within the site will create an instant greening effect to the development. Upon full establishment of planting proposals, proposed development is hardly to be seen in the view and fit into the landscape character of its neighbourhood village development. Visual impacts on the VSRs will be alleviated to Insubstantial.

Vantage Point E

(Looking southwest towards the development site at street level from Ha Chuk Yuen Road representing views from transient VSRs along Ha Chuk Yuen Road (VSR5))

The viewpoint is located approximately 20m from the proposed development. Low level views of these VSRs are dominated by vegetation alongside Ha Chuk Yuen Road and the engineered water channel.

This vantage point (**Figures 11-12-9 and 11-12-10** refer) is located immediately adjacent to the proposed development at street level of Ha Chuk Yuen Road. Similar to vantage point C, views of these VSRs are confined by the roadside vegetation and engineered water channel. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the potential change of visual amenity of vehicular travellers and pedestrians along Ha Chuk Yuen Road. The image shows the proposed noise barrier and demonstrates the effectiveness of the proposed landscape and visual mitigation measures. Although unavoidable some existing trees on slope are affected by the construction of noise barrier and maintenance access to sewage treatment plant, the roadside planting will be reinstated. The house development is almost not able to be seen from this view through the adoption of responsive height profile and building set back. The functional appearance of the noise barrier will be effectively disguised through the adoption of responsive alignment behind the landscape buffer and integrated design with the boundary wall. Although unavoidable some existing in the buffer required to be removed due to the construction of noise barrier, compensatory planting proposal will reinstated the sloping area and alleviate the impacts. Upon full establishment of planting in landscape buffer, screening effect is apparent in this view. Visual impacts on the VSRs will be alleviated to slight level.

Vantage Point F

(Looking west towards the development site at street level from Ha San Wai representing views from permanent VSRs of Villagers of Ha San Wai and Area Reserved for Village Extension (VSR6.2) and Residents of Low-rise House Development along Ha San Wai Road (VSR7))

This vantage point (**Figures 11-12-11 and 11-12-12** refer) is located immediately adjacent to village houses and abandoned Ming Tak village school at Ha San Wai looking west towards the proposed development. The viewpoint is located approximately 200m from the proposed development. Low level views of these VSRs are confined by vegetation and warehouses along Ha San Wai Road in the foreground. The view is taken from pedestrian level to demonstrate the potential change of visual amenity of villagers and residents living in Ha San Wai and along Ha San Wai Road. Given the nature of views which are largely intervened by the built environment, only a partial view of the proposed development can be seen in the view.

The image shows the proposed noise barrier and sewage treatment plant behind existing built structures and vegetation in Ha San Wai and demonstrates the effectiveness of the proposed landscape mitigation measures. Although unavoidable there is some visual intrusion of engineering structures in the views of these VSRs, the functional appearance of these engineering structures will be effectively disguised through the adoption of an integrated design of engineering structures and creation of landscape buffer in front. The landscape buffer will be created on berms, utilised broadleaf trees, shade tolerant shrubs and climbing plants. Upon full establishment of planting proposal, the built structures will be largely screened and not apparent in this view. Visual impacts on the VSRs will be alleviated to Insubstantial.

Vantage Point G

(Looking northwest towards the development site at street level from Ha San Wai Road representing views from permanent VSRs Residents of low-rise developments along Ha San Wai Road (VSR7).)

This vantage point (**Figures 11-12-13 and 11-12-14** refer) is located immediately adjacent to the proposed development at Ha San Wai Road. The viewpoint is located approximately 100m from the proposed development. Low level views of these VSRs are dominated by vegetation alongside the engineered water channel in the south, house developments, warehouses and open container storage facilities in the north adjacent to the Site. Low level views of residents of house developments along Ha San Wai Road are confined by vegetation along the water channel and warehouses adjacent to the proposed development. It should be noted that major views of these VSRs are facing Fairview Park Boulevard, only views from the upper floors of these house developments facing north will have partial views of the proposed development through existing vegetation. The view is taken at pedestrian level to demonstrate the change of visual amenity of residents living in Ha San Wai Road. Given the nature of views, only a partial view of the proposed development would be seen in these VSRs.

The image shows part of the integrated noise barrier and sewage treatment plant structure with landscape buffer in front and tree planting along Ha San Wai Road. It demonstrates the effectiveness of the proposed landscape mitigation measures. The proposed houses will not able to be seen through the adoption of responsive building height profile and setback. Proposed tree planting along the development edge will enhance the visual amenity of Ha San Wai Road. The introduction of landscape buffer with tree and shrub planting in front of the integrated noise barrier and sewage treatment plant structure will disguise its functional appearance. Although unavoidable there is some visual intrusion of engineering structures in the views of these VSRs, it should be noted that their visual context have been interrupted by unpleasant built structures in Ha San Wai, upon full establishment of the landscape and visual mitigation measures and planting proposal mentioned above the development mass will be soften. Visual impacts on these VSRs will be alleviated to a slight to insubstantial level.

Vantage Point H

(Looking northeast towards the development site from the road junction of Kam Pok Road and Fairview Park Boulevard representing views from transient VSRs along Ngau Tam Mei Drainage Channel (VSR11) and Future Residents and Recreational Users of Planned Recreation Zone to the east of Fairview Park (PVS12A&B))

This vantage point (**Figures 11-12-15 and 11-12-16** refer), is located approximately 25m immediately adjacent to the proposed development. Low level views of these VSRs are open to Ngau Tam Mei Channel and dominated by vegetation alongside of Kam Pok Road and Ha San Wai Road. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the change of visual amenity of visitors to the Ngau Tam Mei Channel, vehicle travellers and pedestrians along Kam Pok Road.

The image shows the proposed development in an oblique angle in relation to the adjacent channelside landscape and demonstrates the effectiveness of the proposed landscape mitigation measures. Although unavoidable there is some visual intrusion of built structures in the views of these VSRs, the development mass will be soften through building setback, responsive building height profile and the retention of roadside amenity areas in front along Kam Pok Road. Landscape buffer reserved along Kam Pok Road will comprise of preserved trees and in-filled tree planting. In addition, tree transplanting allocated at the south-western corner of the site will create an instant screening effect to the development. Climbing plants proposed at the base of boundary wall will further soften the development mass. Upon full establishment of planting proposals, the potential visual impact on these VSRs will be alleviated to Insubstantial and proposed development will fit into the roadside and channelside landscape and visual context.

Vantage Point I

(Looking southeast towards the development site from a channel crossing connecting Yau Pok Road and Kam Pok Road representing views from transient VSRs along Ngau Tam Mei Drainage Channel (VSR11), Future Residents and Recreational Users of Planned Recreation Zone to the east of Fairview Park (PVS12), and permanent VSRs Residents of Fairview Park (VSR10).

This vantage point (**Figures 11-12-17 and 11-12-18** refer), is similar to vantage points A&B, and is located approximately 80m from the proposed development at Yau Pok Road across Ngau Tam Mei Channel. Pedestrians at Yau Pok Road and visitors to Ngau Tam Mei Channel have an open view of the proposed development and their low level views are dominated by roadside and channelside vegetation. Given that the VSRs in Fairview Park and planned recreational sites along Yau Pok Road are located at a lower elevation and their views are intervened by existing built structures and vegetation in their foreground, only partial views of the proposed development will be perceived. The view is at a relatively close distance and is taken at pedestrian level to demonstrate the potential change in the amenity of views available to visitors to the Ngau Tam Mei Channel, vehicle traveller and pedestrians along Yau Pok Road and Kam Pok Road, residents in Fairview Parks and Future users of a planned recreational site along Yau Pok Road. The image shows the proposed development in an oblique angle in relation to the adjacent channelside landscape and demonstrates the effectiveness of the proposed landscape mitigation measures.

Although unavoidable a few existing trees along the western periphery of the site required to be removed due to site formation and building works, compensatory tree will be in-filled along the landscape buffer to mitigate the impact.

The mitigation measures perceive in the image including responsive architectural design and building height profile and creation of landscape buffer along Kam Pok Road. Climbing plants will be added at the base of the boundary wall as to further soften the development mass. Low-rise development profile responds to its neighbourhood developments along Yau Pok Road. Upon full establishment of new tree planting in the landscape buffer in combination of preserved trees within the development site along Kam Pok Road, screening effect is apparent in this view. Upon full establishment of planting proposals, the potential visual impacts on these VSRs will be alleviated to Insubstantial and the channelside landscape and visual context will be enhanced by replacing visually detracting elements with residential landscapes.

11.12 Environmental Monitoring and Audit

The design, implementation and maintenance of landscape and visual mitigation measures should be checked to ensure that they are fully realised, thus EM&A for these mitigation measures should be undertaken. Design measures shall be incorporated at the detailed design stage. Implementation of the mitigation measures such as tree protection and preservation shall be monitored through site audit programme.

11.13 Impact Summary and Conclusion

11.13.1 Compatible with the Landscape Planning Framework

The proposed house development will have direct impact on a Residential (Group D) zone under S/YL-MP/6 Mai Po & Fairview Park OZP. There is no impact on adjacent zonings under S/YL-KTN/9 Kam Tin North, S/YL-NTM/12 Ngau Tam Mei and S/YL-NSW/8 Nam Sang Wai OZPs. The proposed development is low-rise and low-density residential developments which complied with the existing and planned land uses and planning intention. The proposal will not affect its viability in terms of being a landscape planning designation. The introduction of a high quality residential landscape in the Study Area assists the fading out of unpleasant uses in the New Territories. The proposed development is thus considered to be tolerable to the planning intention of the development control framework with full establishment of the

recommended landscape and visual mitigation measures. The proposed development is found integrated with the future outlook of the rural landscape context in combination with other planned low-rise residential and recreational developments along Ngau Tam Mei Channel. Section 16 planning application of the development scheme in this EIA has been approved by Town Planning Board on 7 February 2014.

11.13.2 Landscape Impact

Construction impacts on all affected landscape resources (LRs) and landscape character area (LCA) would be mitigated to moderate to slight level through the implementation of mitigation measures including preservation of existing vegetation, transplantation of existing trees, implementation of mitigation planting as early as technically feasible and selection of plant species which will enhance both landscape and ecological value of the site.

With the adoption of responsive design of architecture, noise barrier and associated utilities and built structures, tree preservation, full establishment of planting proposals inside the development site, creation of continuous landscape buffer/tree planting at the periphery of the development site, provision of landscape pond, and restoration of the disturbed areas, the residual impacts on the all affected landscape resources (LRs) would be slight to insubstantial impact significance (Yr10).

Impact on existing trees will be compensated by new tree planting with a replanting ratio of not less than 1:1 in terms of quantity and quality. Tree planting in landscaped gardens and landscape buffer will utilise both native and ornamental species with a combination of various planting stock sizes from heavy standard to light standard to create an instant and natural greening effect. Roadside trees provide thermal comfort of future residents and pedestrians. The retention of existing trees in-situ or through transplanting in combination with the establishment of the newly planted trees within the development form roadside amenity and residential landscape. Tree planting proposal will fully compensate the tree loss and provide new amenity trees where space allows enhancing the landscape, visual amenity and ecological value of the context. In combination of new tree planting and tree preservation, there will be a net gain of approximate 101 new trees within the Site.

In the wider landscape context, the existing open storage and warehouses landscape will be faded out. Planting proposal for the development creates an identity for the residential development and quality residential landscape will enhance the visual amenity along Ngau Tam Mei Channel. Given the above design approach, the proposed residential development will fit into the local low-rise residential and nullahside landscape context as well as the wider rural landscape context.

Proposed innovative and responsive design of houses and associated noise attenuation measures and utilities, creation of landscape buffer, pond and gardens and the introduction of extensive tree and shrub planting integrated with the preserved trees will serve to mitigate most of the potential adverse impacts. It is likely that upon full establishment of the proposed landscape mitigation measures and the growth to maturity of the proposed planting proposals, the proposed development will form a relatively small component within the future residential landscape context of Kam Pok Road (LCA5), will fit into its surroundings of planned residential and recreational developments, and thus considered to have a Insubstantial residual impact (Yr. 10) on this LCA.

In addition, there are many planned residential and recreational developments currently undertaken surrounding the site along the Ngau Tam Mei Channel. Although the proposed development do not have direct impact on the LCA1 Fairview Park Low-rise Extensive Residential Landscape, LCA2 Yau Pok Road Nullahside Rural Landscape and LCA3 Kam Pok Road Nullahside Rural Landscape, the change of local landscape character due to the above planned developments in combination with the proposed development in LCA5 will improve the landscape quality along the Channel, will enhance and benefit to the whole Study Area.

11.13.3 Visual Impact

As has been described above, the proposed development is located in a visual context pending for further house developments with planning intention of fading out the unpleasant open storage and warehouses in the New Territories replacing by high quality residential, village and recreational developments. The proposed development site, which is currently part vacant and partly occupied by car parking and was once occupied by open storage and warehouses, the provision of landscape areas within the development and the continuous landscape buffer/ tree planting surrounding the development will change the visual amenity following the completion of the construction phase of the house development from an visually unpleasant landscape to a quality residential landscape. It is compatible to future developments along the Channel. Key mitigation measures for the proposed development including the adoption of innovative and responsive design for the proposed houses and associated engineering structures, sewage treatment plant and noise barrier, responsive building disposition and height profile, creation of landscape buffer and green roof on built structures, creation of landscape areas within the development and preservation of existing roadside amenity areas and existing trees, will soften the development mass and enhance the visual amenity. As such the level of visual intrusion arising from the implementation of the proposed low-rise, low-density development will further mitigated by the proposed planting and greening proposals within the development and therefore the visual impact will be alleviated to an extent.

Due to the scale of the residential development, mitigation measures implemented during construction including preservation of existing trees, responsive hoarding, tidy site management and careful planning of the construction program, responsive construction method, the predicted level of impacts on the majority of VSRs would be alleviated to moderate to slight impact significance.

The visual amenity of VSRs in proximity to the development site, such as VSR 3 Vehicular Travellers and Pedestrians along Fung Chuk Road, VSR 5 Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road, VSR 7 Residents of Low-rise House Development along Ha San Wai Road and VSR 11 Vehicular Travellers and Pedestrians alongside Ngau Tam Mei Drainage Channel will experience a significant unmitigated impact with the implementation of the proposed development. This potential visual intrusion resulting from built structures will be alleviated to an extent through the responsive building disposition, building height profile, architectural and engineering design; and the restoration of the disturbed areas with new amenity tree and shrub planting within the development and in the continuous landscape buffer at the periphery of the site, and the use of green roof on the sewage treatment plant. These mitigations create high quality landscape areas for the enjoyment of future residents as well as provide an enhanced visual amenity in the wider context of the Ngau Tam Mei channelside rural and low-rise development context. Although these measures might not fully screen views of the built structures within the development, the measures will effectively soften the development mass and create a greater sense of visual integration to the overall landscape of Ngau Tam Mei. With the adoption of these measures, the potential significant impact to the visual amenity of these VSRs will be mitigated to moderate during operation phase (Day 1) and slight adverse during operation phase (Year 10).

The visual intrusion of the house development and noise barrier will be significantly reduced through the implementation of the proposed mitigation strategies and replaced visually detracting elements in the visual context. The moderate visual impacts on VSRs, including PVSR 1 Residents of Planned Low-rise House Development at Fung Chuk Road North, VSR 2 Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond, VSR 4 Villagers of Chuk Yuen Tsuen and Hang Fook Gardens, VSR 6.1 Workers of Warehouses and Open

Container Storage at Ha San Wai Tsuen, VSR 6.2 Villagers of Ha San Wai, VSR 8 Residents of Low-rise House Development along Fairview Park Boulevard, VSR 9 Vehicular Travellers and Pedestrians along Fairview Park Road South and VSR 10 Residents of Low-rise House Development at Fairview Park will be mitigated to an extent to slight during operation phase (Day 1) and insubstantial during operation phase (Year 10) following the full establishment of the recommended mitigation measures.

The implementation of the planned low-rise developments along the Ngau Tam Mei Channel in combination with proposed development under this EIA and their associated landscape enhancement within individual developments will fade out the unpleasant uses in the context and will benefit the visual quality and amenity of VSRs along the Channel including PVSR 12A Future Residents of Planned Recreation Zone to the east of Fairview Park and PVSR 12B Future Recreational Users of Planned Recreation Zone to the east of Fairview Park. Impacts on these VSRS will be mitigated to an extent to slight during operation phase (Day 1). Upon full establishment of the recommended mitigation measures including planting on the landscape buffer/berm will benefit to the visual amenity of these VSRs during operation phase (Year 10) of proposed development.

In accordance with Annex 10 of the EIAO-TM, the landscape and visual impacts as a result of the proposed development would be ‘acceptable with mitigation measures’ that is to say ‘there would be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures’.

Summary of Landscape and Visual Impact

ID	Sensitivity	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures*	Significance Threshold (Mitigated)	
		Construction Phrase	Operation Phrase	Construction Phrase	Operation Phrase		Construction Phrase/ Operation Phase Day 1 (Mitigated)	Operation Phrase Year 10 (Residual)
1.0 Key Landscape Resources (LRs) – Insubstantial to Slight residual impact significance								
LR3.5 Fung Chuk Road Roadside Amenity	Medium	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP3, CP4, OP1, OP2, OP6	Slight Adverse	Insubstantial
LR3.8 Kam Pok Road Roadside Amenity		Small	Small			CP1, CP3, CP4, OP1, OP2, OP6		
LR6.1 Ha San Wai Road North Fish Pond (Abandoned)	Low	Large	Large			CP3,OP2, OP7	Moderate Adverse	Slight Adverse
LR10.3 Ha Chuk Yuen Road Open Yards		Intermediate	Intermediate			CP3,OP1, OP2	Slight Adverse	Insubstantial
2.0 Key Landscape Character Areas (LCAs) – Insubstantial residual impact significance								
LCA5 Kam Pok Road Low-rise Residential Landscape	Low	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP3, CP4, OP1, OP2, OP5, OP6, OP7	Slight Adverse	Insubstantial

ID	Sensitivity	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures*	Significance Threshold (Mitigated)	
		Construction Phrase	Operation Phrase	Construction Phrase	Operation Phrase		Construction Phrase/ Operation Phase Day 1 (Mitigated)	Operation Phrase Year 10 (Residual)
3.1 Visually Sensitive Receivers (VSRs) - slight residual impact significance								
VSR 3 Vehicular Travellers and Pedestrians along Fung Chuk Road	Medium	Large	Large	Significant Adverse	Significant Adverse	CP1, CP2, CP5, OP3, OP4, OP5, OP6	Moderate Adverse	Slight Adverse Further to the establishment of tree preservation and transplanting proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.
VSR 5 Vehicular Travellers and Pedestrians along Ha Chuk Yuen Road						CP1, CP2, CP5, OP3, OP4, OP5, OP6		Slight Adverse Further to the establishment of tree preservation proposals and new tree planting proposals in the landscape buffer, the proposed development will be largely screened as in their original visual context.
VSR 7 Residents of Low-rise House Development along Ha San Wai Road						CP1, CP2, OP3, OP4, OP5, OP6		Slight Adverse Responsive design of the building height profile and massing and innovative design of noise barrier.
VSR 11 Vehicular Travellers and Pedestrians alongside of Ngau Tam Mei Drainage Channel						CP2, OP3, OP4, OP5		Upon full establishment of transplanting proposals in landscape area of Ha San Wai Road, visual impact will be alleviated

ID	Sensitivity	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures*	Significance Threshold (Mitigated)	
		Construction Phrase	Operation Phrase	Construction Phrase	Operation Phrase		Construction Phrase/ Operation Phase Day 1 (Mitigated)	Operation Phrase Year 10 (Residual)
3.2 Visually Sensitive Receivers (VSRs) – Insubstantial impact significance								
PVSR 1 Residents of Planned Low-rise House Development at Fung Chuk Road North	High	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3, OP6	Slight Adverse	Insubstantial
VSR 4 Villagers of Chuk Yuen Tsuen and Hang Fook Gardens						CP2, OP3,OP4,		
VSR 8 Residents of Low-rise House Development along Fairview Park Boulevard	Medium	Small	Small	Moderate Adverse	Moderate Adverse	CP2, OP3, OP4, OP5	Slight Adverse	Insubstantial
VSR 10 Residents of Low-rise House Development at Fairview Park		Intermediate	Intermediate			CP1, OP6		
VSR 2 Workers at Chuk Yuen Floodwater Pumping Station and Storage Pond	Low	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3,OP6	Slight Adverse	Insubstantial
VSR 6.1 Workers of Warehouses and Open Container Storage at Ha San Wai Tsuen						CP1, CP2, CP5, OP3,OP4, OP5, OP6		
VSR 6.2 Villagers of Ha San Wai						CP2, OP3, OP4, OP5, OP6		
VSR 9 Vehicular Travellers and Pedestrians along Fairview Park Road South						CP2, OP3, OP4, OP5		

ID	Sensitivity	Magnitude of Change		Significance Threshold (Unmitigated)		Mitigation Measures*	Significance Threshold (Mitigated)	
		Construction Phase	Operation Phase	Construction Phase	Operation Phase		Construction Phase/ Operation Phase Day 1 (Mitigated)	Operation Phase Year 10 (Residual)
3.3 Visually Sensitive Receivers (VSRs) – beneficial impact significance								
PVSR 12A Future Residents of Planned Recreation Zone to the east of Fairview Park PVSR 12B Future Recreational Users of Planned Recreation Zone to the east of Fairview Park	Medium	Intermediate	Intermediate	Moderate Adverse	Moderate Adverse	CP1, CP2, CP5, OP3, OP5, OP6	Slight Adverse	Slight Beneficial Responsive design of the building height profile and massing. Upon full establishment of tree preservation, transplanting and new planting proposals in the roadside landscape area of Kam Pok Road, visual impact will be alleviated

Note: Only key LRs, LCA and VSRs with impact as a result of proposed works are summarised in the table. Detail assessments refer to EIA Report Chapter11.

* Proposed Landscape and/or Visual Mitigation Measures

	Mitigation Code	Mitigation Measures	Landscape/Visual
Construction Phase	CP1	Preservation of Existing Vegetation	L/V
	CP2	Works Area and Temporary Works Areas	V
	CP3	Implementation of Mitigation Planting and Planting Species Selection	L
	CP4	Transplantation of Existing Trees	L
	CP5	Coordination with Concurrent Projects - Coordinated implementation programme with concurrent projects to minimise potential impacts and where possible reduce the period of disturbance.	V
Operational Phase	OP1	Roadside and Amenity Planting	L
	OP2	Compensatory Planting Proposals	L
	OP3	Responsive Design of Buildings	V
	OP4	Noise Mitigation Structures	V
	OP5	Design of Engineering Structure	L/V

	Mitigation Code	Mitigation Measures	Landscape/Visual
	OP6	Creation of Landscape Buffer	L/V
	OP7	Provision of Landscape Pond	L

12. SUMMARY OF ENVIRONMENTAL OUTCOMES

12.1 Introduction

Environmental impacts due to both construction and operation of the Project have been assessed in this EIA study. The assessment covers assessment area specified in the Project EIA study brief. Where necessary, mitigation measures have been recommended to alleviate any adverse environmental impact down to an acceptable level. Environmental outcomes of the Project are summarized in below paragraphs.

The proposed low density and low rise residential development will bring in environmental benefits to the area when compared with the existing car parking use and abandoned pond.

Environmental disturbance such as noise level, air quality and dust from the existing car park is relatively higher than that of the proposed residential development which is with less vehicular movement (particularly large-sized/ heavy vehicles). In fact, it is expected that there will be a decline in traffic flow during operation phase when compared with existing car parking operation (see **Section 8.8.3**). Hence, the Project will result in decline of disturbance of traffic to the surrounding areas.

The Project Site is currently utilized as car park and most areas are covered by bare concrete areas with low vegetation cover. With the implementation of landscape planting programme of the Project, the vegetation cover and green area in the Project Site will increase (coverage of green area of 30% of the total area of the Project Site is required for this Project).

12.2 Air Quality

Through implementation of dust control measures required under the Air Pollution Control (Construction Dust) Regulation; recommended specific measures in this EIA report; and good housekeeping practices by the works contractors, construction dust impacts upon surrounding ASRs can be controlled to an acceptable level. Practical mitigation measures have already been proposed for this Project to alleviate potential impacts. The concerned site formation works will be undertaken in stages and only be short-term and potential air quality impacts have been reduced to a minimal through recommended mitigation measures and can comply with the relevant air quality criteria/ AQOs. Thus, no adverse impact is anticipated. As a result, there is no residual impact.

During the construction phase, the concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. Potential odour impact is therefore not considered to be an issue. During the operational stage, appropriate precautionary measures (e.g. peripheral set back from the site boundaries) have been incorporated in the layout, which can satisfy the buffer distance requirements stated in the HKPSG for both active and passive recreational uses. No unacceptable air quality impact due to industrial emission is expected as no industrial emission source has been identified within the Assessment Area. The existing open storage site and an enclosed godown to the east of the Project Site are unlikely to have adverse air quality impact upon the development. Thus, no adverse air quality impact is anticipated.

Given the scale of the Project (for small houses development), there are no major planned dust generating or air pollutant emission sources from the proposed development that would contribute to any adverse impact on air quality. In addition, vehicular emission due to additional traffic generated/ attracted by this Project is found to be insignificant. Thus, the Project Site itself is unlikely to generate any air pollution nuisance.

During the operational phase, a licensed waste collector will be employed to collect domestic waste on daily basis and RCP will be provided for the residential development.

During the operational stage, an interim sewage treatment plant is proposed within the Project Site before connection to the public sewerage system becomes available. The interim sewage

treatment plant will be within a totally enclosed building with biological treatment, membrane filtration and Reverse Osmosis processes to be located underground. The exhaust will be directed away from nearby ASRs and odour removal system will be provided. With the careful design and effective odour removal filtering system, adverse odour impact due to operation of the interim sewage treatment plant is not anticipated.

12.3 Noise

The Noise Control Ordinance will be complied throughout the Project. The predicted traffic noise and industrial noise results at the NSRs of proposed development fully comply with the noise criteria with the proposed noise mitigation measures. With construction phase mitigation measures such as the use of quiet type equipment, movable and fixed temporary noise barriers as well as recommended best practices on construction sites, construction noise can comply with the relevant noise criteria. Potential visual impact of noise barrier and its design are also addressed (see Landscape and Visual Chapter).

With the layout shown in the MLP, the Project Site is not adversely affected by road traffic noise. It was found that with the provision of noise mitigation measures including noise barrier and placing noise tolerant use (i.e. STP) as well as those recommended for the proposed interim STP, no adverse noise impact is anticipated during operation of the Project. No adverse noise impact is expected due to the existing Chuk Yuen Floodwater Pumping Station, and no noise mitigation measure is needed.

12.4 Water Quality

The major impact during construction works of this Project is surface runoff and soil erosion due to exposed surfaces. Peripheral site drainage comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities together with those good site practices stipulated in ProPECC Note PN 1/94, have been recommended. Collected construction site runoff will be discharged into nearby existing stormwater drains, and via which into the NTMDC following the existing flow regime. With the adoption of the recommended good practices on-site, adverse water quality impact is not expected. The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence.

During operation, an interim sewage treatment plant will be used for treatment of sewage generated from the proposed development site until the public sewerage system becomes available. Treated effluent from the interim STP will be discharged to the adjacent NTMDC and it has demonstrated compliance with the no net increase in pollution loading requirement. Thus, no adverse water quality impact is anticipated. The discharge is also subject to EPD's discharge licence requirements.

Surface runoff from the development site will be discharged to the NTMDC. Pollutants, if any, will be pre-treated and settled before discharge. It was estimated that the increase in surface runoff due to this Project is negligible when compared with the design capacity of the NTMDC. Best Management Practices have been proposed in order to abate first flush pollution in stormwater runoff such as design measures to minimize soil erosion; design of drainage system to collect surface runoff; street level planting; selection of tree species; and control of application of fertilizer. In addition, screening facilities such as gully grating, trash frille, and road gullies with silt traps and oil interceptor will be incorporated into the drainage design to control pollution. Asides from the above, administrative measures such as regular cleaning and sweeping of road surface/ open area as well as stormwater gullies and ditches to remove pollution source by property management company, have also been recommended. With the recommended measures, there will be no unacceptable impacts to the water quality in the Deep Bay.

It is also recommended that emergency response plans to deal with inclement weather and emergencies for both construction and operation phases, will be developed.

Potential cumulative impacts due to construction and operation of nearby approved designated projects as well as planned development sites, have been assessed. All these identified concurrent projects will implement their own mitigation measures to ensure discharge can comply with the relevant WPCO as well as EIA requirements. Project-specific mitigation measures are also recommended for this Project to ensure construction site runoff is collected and treated before discharge. The discharge will be controlled through implementation of committed measures described in the respective EIA reports of those projects as well as those recommended in this Project. Further site inspections and regular water quality monitoring are also recommended to monitor the water quality level at nearby drainage channels during the construction phase of this Project, and Event and Action plan is proposed to rectify any deficiencies. Thus, no adverse cumulative impact is expected.

No residual impact is anticipated during the construction or operation of the Project.

12.5 Sewerage and Sewage Treatment

Sewage generated from the proposed development will be discharged into the planned trunk sewer at Kam Pok Road under PWP No. 4235DS, as permanent measure. The quantity of sewage effluent generated from the proposed development is relatively small amount when compared with the spare capacity of the downstream sewerage facilities. Thus, no adverse impact is anticipated.

An interim STP has been proposed for treatment of sewage generated from the proposed development site until the planned public sewerage system becomes available. The proposed development will not impose any adverse sewerage impact on the surrounding areas by co-treatment of water abstracted from existing Ngau Tam Mei Drainage Channel. The interim STP has been designed such that it can meet the no net increase in pollution loading requirement in Deep Bay. The discharge of treated effluent from the interim STP should follow the discharge licence requirements under the WPCO as well as the terms and conditions specified in the EP under the EIAO. Thus, the development is considered acceptable in sewerage terms.

With the proposed measures, adverse environmental impacts due to the long term and interim sewerage scheme are not anticipated. No adverse sewerage impact will be incurred as a result of the development.

12.6 Waste Management

No waste related regulatory non-compliance and unacceptable environmental impacts are expected to arise due to construction of proposed residential development. Waste management measures as well as control/ mitigation measures have been recommended during the construction accordingly.

The Project Site is vacant and partially used as open air car park. No historic and/ or existing land uses at the Project Site that would result in potential land contamination has been identified. Thus, land contamination at the Project Site is not expected.

Refuse collection chambers shall be provided and a licensed waste collector will be employed to collect domestic waste during the operational phase.

12.7 Ecology

The Project would cause loss of 3.17ha of urbanized/disturbed, 0.3ha of plantation and 0.33 ha of an abandoned pond. Due to the low ecological value of the abandoned fishpond, potential impact was ranked as minor. No corresponding mitigation is required and the residual impact is acceptable.

The Project would cause Moderate impact to birds utilisating the Ngau Tam Mei Drainage Drainage due to construction disturbance during construction phase. Runoff during construction phase will cause Low to Moderate Impact. Other potential impact during construction and operation phase is considered Insignificant. A number of mitigation measures will be implemented to minimize the potential impacts during both construction and operation phases. Utilisation of the section of Ngau Tam Mei Drainage Channel will be monitored between October and March during construction phase for evaluation of effectiveness of the recommended mitigation measures for minimization of construction noise and dust.

12.8 Fisheries

The Project would cause loss of 0.33 ha of an abandoned pond. Direct impact on fisheries due to the implementation of the Project was anticipated to be Insignificant. . Indirect impacts during construction and operation phases would also be insignificant.

12.9 Cultural Heritage

According to the assessment findings, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during construction and operational phase is anticipated.

The proposed development will not encroach upon any known sites of archaeological interest or areas of archaeological interest, and will not have any direct or indirect impacts on any declared monuments, graded or proposed graded historic buildings, cultural landscape features, graves or historical village during construction and operational phases.

12.10 Landscape and Visual

Proposed development will not lead to a degradation of the landscape setting of the area following full establishment of the recommended mitigation measures, on the contrary it is an improvement to the landscape setting along Ngau Tam Mei Channel. It will not affect its viability in terms of being a landscape planning designation. The introduction of high quality residential landscape within the development will assist the fading out of unpleasant open storage and warehouses in NT. Proposed development thus considered to be tolerable to the planning intention of development control framework with full establishment of recommended landscape and visual mitigation measures and hence they will be integrated with the future outlook of this rural, recreation and residential landscape context.

Residual impact significance on the affected LRs and LCAs during the construction phase will be alleviated to moderate to slight adverse levels with implementation of tree preservation and transplanting proposal and mitigation planting. With the implementation of responsive design of architecture, noise barrier and associated utilities in combination with full establishment of planting proposals within proposed development, on landscape buffer/berm/tree planting at periphery of the development site and on built structures, design of landscape pond and gardens, tree preservation proposal and restoration of the disturbed areas following the completion of the works during operation phase, the residual impact significance on all the affected landscape resources and Kam Pok Road Low-rise Residential Landscape Character

(Yr10) would be slight adverse to Insubstantial. The development proposals will replace the unpleasant open storage and warehouses along the Channel, enhance and benefit the existing landscape and visual quality of the whole Study Area.

This potential visual intrusion resulting from built structures will be alleviated to an extent through the responsive building disposition, building height profile, architectural and engineering design, and the restoration of the disturbed areas with planting proposals within the development, at the periphery of the site and on built structures. These mitigation measures create high quality landscape areas for the enjoyment of future residents as well as provide enhanced visual amenity in the wider context of Ngau Tam Mei channelside rural and low-rise development context. Although these measures might not fully screen views of built structures of the development, these measures will effectively soften the development mass and create a greater sense of visual integration and enhancement to the overall landscape of Ngau Tam Mei. With the adoption of these measures the potential significant to moderate adverse unmitigated impacts on the majority of VSRs will be mitigated to moderate to slight adverse (during construction phase/ Year 1 of operation phase) and slight adverse to Insubstantial (Year 10 of operation phase). By incorporating all the proposed visual mitigation measures, the Project will slightly beneficial to the visual context and quality of some VSRs at planned residential and recreational developments adjacent to the Site.

The planting proposal in proposed gardens and landscape buffer, which will utilise a combination of native and ornamental species, in addition bird-attracting and butterfly-attracting plant species will be introduced within and surrounding the landscape pond to enhance the landscape and ecological value of the Site. For example, plants producing berry will enhance the food resources of birds. Nectar plants will also provide food resources for butterflies. Both fauna groups will benefit from landscape planting. The planting of trees will also provide roosting habitats for birds. There would be improvement in the environmental condition considering that the Project Site only supports low plant diversity and covered by mainly exotic species (including the invasive plant *Leucaena leucocephala*) in existing condition.

There will be a landscape pond (wet garden) within the Project Site during operation phase. Similarly, it will enhance the amenity and landscape value by planting a combination of native and ornamental, bird-attracting and butterfly-attracting plant species within and surrounding the pond area. Fauna, including birds and butterflies, living in the surrounding areas may extend their livelihood activities to the proposed water body and planting area.

13. ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

13.1 Overview

A detailed EM&A Manual has been prepared for this project as required under the Study Brief and in accordance with Annex 21 of the EIAO-TM. The following sections provide a summary of the need for monitoring and auditing of the individual environmental aspects. Details of which are also provided in the Project EM&A Manual.

In the course of EIA study, no significant adverse residual impacts on air quality, noise aspect, water quality, sewerage, waste management, ecology and fisheries, and landscape and visual aspects are identified with the proposed mitigation measures in place. It is expected that the relevant standards/ guidelines can be complied with after the proposed mitigation measures. Regular monitoring as well as site inspections and audits have been recommended for the Project to ensure the effectiveness of the proposed mitigation measures. Given the findings of EIA study, it is proposed that real-time monitoring and reporting is not needed for this Project.

13.2 Air Quality

Although the Project is not expected to generate excessive dust during construction, an EM&A program including regular air quality monitoring is recommended to ensure compliance with relevant air quality criteria during the Project construction phase, and the proper implementation of mitigation measures. The corresponding implementation schedule is tabulated in **Table 14-1**.

The EM&A program will include monitoring on air quality level during the Project construction phase, and the implementation of good practices by the works contractor. Details of the EM&A requirements are provided in the Project EM&A Manual.

No particular monitoring is required during the Project operational phase.

13.3 Noise

According to the construction noise assessment results, with implementation of proper noise mitigation measures, no residual noise impact is expected. The type of noise mitigation measures and their implementation schedule are tabulated in **Table 14-1**. EM&A programme would be required for the Project construction works, which is detailed in the Project EM&A Manual.

Operational phase noise impacts due to road traffic noise levels and that from fixed noise sources have been examined. As the predicted noise levels can comply with the relevant noise criteria with the precautionary measures in place, no further noise mitigation measures are considered to be necessary and no residual noise impact is anticipated. The concerned precautionary measures that need to be considered during the detailed design are tabulated in **Table 14-1.**

13.4 Water Quality

A water quality monitoring and site auditing programme has been proposed during construction phase, which is included in the EM&A Manual to ensure that mitigation measures will be implemented to protect the water bodies in the sensitive area.

Through the implementation of EM&A programme, effectiveness of recommended mitigation measures will be assessed and the water quality will be monitored to ensure the relevant water

quality criteria can be complied with and that the water quality at the nearby sensitive receivers would not deteriorate.

13.5 Sewerage and Sewage Treatment

There is currently no existing public sewerage system in vicinity of the Project Site. The Project will be connected to the planned public sewer as permanent scheme. Operation and maintenance requirements of the interim sewage treatment plant have also been provided in the EIA and included in the EM&A Manual. With these measures in place, no adverse sewerage impact will be envisaged as a result of the Project. Nevertheless, specific monitoring requirements have been proposed to monitor and implementation of the interim STP and its performance, which will also be licensed under the WPCO and implemented under the EP conditions of the Project. The water quality at Ngau Tam Mei Drainage Channel will also be monitored regularly. The satisfaction of no net increase in loading will be reviewed annually. The EM&A programme is detailed in the Project EM&A Manual.

13.6 Waste Management

No unacceptable environmental impacts are expected as a result of handling, storage, transportation and disposal of construction waste arising from the proposed development or due to operation of the Project. Details of the recommended mitigation measures are described in Chapter 14.

An EM&A programme is recommended to be in place to check that the waste generated from the construction site are being managed in the accordance with the recommended procedures. The programme is detailed in the Project EM&A Manual. No specific EM&A requirements is recommended during the operational phase.

13.7 Ecology

Ecological monitoring of utilization of the section of Ngau Tam Mei Drainage Channel within the Assessment Area by birds between October and March during construction phase is proposed. Baseline surveys will be conducted prior to the site construction work. Observations during construction phase monitoring will be compared against the baseline data, and the effectiveness of the recommended mitigation measures will be evaluated. Regular site audit will be conducted for checking the implementation of the proposed good site practice.

13.8 Fisheries

As no significant fisheries impact is anticipated. Other than the water quality monitoring programme at nearby water courses/ channels during the construction phase, no specific fisheries EM&A programme would be required during the construction and operation phases of the Project.

13.9 Cultural Heritage

According to the assessment findings, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during construction and operational phase is anticipated.

The proposed development will not encroach upon any known sites of archaeological interest or areas of archaeological interest, and will not have any direct or indirect impacts on any declared monuments, graded or proposed graded historic buildings, cultural landscape

features, graves or historical village during construction and operational phases. No specific EM&A requirement is considered necessary.

13.10 Landscape and Visual

Tables 11-13 to **11-16** have recommended that EM&A for landscape and visual resources is undertaken during the design, construction and operational phases of the project. The design, implementation and maintenance of landscape mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape measures and any other works of the Project would be resolved as early as practical without affecting the implementation of the mitigation measures.

The proposed mitigation measures for landscape and visual impacts are **summarised in** Table 14-1 Implementation Schedule of Recommended Mitigation Measures and shown on **Figures 11-11-1 to 11-11-23**. These measures proposed will be incorporated in the detailed landscape, building and engineering design during design phase. The construction phase mitigation measures will be adopted and audited from the commencement of construction throughout the entire construction period. Mitigation measures for the operational phase will be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

14. PROJECT IMPLEMENTATION SCHEDULE

14.1 Proposed Infrastructure and Mitigation Measures

Based on the findings of this EIA, temporary fixed noise barriers together with other noise mitigation measures have been proposed during the construction phase in order to alleviate construction noise impact. The proposed construction phase noise mitigation measures have been summarised and presented in **Figure 4-3A**. During the operational phase, noise barriers have been proposed along the eastern site boundary to alleviate operational noise sources to the east, which are shown in **Figure 4-9**.

All domestic sewage generated at the Project will be discharged to the planned public sewerage. An interim sewage treatment plant will be provided if the planned public sewerage is not available at the time of occupation. The interim sewage treatment plant will be inside a totally enclosed building and there will be no net increase of pollution loading during operation of the interim sewage treatment plant (Sections **1.1**, **6.9**, **6.11**, and **6.12** refer).

In addition, other mitigation measures have also been proposed for both the construction and operational phase of the Project and are presented in the respective chapters of this EIA report. The implementation schedules for the recommended mitigation measures for each environmental aspect covered in this EIA are also tabulated below as appropriate.

14.2 Responsibility for Fundings, Implementation, Management and Maintenance of Mitigation Measures

The Project Proponent will be responsible for funding and implementation of all the mitigation measures, while the operation and maintenance will be carried out by the future property management company and the Incorporated Owners. The Project Proponent would assume the responsibilities of all the mitigation measures contained in the EIA report until an agreement is reached between the Project Proponent and relevant parties on the funding, implementation, management and maintenance of mitigation measures.

Table 14-1 Implementation Schedule of Recommended Mitigation Measures

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
Air Quality						
During Construction Phase:						
3.9.1	4.9.2	Good site management practices are important in reducing potential air quality impacts. As a general guidance, the contractor shall maintain high standard of housekeeping to prevent emission of fugitive dust emission. Loading, unloading, handling and storage of fuel, raw materials, products, wastes or by-products should be carried out in a manner so as to minimise the release of visible dust emission. It is recommended that the active works areas within the construction site to be watered regularly during the construction period so as to supress dust emission effectively.	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control (Construction Dust) Regulation
3.9.1	4.9.3	The speed of the trucks travelling on haul roads within the Project Site to be controlled at 10 kph in order to reduce dust impact and for safe movement around the Project Site. Any piles of materials accumulated on-site to be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas to be carried out in a manner without generating fugitive dust emissions. The material to be handled properly to prevent fugitive dust emission before cleaning.	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control (Construction Dust) Regulation
3.9.1	4.9.4	If concrete batching is required on-site, the plant should be cleaned and watered regularly as a good practice. Cement and other fine grained materials delivered in bulk should be stored in enclosed silos fitted with high level alarm indicator. Wet mix batching process is preferred over dry mix batching. In addition,	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		concrete batching plant shall comply with the specified process (SP) licence requirements including specified emission limits and dust control measures.			construction period	(Construction Dust) Regulation
3.9.1	4.9.5	All the relevant dust control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* would be fully implemented:	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control (Construction Dust) Regulation
3.9.1	4.9.5	• The designated haul road should be hard paved to minimize fugitive dust emission; • During the site formation works, the active works areas should be water sprayed with water browser or sprayed regularly during the construction period. The Contractor(s) should ensure that the amount of water spraying is just enough to dampen the exposed surfaces without over-watering which could result in surface water runoff; • Dump trucks for material transport should be totally enclosed using impervious sheeting; • Any excavated dusty materials or stockpile of dusty materials to be covered by impervious sheeting or sprayed with water so as to maintain the entire surface wet, and recovered or backfilled or reinstated as soon as practicable; • Dusty materials remaining after a stockpile is removed should be wetted with water; • The area where vehicle washing takes place and the section of the road between the washing facilities and the	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		exit point should be paved with e.g. concrete, bituminous materials or hardcore or similar; • The Contractor(s) shall only transport adequate amount of fill materials to the Project Site to minimise stockpiling of fill materials on-site, thus reducing fugitive dust emission due to wind erosion; • Should temporary stockpiling of dusty materials be required, it shall be either covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides; or sprayed with water so as to maintain the entire surface wet;				
3.9.1	4.9.5	• All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet; • Vehicle speed to be limited to 10 kph except on completed access roads; • The portion of road leading only to a construction site that is within 30 m of a designated vehicle entrance or exit should be kept clear of dusty materials; • Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites; • The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • The working area of excavation should be sprayed with water before, during and after (as necessary) the works so as to maintain the entire surface wet;	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	Annex 4 and Annex 12 of EIAO -TM, Air Pollution Control (Construction Dust) Regulation
3.9.1	4.9.5	• Use of effective dust screens, sheeting or netting to be provided to enclose dry scaffolding which may be provided from the ground floor level of the building or if a canopy is provided at the first floor level, from the first floor level, up to the highest level (maximum four floors for this Project) of the	Air Quality (fugitive dust) Control during	Contractors	At all construction areas of the site during the entire	Annex 4 and Annex 12 of EIAO -TM, Air Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		scaffolding where scaffolding is erected around the perimeter of a building under construction.	Construction Phase		construction period	Control (Construction Dust) Regulation
3.9.1	4.9.6	In order to minimize potential fugitive dust impacts, the site formation works should be carried out in stages. Regular site watering will be applied within the construction site in order to effectively supress dust emission, and that dusty materials will be properly covered to prevent wind erosion. Works area shall be properly covered at the end of working day to minimize wind erosion.	Air Quality (fugitive dust) Control during Construction Phase	Contractors	At all construction areas of the site during the entire construction period	EIA
3.9.1	4.9.7	The concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. However, in case pond sediment is involved during construction at the abandoned pond area, the following precautionary measures are proposed:	Odour control during construction	Contractors	During construction at the abandoned pond (in case pond sediment is involved during construction)	EIA
3.9.1	4.9.7	• Exposed surface shall be filled by filling materials; • Malodorous material, if any, should be placed as far as possible from any ASRs; • Malodorous materials should be covered by plastic tarpaulin sheets; and • Regular odour patrol to examine the effectiveness of the above control measures.	Odour control during construction	Contractors	During construction at the abandoned pond (in case pond sediment is involved during construction)	EIA
During Operational Phase:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
3.9.2	4.10.6	During operation, RCP will be provided for the residential development. A licensed waste collector shall be employed to collect domestic waste on daily basis.	Odour control during operation	Project Proponent	During operational stage	EIA
3.9.2	4.10.3, 4.10.2	During the operational stage, an interim sewage treatment plant is proposed within the Project Site before connection to the public sewerage system becomes available. Detailed design of the interim STP has yet been carried out, but the interim sewage treatment plant will be within a totally enclosed building with biological treatment, membrane filtration and Reverse Osmosis processes to be located underground. The concerned facility will only be temporary and will be carefully planned such that the brine disposal during maintenance (a potential odour source) will be away from the residential area as much as possible and will be close to the vehicular access connecting the nearby road.	Odour control during operation	Project Proponent	During operational stage	EIA
3.9.2	4.10.4	The STP will be equipped with odour removal system (with an odour removal efficiency of not less than 99.5%). In addition, the exhaust of the STP will be directed away from nearby ASRs.	Odour control during operation	Project Proponent	During operational stage	EIA
3.9.2	4.10.8	In terms of vehicular emission impacts, the required minimum separation distance between air quality sensitive uses of this Project and the edge of nearby roads surrounding the Project Site should be >5m as stipulated in Chapter 9 of HKPSG. The current proposed development (with separation distance of 7m to over 104m between air quality sensitive uses of this Project and the edge of nearby roads surrounding the Project Site) can satisfy the above-mentioned minimum separation distance (**Figure 3-1** refers).	Vehicular emission during operation	Project Proponent/ Project architect	During operational stage	EIA, HKPSG
Noise Quality						
During Construction Stage:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
4.8.2 & 4.8.1	5.7.3, 5.7.4, & 5.7.6	EPD's quality powered mechanical equipment (QPME) inventory is reviewed and proposed to be used wherever possible as a noise mitigation measure. The Contractor of this Project should diligently seek equivalent models of quiet/ silenced PMEs. Asides from QPMEs mentioned above, additional noise mitigation measures in terms of movable noise barriers are also proposed. Movable noise barriers are proposed to shield construction plants. The movable noise barriers should have sufficient surface density of at least 10 kg/m^2 or material providing equivalent acoustic performance to block the line of sight from the sensitive receivers. There should not be any gaps and openings at the noise barriers to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineer's Representative (ER) and the Environmental Team in accordance with the Project EM&A Manual.	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.
4.8.3	5.7.11	It is also recommended that good housekeeping activities shall also be carried out to further minimise the potential construction noise impact, and these are summarised below. The following good site practices are also recommended for incorporation into the contractual requirements:	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.
4.8.3	5.7.11	• Before the commencement of any work, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures intended to be used at the Project Site; • Contractor shall comply with and observe the Noise Control Ordinance (NCO) and its current subsidiary regulations;	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• Contractor shall devise and execute working methods that will minimise the noise impact on the surrounding environment; and shall provide experienced personnel with suitable training to ensure that these methods are implemented; • Only well-maintained plants should be operated on-site; • Plants should be serviced regularly during the construction programme; • Machines that may be in intermittent use should be shut down or throttled down to a minimum between work periods; • Silencer and mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;				
4.8.3	5.7.11	• Noisy activities can be scheduled to minimise exposure of nearby NSRs to high levels of construction noise. For example, noisy activities can be scheduled for midday or at times coinciding with periods of high background noise (such as during peak traffic hours); • Noisy equipment such as emergency generators shall always be sited as far away as possible from noise sensitive receivers; • Provision of mobile noise barriers in adjacent to construction plants, piling machine, or provision of acoustic screens by the Contractor(s); • Mobile plants should be sited as far away from NSRs as possible;	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• Material stockpiles and other structures should be effectively utilised as noise barrier, where practicable; • The contractor(s) is also encouraged to arrange construction activities with care so that concurrent construction activities are avoided as much as possible. The contractor(s) should closely liaise with the school so that noisy activities are not undertaken during school's examination period. With the above noise mitigation measures in place and good site practices, residual noise impact at the school would be temporary and unacceptable noise impact is not expected;				
4.8.3	5.7.11	• EM&A will be carried out for this Project during the Project construction phase in order to monitor the construction noise level and to verify the effectiveness of the noise mitigation measures. A Project Environmental Team will be formed as part of the Project EM&A works, which will closely monitor contractor(s)' performance and the residual noise level at the school. Should unacceptable construction noise level be identified during the construction noise monitoring, necessary actions following the standard Event and Action Plan specified in the Project EM&A Manual, will be required by the Project Environmental Team.	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.
4.9.4	5.7.7 to 5.7.10	Since site hoarding will be erected along the site boundary, the proposed temporary fixed noise barriers may be combined with the site hoarding. It is proposed that 3m tall temporary fixed noise barrier would be required along the western site boundary in order to shield N8 (i.e. the Bethel High School) from construction site of this Project. Figure 4-8 of EIA report refers. It shall be noted that these proposed temporary fixed noise barriers are only required when this Project is constructed concurrently with the nearby approved EIA projects (namely, the	Noise control during construction	Contractors, ER	Construction areas near the specified locations during the construction period	EIA, Contractual requirements, Annex 5 and Annex 13 of EIAO-TM.

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		approved cycle track project; the approved public sewerage project). The exact alignment and design of these temporary noise barriers is subject to the contractor(s) and the prior approval from the Engineer's Representative (ER). To minimize potential impact, erection of temporary fixed noise barriers will be carried out section by section and precast units will be used for the foundation of the noise barrier. These noise barriers shall be erected before the commencement of construction works of this Project. The temporary fixed noise barriers should have sufficient surface density of at least 10 kg/m^2 or material providing equivalent acoustic performance. There should not be any gaps and openings at the noise barriers and site hoardings to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineer's Representative (ER) and the Environmental Team in accordance with the Project EM&A Manual				
During Operational Phase:						
4.4.3, 4.8.4	5.8.3, 5.8.2	The permissible SWL of STP is 74dB(A). According to the approved "EIA and TIA Studies for the Stage 2 of PWP Item No. 215DS-Yuen Long and Kam Tin Sewerage and Sewage Disposal", maximum permissible SWLs at louvre of sewage pumping station are reported to be in the range of 64 – 74dB(A) by the same noise mitigation measures such as acoustic silencer and enclosure. During detailed design, the acoustic performance of the STP should be reviewed and acoustic treatments such as provision of acoustic silencer and acoustic enclosure shall be proposed so that the SWL of STP should be 74dB(A) or below in order to meet the noise criteria.	Noise control during operation at STP	Project architect and Project Proponent	During detailed design stage and operation	EIA, Noise Control Ordinance

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
4.8.4	5.8.1	Given to the site condition and the presence of industrial noise sources in adjacent to the Project Site and the proposed interim STP, proactive noise protection measures have already been incorporated into the design of the proposed development, which include setback from Kam Pok Road, placing noise tolerant uses such as the proposed STP (with 10.4mPD at roof level) between the proposed house and the industrial noise source; a noise barrier along the remaining eastern site boundary with a minimum 4.5m tall solid boundary wall; and recommended noise mitigation measures for the proposed interim STP (as mentioned above). The locations of the above-mentioned noise barriers and noise tolerant uses as proactive measures are shown in **Figure 4-8.**	Noise control during operation	Project architect and Project Proponent	During detailed design stage and operation	EIA, Noise Control Ordinance
Water Quality						
During Construction Phase:						
5.5	6.3.3	The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence. Contractor(s) of this Project is required to submit a Construction Phase Drainage Management Plan with details such as design of the temporary site drainage system; wastewater treatment facilities; and maintenance of drainage system for the approval of the Engineers Representative (ER) and the Environmental Team in order to ensure that the mitigation measures are in place.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		The concerned drainage management plan should include recommended mitigation measures as well as best practices listed out in the EM&A Manual.				
5.5	6.3.4	The Drainage Management Plan and recommended mitigation measures and best practices shall be implemented by the Contractor(s) and inspection shall be carried out regularly (e.g. weekly) by the Engineer's Representative (ER), and Environmental Team (ET) in order to ensure all mitigation measures are effectively implemented, in particular to ensure that no off-site spillage of runoff from the project site. Any deficiencies identified shall be timely rectified by the Contractor(s).	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	The BMPs given in the ProPECC PN 1/94 shall be implemented in controlling water pollution during the whole construction phase. The main practices provided in the above-mentioned document (i.e. ProPECC PN 1/94) are also summarized in the following paragraphs which should be implemented by the contractor during the construction phase, where practicable :	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• High loading of suspended solids (SS) in construction site runoff shall be prevented through proper site management by the contractor;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• The boundary of critical work areas shall be surrounded by ditches or embankment. Accidental release of soil or refuse into the adjoining land should be prevented by the provision of site hoarding or earth bunds, etc. at the site boundary.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire	ProPECC PN1/94, Water Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		These facilities should be constructed in advance of site formation works and roadworks;			construction period	Control Ordinance
5.5.1	6.3.5	• Consideration should be given to plan construction activities to allow the use of natural topography of the Project Site as a barrier to minimise uncontrolled non-point source discharge of construction site runoff;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Temporary ditches, earth bunds should be provided to facilitate directed and controlled discharge of runoff into storm drains via sand/ silt removal facilities such as sand traps and sedimentation basins. Oil and grease removal facilities should also be provided where appropriate, for example, in area near plant workshop/ maintenance areas; • Sedimentation basins and sand traps designed in accordance with the requirements of ProPECC Note PN 1/94 should be installed at the construction site for collecting surface runoff;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Sand and silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly by the contractor, and at the onset of and after each rainstorm to ensure that these facilities are functioning properly;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Slope exposure should be minimised where practicable especially during the wet season. Exposed soil surfaces should be protected from rainfall through covering the temporary exposed slope surfaces or stockpiles with tarpaulin or the like;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
5.5.1	6.3.5	• Haul roads should be protected by crushed rock, gravel or other granular materials to minimise discharge of contaminated runoff;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Slow down water run-off flowing across exposed soil surfaces;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Plant workshop/ maintenance areas should be bunded and constructed on a hard standing. Sediment traps and oil interceptors should be provided at appropriate locations;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Manholes (including newly constructed ones) should be adequately covered or temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Construction works should be programmed to minimise soil excavation works where practicable during rainy conditions;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire	ProPECC PN1/94, Water Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
					construction period	Control Ordinance
5.5.1	6.3.5	• Chemical stores should be contained (bunded) to prevent any spills from contact with water bodies. All fuel tanks and/ or storage areas should provide with locks and be sited on hard surface;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Chemical waste arising from the Project Site should be properly stored, handled, treated and disposed of in compliance with the requirements stipulated under the Waste Disposal (Chemical Waste) (General) Regulation;	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Drainage facilities must be adequate for the controlled release of storm flows.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.1	6.3.5	• Vehicle wheel washing facilities should be provided at the site exit such that mud, debris, etc. attached to the vehicle wheels or body can be washed off before the vehicles leave the work site.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, WPCO, EIA, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
5.5.1	6.3.5	• Section of the road between the wheel washing bay and the public road will be paved to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, WPCO, EIA, Contractual requirements
5.5.1	6.3.5	• Bentonite slurries, if any to be generated, shall be reconditioned and reused as far as practicable. Spent bentonite should be kept in a separate slurry collection system for disposal at a marine spoil grounds subject to obtaining a marine dumping licence from EPD. If used bentonite slurry is to be disposed of through public drainage system, it should be treated to meet the respective applicable effluent standards for discharges into sewers, storm drains or the receiving waters	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, WPCO, EIA, Contractual requirements
5.5.1	6.3.5	• Appropriate peripheral drainage system shall be constructed along the Project Site boundary to divert away surface runoff in accordance with requirements stipulated in ProPECC PN 1/94 in order to collect surface runoff and discharge it into the nearby existing stormwater drains, and via which into the existing NTMDC	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, WPCO, EIA, Contractual requirements
5.5.1	6.3.5	• Temporary drains, sedimentation basins, sand traps and similar facilities shall be provided during the construction works in accordance with the ProPECC PN 1/94.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, WPCO, EIA, Contractual requirements
5.5.1	6.3.5	• Sewage generated from the construction workforce should be contained in chemical toilets before connection to public foul sewer becomes available. Chemical toilets should be provided at a minimum rate of about 1 per 50 workers. The	Sewage and Non-point Source Pollution Control	Contractors	At all construction areas of the site	ProPECC PN1/94, Water Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		facility should be serviced and cleaned by a specialist contractor at regular intervals;			during the entire construction period	Control Ordinance
5.5.1	6.3.5	• Spillage of fuel oils or other polluting fluids should be prevented at source. It is recommended that all stocks should be stored inside proper containers and sited on sealed areas, preferably surrounded by bunds.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.2	6.3.7	During construction, temporary drains, peripheral site drainage comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities will be provided along the Site boundary. **Figure 5-3** of EIA report shows the indicative site drainage during construction phase. The construction of water extraction facility for interim STP should be carried out in dry season so that to avoid affecting water quality at the channel. Silt curtain or sand bags should be provided to carve out the working area so as to bypass the channel flow and to avoid any solids/materials arising from the construction activities from entering the channel during construction phase. The work sites at the NTMDC for construction of water abstraction facilities should be maintained in dry conditions. Regular visual inspections should also be carried out by the Environmental Team and Contractor to ensure there is no spillage into the channel.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.2	6.3.8	The existing abandoned pond will be filled up by imported fill materials. The pond sediment is intended to be left in place and not to be disturbed as far as possible. However, in case any sediment is encountered during construction, preventative measures are proposed. Temporary access roads of Project Site should be protected by crushed stone or gravel. Offsite disposal should be avoided and pond sediment should be re-used on-site. For the purpose of prevention of soil erosion, temporary exposed surfaces should be covered by tarpaulin	Non-point Source Pollution Control	Contractors	During construction at existing abandoned pond	ProPECC PN1/94, Water Pollution Control Ordinance

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		sheets to prevent materials from washing away. Appropriate site drainage should be provided, as part of the construction phase drainage system, to ensure surface runoff is properly collected and treated and there should be no spillage to offsite location. In addition, intercepting channels should be provided along the edge of pond to divert surface runoff away from this pond and to prevent storm runoff from washing across exposed surfaces (Figure 5-3 refers). Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.				
5.5.2	6.3.9	As the concerned existing abandoned pond will be filled up to the proposed site formation level during construction, remaining water in the pond will be absorbed by soakaway mechanism and no discharge to off-site location is expected. Site drainage should be provided around the existing abandoned pond to divert surface runoff away from this pond during pond filling. Draining of pond water and discharge to surrounding area should be avoided as far as possible.	Stormwater and Non-point Source Pollution Control	Contractors	During construction at the existing abandoned pond	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.2	6.3.9	In case there is still surplus pond water, the pond water will be on-site re-used for the construction activities such as dust suppression and wheel washing facilities to minimize the water consumption of project as well as the volume of pond water that needs to be handled. In case there is a need for disposal, on-site treatment should be proposed by the Contractor(s) and the discharge of treated effluent will be subject to agreement with EPD and DSD, where necessary. The contractor(s) will be required to properly treat the water on-site with the quality of the treated water complying with the requirement of the discharge license to be issued by the EPD.	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire construction period	ProPECC PN1/94, Water Pollution Control Ordinance
5.5.3	6.3.10	During construction period, in order to better control potential water pollution due to site runoff during inclement weather and	Stormwater and Non-point Source Pollution Control	Contractors	At all construction areas of the site during the entire	ProPECC PN1/94, Water Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		emergencies, the Contractor(s) will be required to prepare and implement an Emergency Response Plan (ERP). As a general indication, the ERP should include but not limited to the design of drainage facilities/ system; maintenance of drainage system; recommended measures and best practices identified in the EIA study; an event and action plan during inclement weather and emergencies condition; emergency procedures and emergency contact details; and responsibility of relevant parties and follow up actions. In particular, the plan should provide details of procedure and actions required both before and after forecasted rainstorm such as checking/ inspection before onset of rainy season/ rainstorm that all drains are cleared from blockage and functioning properly; checking standby plant and equipment are ready for use; frequency of updating weather conditions; persons who will implement the measures and follow up actions; ensuring easily loose construction materials are well covered; more frequent inspection and cleansing preferably before and after every rainstorm event. In case of severe weather condition, upon the instruction from the Engineer's Representative (ER), to stop works for the sake of safety reasons.			construction period	Control Ordinance
During Operational Phase:						
5.6.1	6.3.12, 6.3.13	All domestic sewage generated will be discharged to the public sewerage system via a proposed rising main from the Project Site. The discharge from the club house and swimming pool shall apply for a discharge licence under the WPCO, and the discharge shall comply with the terms and conditions of a licence and the standards for effluents specified in the licence, as well as conditions in Environmental Permit.	Sewage Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain.	During operation	EIA, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
5.6.1	6.3.14, 6.3.12	An interim STP will be proposed with discharge of the treated effluent to the adjacent NTMDC in case the public sewerage is not available when the Project is in operation. Samples of treated effluent will be taken regularly and tested according to the discharge licence under the Water Pollution Control Ordinance to ensure compliance with discharge standards as well as conditions in Environmental Permit of this Project under the EIAO.	Sewage Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
5.6.1	6.3.14	The proposed interim sewerage system will be designed in such a way to facilitate the future connection to the planned Ngau Tam Mei sewerage system with the flow direction to be controlled by several flow control devices such as valves or stop-log, etc. The interim STP will be decommissioned and converted to a sewage pumping station once the trunk sewer becomes available for connection. Small amount of residual sewage left in the interim STP would be tankered away. No sewage will be discharged into the nearby water body during decommissioning of the interim STP.	Sewage Pollution Control	Project Proponent to implement	During operation	EIA, Contractual requirements
5.6.1	6.3.15	Precautionary measures have also been proposed in Section 6.12 and 6.6 of EIA report to deal with sewage overflow, emergencies discharge, and change in flow regime. In addition, equalization tank will be provided in the STP for temporary storage of sewage in case of outage of the interim STP, and tank away will be provided for proper disposal at designated sewage treatment works to be assigned by DSD	Sewage Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
5.6.2	6.3.16	Best Management Practices (BMPs) have been proposed for the development, which are summarised and grouped under the following categories: *Design Measures* • Exposed surface shall be avoided within the proposed development to minimize soil erosion. Development site shall be either hard paved or covered by landscaping area where possible.	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• The landscaped open area should be managed and maintained by the property management company (and its contractor) during operation. • Paved area of development has been minimized by a simpler and more effective internal road layout, at which proposed houses are allocated on both sides of the road. Thus hard paved area of internal access road as well as increase in surface runoff, can be minimized; • The roadside channel surrounding the Project Site will be retained to maintain the original flow path. The drainage system will be designed to avoid flooding;				
5.6.2	6.3.16	• Drainage system of the development shall be designed in such a way that surface runoff from the residential area is directed towards the internal access road, where appropriate drainage system with control facilities have been proposed. Additional paved U-channels with screening facilities are also provided along site boundary to avoid uncontrolled spillage of runoff. • Street level tree planting should be introduced along roadside of internal access road, which can help to reduce soil erosion and as a buffer zone between the residential area and the drainage system along roadside. • Broadleaf and evergreen species, which in general generate relatively smaller amount of fallen leaves, should be selected where possible (e.g. at landscape berm at the periphery of the site). • Fertilizer will only be applied on landscape area when needed. If required, the fertilizer should be applied in early Spring and in later summer in order to avoid major rainy	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		season as far as possible. Slow release fertilizer should be selected as far as possible to minimize the amount of nutrient to be washed out by rain. Application of fertilizer should not be arranged before forecasted heavy rainfall, and over dosing should be avoided. Application of fertilizer should be managed by an experienced contractor through the property management company.				
5.6.2	6.3.16	*Devices/ Facilities to Control Pollution* • Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system as well as at upstream location of the u-channels. • Road gullies with standard design and silt traps and oil interceptors should be incorporated during the detailed design to remove particles present in stormwater runoff. • Drainage outlet of any covered car park should be connected to foul sewers via petrol interceptors or similar facilities.	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
5.6.2	6.3.16	In the event of emergency (e.g. car accident) where there is a major spillage of oil, chemical or fuel, dispersants or firefighting foam, etc., a system of contaminant bunding will be implemented as appropriate.	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
5.6.2	6.3.18	Good management measures such as regular cleaning and sweeping of road surface/ open areas is suggested. The road surface/ open area cleaning should also be carried out prior to occurrence of rainstorm	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
5.6.2	6.3.19	Stormwater gullies and ditches provided among the residential development will be regularly inspected and cleaned (e.g. monthly) by the property management company. Additional inspection and cleansing should be carried out if heavy rainfall is forecasted.	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
5.6.2	6.3.20	During operation, in order to control/ minimize water pollution during inclement weather and emergencies, an Emergency Response Plan should be established and implemented. As a general indication, the ERP should include but not limited to record plans of drainage facilities/ system; maintenance of drainage system; recommended measures and best practices identified in the EIA study; an event and action plan during inclement weather and emergencies condition; emergency procedures and emergency contact details; and responsibility of relevant parties and follow up actions. In particular, the plan should provide details of procedure and actions required both before and after forecasted rainstorm such as checking/ inspection before onset of rainy season/ rainstorm that all drains are cleared from blockage and functioning properly; checking standby plant and equipment are ready for use; frequency of updating weather conditions; persons who will implement the measures and follow up actions; more frequent inspection and cleansing preferably before and after every rainstorm event.	Stormwater and Non-point Source Pollution Control	Project Proponent to implement, and property management company / Incorporated Owners to maintain	During operation	EIA, Contractual requirements
Sewerage and Sewage Treatment						
During Construction Phase:						
Nil	Nil	Nil	Nil	Nil	Nil	Nil
During Operational Phase:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
6.5	7.2.1	With reference to the routing of the planned trunk sewerage in the vicinity, sewage from the Project Site is proposed to be discharged to the planned public gravity trunk sewer via a rising main to be constructed and maintained by the subject development for eventual discharge to the existing YLSTW. The proposed rising main for conveying sewage from the Project Site to the future public sewer will be in the form of twin rising mains, so as to provide continued operation of the pumping system when one of the mains is damaged. The rising main will run underneath the internal roads within the Project Site and then northward along Kam Pok Road to a new sewage manhole at immediate upstream of San Tin No.1 Sewage Pumping Station. The section of rising main within the development will be constructed before the occupation intake to minimize disruption to the residents. The construction programme of the remaining rising main along public road will be discussed with relevant departments at later stage to cope with the construction programme of the trunk sewerage project. Agreements will be sought from all relevant authorities for the construction of the proposed sewerage, connection to the planned public sewerage system, and the associated future maintenance responsibility.	Sewage management during operation	Project Proponent	During operation stage (permanent scheme)	EIA, WPCO, Contractual requirements
6.6	7.1.2	In view of the programme gap between the provision of public sewerage and the occupation of the proposed development, it is necessary to consider the provision of STP as an interim	Sewage management during operation	Project Proponent	During operation stage	EIA, WPCO, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		measure to handle the sewage generated from the development before the availability of public sewerage for connection. To minimize disturbance to the residents, all sewers within the development for connection to the public system in the future will also be constructed together with the construction of this Project.				
6.7	7.2.4	The treated effluent will be discharged into the new drainage system within the development and conveyed to the adjacent Ngau Tam Mei Channel via existing twin cell box culvert. The channel water will be co-treated in the interim STP with the sewage generated by the development. Considering the influent characteristic, the process of biological treatment, membrane filtration and Reverse Osmosis (such as MBR + RO), is proposed for the interim STP. The interim STP will adopt RO system after membrane filtration process to further polish the effluent quality in order to cover fluctuation of pollutants in Ngau Tam Mei Drainage Channel water, to ensure that the Target Effluent Quality can be met. After successful operation of the interim STP for a period not less than one year, and the end of year result showing no net increase in pollution loading is confirmed, the operation frequency of the RO system will then be reviewed. Before reviewing the performance of the RO system, sufficient performance data including influent quality and effluent quality of the RO system should be collected. The RO system can be served as a backup process to further polish the upstream effluent and eliminate the residual pollution loads of the STP, competent personnel will be responsible to constantly review the effluent water quality and decide the need of the RO system as it	Sewage management during operation	Project Proponent	During operation stage	EIA, WPCO, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		is readily available for operation when upstream system experienced deficiency in handling the fluctuation of the influent.				
6.10	7.2.11	In order to offset the additional pollution load due to the development, it is proposed to abstract water from Ngau Tam Mei Drainage Channel for co-treatment in the interim STP. The water abstraction facility which is to be located within the application site is subject to detailed design and relevant approval for construction access and government land matters. The construction of water abstraction facility should be carried out in dry season. Silt curtain or sand bags should be provided to carve out the working area so as to bypass the channel flow and to avoid any solids/materials arising from the construction activities from entering the channel during construction phase. The work sites at the NTMDC for construction of water abstraction facilities should be maintained in dry conditions. Regular visual inspections should also be carried out by the Environmental Team and Contractor to ensure there is no spillage into the channel.	Sewage management during operation	Project Proponent / Contractor	During construction of water abstraction facility	EIA, WPCO, Contractual requirements
6.11	7.2.6	Proper operation and maintenance of interim sewage treatment plant is essential to safeguard the quality of discharge effluent, subject to the following aspects: • Competent technicians to be employed by the development management office to operate the sewage treatment plant (STP). They are to be fully conversant with the operating procedures as stipulated in the operation and maintenance manuals. • The proposed STP only serves the proposed development and thus the operation and maintenance (O&M) cost would be borne by the future management office of the development. The Applicant will ensure the design of STP is cost-effective such that the O&M cost imposed is reasonable.	Sewage management during operation	Project Proponent	During operation stage	EIA, WPCO, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• The STP is to be kept in a tidy state. This includes regular hosing down, scraping of the walkways, whitewashing the walls, cleaning and painting the metalwork, and maintaining adequate lighting and ventilation.				
6.11	7.2.6	• Where parts of the STP are sited beneath ground, forced ventilation will be provided. • Online sensors will be installed in the STP to monitor the parameters of Ammonia, Nitrite & Nitrate, and TSS. Easily accessible sampling point will also be provided for sampling of the treated effluent for laboratory testing. • Turbidity meter will be installed at the outlet of membrane filtration as well as the outlet of Reverse Osmosis (RO) to indicate the efficiency of pollutant removal from the corresponding process units, adjustment of RO system can then be made to suit the variation of pollutants. • Samples of treated effluent and abstracted channel water will be documented weekly, such that the lows and highs of the pollutant variations can be captured. Results will be compared against the total annual loadings, adjustment of water abstraction amount, membrane backwash frequency, RO unit operation will be fine-tuned to ensure effluent quality meet discharge license under the Water Pollution Control Ordinance and the target effluent quality in Table 6-6. • Based on the pollutant offsetting approach, co-treating sewage with abstracted channel water will be subject to the amount of pollutants in the channel water for offsetting. The proposed target effluent quality of the STP has taken it into account. The annual pollution loading in abstracted channel water (kg) and annual pollution loading in effluent of the interim STP (kg) would be balanced.	Sewage management during operation	Project Proponent	During operation stage	EIA, WPCO, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• A check and balance system monitor the pollutant loading every week. Monthly or quarterly report shall be submitted. By the end of each year, the exceeding and shortcoming amount will be balanced to quantify no net increase in pollutant loading achieved based on total pollutant reduction of the year. • The production of sludge is estimated to be approx. 4 m^3/d. While the reject water from the RO unit is normally around 20% of the influent depends on the quality of RO influent. The sludge and reject water will be transported by tankers from the interim private STP to government's STW for offsite treatment. A storage tank with capacity of 150 m^3 will be provided for storage of the RO reject water. • The Project Proponent will be responsible for the future sewer connection upon its available in the future and STP decommissioning with connection details subject to agreement of DSD. Appropriate conditions could be imposed in the Environmental Permit (EP) to ensure the EP holder to take up the responsibility to ensure connection to public sewer when trunk sewer is ready. • The Project Proponent will be responsible for the maintenance of the proposed water abstraction facilities and the associated pipelines. The proposed water abstraction facilities will be decommissioned together with the interim STP once the public sewer becomes available. • The discharge of treated effluent from the interim STP should follow the discharge licence requirements under the WPCO as well as the terms and conditions specified in the EP under the EIAO.				

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
6.12	7.2.8	The following measures will be adopted in order to eliminate adverse impact due to potential sewage overflow, emergencies discharge and change in flow regime beyond the expectation of this assessment: • Adequate spare parts for the plant will have to be made readily available by storage. • Qualified personnel will be hired to inspect the plant condition and carry out maintenance on a regular basis. • Regular test, maintenance and replacement of membranes and plant equipment will be carried out in accordance to the recommendations from manufacturers or as recommended by the qualified personnel after inspection. • Equalization tank with capacity of 168 m^3 (~ 3 days of sewage storage depending on actual flow condition) will be provided in case of entire outage of the interim STP. • Tank away will be provided for prolonged outage of the interim STP, for disposal of sewage to Government operated public sewage treatment works to be assigned by DSD. In case of abnormal effluent quality is detected from water sampling, discharge of treated effluent will be suspended and all sewage will be diverted to the equalization tank for temporary storage until the problem is rectified. In case of entire outage of the STP, channel water will not be abstracted from Ngau Tam Mei Drainage Channel. And if prolonged outage of the interim STP is anticipated, tankers will be arranged to transport the sewage for disposal to Government operated public sewage treatment works to be assigned by DSD.	Sewage management during operation	Project Proponent	During operation stage	EIA, WPCO, Contractual requirements

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
Waste Management						
During Construction Phase:						
7.4.4	8.3.2	Cross contamination of inert C&D materials by other waste categories shall be minimised as far as practicable through provision of storage facilities for storage of different categories of waste. Inert materials including soil, rock, concrete, brick, cement plaster/ mortar, inert building debris, aggregates and asphalt should be segregated from and stored separately from other waste categories to ensure proper handling and reuse. The on-site temporary facilities should be equipped with dust control measures where necessary.	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	EIA, Waste Disposal Ordinance, ETWB TC(W) No. 19/2005
7.4.4	8.3.32	Spent bentonite slurries, if any, will be handled and disposed of properly in accordance with the requirements set out in the Practice Note for Professional Persons (PN1/94) Construction Site Drainage.	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	EIA, Waste Disposal Ordinance, ETWB TC(W) No. 19/2005, PN1/94.
7.4.4	8.3.2	Wooden boards can be reused on-site or off-site, though the reusability and quantity of final waste to be generated will be subject to the quality, size and shape of the boards proposed by the contractor(s). Timbers which cannot be reused shall be sorted and stored separately from all other inert waste before disposal	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	EIA, Waste Disposal Ordinance,ETWB TC(W) No. 19/2005
7.4.4	8.3.3	Should construction site hoarding be erected, metal fencing or building panels, which are more durable than wooden panels, are recommended to be used as far as practicable. Opportunity shall also be sought to re-use any wooden boards used in site fencing on-site or off-site. Concrete and masonry can be	Waste management during construction	Contractors	At all construction areas of the site during the entire	EIA, Waste Disposal Ordinance, ETWB TC(W) No. 19/2005

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		crushed and used as fill material if practicable. On-site burning of wooden waste is prohibited			construction period	
7.4.4	8.3.4	In order to avoid dust, odour and erosion impacts, any stockpile areas within the Project Site should be covered with tarpaulin or impermeable sheeting. Any vehicle carrying C&D waste should have their load covered when leaving the works area. Vehicles should be routed as far as possible to avoid sensitive receivers in the area	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	EIA, Waste Disposal Ordinance, ETWB TC(W) No. 19/2005
7.4.5	8.3.5	Chemical waste that could be generated from construction works would primarily arise from chemicals used in operation and maintenance of on-site equipment. These may include fuel, oil, lubricants, cleaning fluids, and solvents arising from leakage or maintenance of on-site equipment and vehicles. Chemical generated from daily operation of the construction works shall be recycled/ reused on-site as far as practicable	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.5	8.3.6	If off-site disposal of chemical waste is required, they should be collected and delivered by a licensed contractor, and disposed of strictly following the Waste Disposal (Chemical Waste) (General) Regulation	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.5, 7.5.3	8.3.7	The contractors shall register with EPD as chemical waste producers when chemical waste is produced. All chemical waste shall be properly stored, labelled, packaged and collected in accordance with the Regulation.	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
7.4.5	8.3.7	Fossil fuel and used lubricants from trucks and machinery are classified as chemical waste.	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.5	8.3.8	Chemical waste generated has to be stored in suitable containers and away from water bodies so that leakage or spillage is prevented during the handling, storage, and subsequent transportation	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.5	8.3.9	The Contractor shall prevent fuel and lubricating oil leakage from plant and storage sites from contaminating the construction site. All compounds in work areas shall be positioned on areas with hard paving and served by drainage facility. Sand/ silt traps and oil interceptors shall be provided at appropriate locations prior to the discharge points	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.6	8.3.10	General refuse generated at the construction site should be stored separately from construction and chemical wastes to avoid cross contamination. A reliable waste collector shall be employed by the Contractor to remove general refuse from the construction site on a daily basis where appropriate to minimise the potential odour, pest and litter impacts	Waste management during construction	Contractors	At all construction areas of the site during the entire construction period	Waste Disposal Ordinance, ETWB TC(W) No. 19/2005
7.4.6	8.3.11	Open burning for the disposal of construction waste or the clearance of the Project Site in preparation for construction work is prohibited under the Air Pollution Control (Open Burning) Regulation	Waste management during construction	Contractors	At all construction areas of the site during the entire	Waste Disposal Ordinance, Air Pollution

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
					construction period	Control (Open Burning) Regulation
7.5	8.3.12	To ensure the appropriate handling of the C&D materials, it is recommended that a Waste Management Plan (WMP) shall be developed by the contractor and incorporated in the Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/2005 – Environmental Management on Construction Sites at the commencement of the construction works.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.14	In formulating the EMP in respect to waste management, the following hierarchy should be considered: • Avoidance and minimization to reduce the potential quantity of C&D materials generated; • Reuse of materials as practical as possible; • Recovery and Recycling as practical as possible; and • Proper treatment and disposal in respect to relevant laws, guidelines and good practice.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.12	The EMP shall be submitted to the Engineer's Representative (ER) and the Project Environmental Team Leader (ETL) for approval, and shall be implemented throughout the Project.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	The EMP should be developed taking into account the recommended control measures given in the EIA report where appropriate, including:	Waste management	ER, Project Proponent	Throughout the entire	Waste Disposal Ordinance,

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
			during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• A waste management policy, organization chart, and responsibility	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• An estimation on the location, type, nature, quality and quantity of different waste streams to be generated from the Project works, and the corresponding waste management methodology	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• A method statement for demolition and transportation of the excavated materials and other construction wastes	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• The potential for recycling or reuse should be explored and opportunities taken if waste generation is unavoidable	Waste management	ER, Project Proponent	Throughout the entire	Waste Disposal Ordinance,

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
			during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• Recommendations for appropriate disposal routes if waste cannot be recycled.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• A system to control the disposal of C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively through a trip-ticket system in accordance with the PNAP ADV-19	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• A system to record the disposal, reuse and recycling of C&D materials/ wastes for monitoring purposes	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.15	• The EMP should be approved before the commencement of construction. All mitigation measures in the approved EMP should be fully implemented.	Waste management	ER, Project Proponent	Throughout the entire	Waste Disposal Ordinance,

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
			during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.16	• The Project Proponent/ ER will ensure that the day-to-day operations comply with the approved EMP.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.16	• The Project Proponent/ ER shall require the contractor to separate public fill from C&D waste for disposal at appropriate facilities. In addition, the Project Proponent/ ER shall regularly audit Contractor(s)' records for the disposal, reuse and recycling of C&D materials for monitoring purposes.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.17	Based on the above waste management recommendations, a detailed management and control plan shall be formulated during the detailed design stage. A good management and control can prevent the generation of significant amount of waste. On-site sorting of construction wastes will be recommended. Secondary on-site sorting can be achieved by avoiding the generation of "mixed waste" through good site control. Construction wastes shall be sorted to remove contaminants, with the inert materials broken up into small pieces before being transported to the public fill reception facilities.	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.18	Chemical and oily wastes generated from the construction activities, vehicle and plant maintenance and oil interceptors should be disposed of as chemical waste in strict compliance	Waste management	Contractor	Throughout the entire	EIA, Waste Disposal

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		with the Waste Disposal (Chemical Waste) (General) Regulations	during construction		construction period	(Chemical Waste) (General) Regulation
7.5	8.3.19	The demolition and construction work shall be considered in the planning and design stages to reduce the generation of C&D waste where possible. Landfill disposal shall only be considered as the last resort	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.20	Construction methods with minimum waste generation quantity and other environmental impacts shall be considered in the detailed design	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.21	In addition, the Project Proponent shall require the contractor to reuse inert C&D materials (e.g. excavated soil) on-site or in other suitable construction sites as far as possible, in order to minimize the disposal of C&D materials to public fill reception facilities	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.21	The Project Proponent shall encourage the contractor to maximize the use of recycled or recyclable C&D materials, as well as the use of non-timber formwork to further minimize the generation of construction waste.	Waste management	Contractor	Throughout the entire	Waste Disposal Ordinance,

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			during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	The following additional control/ mitigation measures are recommended to be followed by the Contractor	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	• Storage of different waste types – different types of waste should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area equipped with required control measures (e.g. dust control) should be provided;	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	• Trip-ticket system – in order to monitor the proper disposal of non-inert C&D waste to landfills and to control fly-tipping, a trip-ticket system should be included as one of the contractual requirements and audited by the Environmental Team;	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	• Records of Wastes – a recording system should be proposed to record the amount of wastes generated, recycled and disposed of (including the location of disposal sites);	Waste management	ER, Project Proponent	Throughout the entire	Waste Disposal Ordinance,

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
			during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	• Training – The contractor should provide his workers with proper training of appropriate waste management procedure to achieve waste reduction as far as practicable and cost-effective through recovery, reuse and recycling and avoid contamination of reusable C&D materials;	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.22	• Incorporate good practice in "Recommended Pollution Control Clauses for Construction Contracts" published by EPD in respect to removal of waste material from the construction site into the contract of the contractor.	Waste management during construction	ER, Project Proponent	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5	8.3.24	In additional to the above, the following construction waste pollution clauses shall be included in construction contracts:	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.24	• The Contractor shall submit to the Engineer for approval a waste management plan with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site	Waste management	Contractor	Throughout the entire	Waste Disposal Ordinance,

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		operations comply with the approved waste management plan.	during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.25	• 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.	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.26	• The Contractor shall ensure that different types of wastes are segregated on-site and stored in different containers, skips or stockpiles to facilitate reuse/recycling of waste and, as the last resort, disposal at different outlets as appropriate	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.27	• The reuse and recycling of waste shall be practised as far as possible. The recycled materials shall include paper/cardboard, timber and metal etc.	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.28	• 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	Waste management	Contractor	Throughout the entire	Waste Disposal Ordinance,

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		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 and, as the last resort, disposal of at landfills.	during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.29	• The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites)	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.30	• The Contractor shall implement a trip ticket system in accordance with the Construction and Demolition Waste in PNAP ADV-19 for public fill, C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.1	8.3.31	• Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal Ordinance, PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.2	8.3.33	• The Contractor shall not permit any sewage, wastewater or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Project Site onto any adjoining land or allow any waste matter [or	Waste management	Contractor	Throughout the entire	Waste Disposal Ordinance,

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		refuse] which is not part of the final product from waste processing plants to be deposited anywhere within the Project Site [or onto any adjoining land]. He shall arrange removal of such matter from the Project Site [or any building erected or to be erected thereon] in a proper manner to the satisfaction of the Engineer in consultation with the Director of Environmental Protection	during construction		construction period	PNAP ADV-19, and ETWB TC(W) No. 19/2005.
7.5.3	8.3.34	• The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation	Waste management during construction	Contractor	Throughout the entire construction period	Waste Disposal (Chemical Waste) (General) Regulation
7.4.3 & 7.5.4	8.2.5 to 8.2.6, & 8.3.23	*Minimization/ Avoidance of Excavation of Pond Sediment* During construction, the concerned abandoned pond within Project Site will be filled up. The concerned pond sediment is intended to be left in place and not to be disturbed as far as possible. However, should pond sediment be encountered during construction, it should be temporarily stored and re-used on-site and no offsite disposal is expected (for example, re-use as fill material during site formation stage. Subject to detailed design stage, mixing pond sediment with cement material may be required so that its quality can meet the engineering requirements). If solidified materials will not be reused on-site and to be used as public filling materials, prior approval from Public Fill Committee of Civil Engineering and Development Department should be sought beforehand in accepting the solidified materials at public fill. As this Project will require imported fill materials in order to raise the site level to the proposed site formation level, this also provides an incentive for contractor(s) to reduce the amount of	Waste management during construction	Contractor	Throughout the entire construction period	EIA, Waste Disposal Ordinance.PNAP ADV-19

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		materials to be excavated provided that the materials can be re-used and its quality can meet the engineering requirements. The Contractor(s) will be required to minimize the amount of materials to be excavated and to re-use excavated materials on-site.				
During Operational Phase:						
7.6	8.4.1	Refuse collection points (RCP) will be provided for the residential development. A licensed waste collector shall be employed to collect domestic waste on daily basis.	Waste management during operation	Project Proponent	During operation	EIA, Waste Disposal Ordinance
7.6	8.4.2	Separate collection bins for used aluminium cans, waste paper and plastic bottles should be provided at strategic locations within the residential development area and adjacent to the passive recreational facilities in order to promote and encourage recycling during the operational phase	Waste management during operation	Project Proponent	During operation	EIA, Waste Disposal Ordinance
Ecology						
During Construction Phase:						
8.9.2	10.4.1	Site hoarding made of opaque, non-reflective materials and painted with colour blending with the environment should be erected to properly delineate the works site boundary and screen disturbance to the nearby habitats before the wintering season of waterbirds from October to March during construction phase.	Reduce the potential disturbance to wildlife utilizing habitats near the Project Area	Construction contractor	Works area before construction phase	EIA
8.9.2	10.4.2	Construction noise will be minimised by the use of quiet construction piling method (non-percussive) and quiet/silenced equipment (QPMEs), provision of mobile noise barriers in adjacent to construction plants or provision of acoustic screens by the Contractor(s).	Reduction of potential impact from construction noise	Construction contractor	Works area during construction phase	EIA, NCO

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
8.9.2	10.4.2	Measures proposed in compliance with the Noise Control Ordinance will also be enforced and monitored as a mitigation measure under the Noise Impact Assessment (details see Chapter 4 of this report).	Reduction of potential impact from construction noise	Construction contractor	Works area during construction phase	EIA, NCO
8.9.2	10.4.3	Dust control measures listed in Section 3.9.1 of this report	Avoid construction impacts due to dust	Construction contractor	Works area during construction phase	EIA, APCO
8.9.2	10.4.4	Submission of a Construction Phase Drainage Management Plan with details such as design of the temporary site drainage system; wastewater treatment facilities; and maintenance of drainage system for the approval of the Engineers Representative (ER) and the Environmental Team in order to ensure that the mitigation measures are in place.	Avoid impact to aquatic habitat due to water quality deterioration	Construction contractor	Works area during construction phase	EIA, WPCO
8.9.2	10.4.5	Good site practice and precautionary measures (e.g. those in Section 5.5 of the EIA report.	Avoid construction impacts due to runoff	Construction contractor	Works area during construction phase	EIA, WPCO
8.9.2	10.4.6	Good site practice listed as follows would be implemented to minimise potential impacts due to noise, dust and runoff on the surrounding environment. • Regular checking should be undertaken to ensure that the work site boundaries are not exceeded and that no damage occurs to surrounding areas; • Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage at all work sites during construction;	Avoid construction impacts	Construction contractor	Whole construction site	EIA

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
		• Implementation of noise control measures at all construction sites to reduce impacts of construction noise to wildlife habitats adjacent works areas; • Implementation of dust control measures at all construction sites to minimise dust nuisance to adjacent wildlife habitats during construction activities;				

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
8.9.2	10.4.6	• Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby waterbodies by rain; • Construction effluent, site run-off and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed with the following approach in descending order; • Dusty materials remaining after a stockpile is removed should be wetted with water; • All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet; • Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified; and • Supervisory staff should be assigned to station on site to closely supervise and monitor the works.	Avoid construction impacts	Construction contractor	Whole construction site	EIA
8.10	10.2.2 – 10.2.4	• Conduct baseline survey of bird uses of the section of Ngau Tam Mei drainage channel within the Assessment Area	Provide baseline information for evaluation of effectiveness of the recommended mitigation measure to minimise impact to birds in Ngau Tam Mei drainage channel from disturbance during construction phase	Construction contractor	Prior to commencement of site construction works; Section of Ngau Tam Mei drainage channel within the Assessment Area	EIA

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
8.10	10.2.5 – 10.2.6	• Monitoring of bird uses of the section of Ngau Tam Mei drainage channel within the Assessment Area between October and March annually	Evaluate the effectiveness of the recommended mitigation measure to minimise impact to birds in Ngau Tam Mei drainage channel from construction disturbance	Construction contractor	During construction phase; Section of Ngau Tam Mei drainage channel within the Assessment Area	EIA
8.10	10.2.7	• Regular site audit on weekly basis.	Checking the implementation of good site practice during construction phase	Construction contractor	Works area during construction phase	EIA
During Operational Phase:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
8.9.2	10.5.1	Minimization of bird collision will be taken into account in the design of noise barrier. Materials which are opaque, non-reflective panels with colour will be used for construction of noise barriers to reduce the risk of bird collision, particularly under dim condition (e.g., dusk and dawn) to reduce bird collision.	Avoidance/ minimization of bird collision	Property management company; incorporated owners	Noise barrier along eastern site boundary	EIA
8.9.2	10.5.2	Extent of glass panels of the noise barrier will be reduced by incorporation of the interim sewage treatment plant as part of the noise mitigation measures.	Avoidance/ minimization of bird collision	Property management company; incorporated owners	Noise barrier along eastern site boundary	EIA
8.9.2	10.5.3	Setback area (with houses at least 30m from the Ngau Tam Mei Drainage Channel) on the western side of the Project Area will increase the distance between houses and Ngau Tam Mei Drainage Channel.	Minimise the potential disturbance to waterbirds in the channel due to human activities and noise.	Property management company; incorporated owners	During operation	EIA
8.9.2	10.5.4	A continuous 5-8m wide landscape buffer will be included in the northern, eastern and western boundary of the Project Area.	Minimize the potential impact to wildlife in the surrounding areas, particularly waterbirds in the Ngau Tam Mei Drainage Channel, due to human activities and noise in the Project Area during operation phase.	Property management company; incorporated owners	During operation	EIA
8.9.2	10.5.5	The layout proposed will only involve the construction of low-rise buildings with a maximum height of 6.6m.	Minimize the potential barrier effect to bird flights	Property management company; incorporated owners	During operation	EIA

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
Fisheries						
During Construction Phase:						
9.7	10.6.3	Standard site practice detailed in Chapter 5 of the EIA would be implemented to avoid or minimise the impacts on water quality on site, which are summarized as follows:	Avoid causing water quality impacts on the surround watercourses	Construction contractor	Works area during construction	EIA, WPCO
9.7	10.6.3	- Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage at all work sites during construction; - Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby waterbodies by rain;	Avoid causing water quality impacts on the surround watercourses	Construction contractor	Works area during construction	EIA, WPCO
9.7	10.6.3	• Construction effluent, site run-off and sewage should be properly collected and/or treated; • Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified; and • Supervisory staff should be assigned to station on site to closely supervise and monitor the works	Avoid causing water quality impacts on the surround watercourses	Construction contractor	Works area during construction	EIA, WPCO
9.6.2	10.6.4	Provide adequate site drainage to ensure that site runoff and wastewater will be properly contained and treated prior to discharge into the surrounding water courses.	Avoid causing water quality impacts on the surround watercourses	Construction contractor	Works area during construction	EIA, WPCO
During Operational Phase:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cultural Heritage						
During Construction Phase:						
Nil	Nil	Nil	Nil	Nil	Nil	Nil
During Operational Phase:						
Nil	Nil	Nil	Nil	Nil	Nil	Nil
Landscape and Visual						
Landscape Mitigation Measures						
During Construction Phase:						
11.9, Table 11-13	**Table 9.1 CP1**	**Preservation of Existing Vegetation:**				
11.9.5	CP1.1	Avoid disturbance to the existing trees and vegetation as far as practicable within the works areas.	Coordinate with the layout and design of the engineering and architectural works to minimise the disturbance on existing trees.	Project Architects/Landscape Architects (Detailed Design Consultants)/ Engineers/ Contractor	Site / Throughout the design and construction phase.	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.5	CP1.2	Creation of Tree Protection Zone around trees/tree groups to be retained and to be fenced off from construction works.	To ensure the success of the tree preservation proposals.	Contractor	Set up at the areas with preserved trees before construction works commence and maintained throughout	EIAO TM- Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
					construction phase	
11.9.5	CP1.3	Prohibition of the runoff from construction activities, the storage of materials including fuel, the movement of construction vehicles, and the refuelling and washing of equipment including concrete mixers within the Tree Protection Zone.	To ensure the success of the tree preservation proposals.	Contractor	Site / Throughout construction phase	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.5	CP1.4	All works affecting the trees identified for retention and transplantation will be carefully monitored. This includes the key stages in the preparation of the trees, the implementation of protection measures and health monitoring throughout the construction period	To ensure the success of the tree preservation proposals.	Contractor	Site / Throughout construction phase	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.5	CP1.5	Detailed landscape and tree preservation proposals will be submitted to the relevant government departments for approval.	To ensure the tree preservation and planting proposals are integrated with the existing landscape context and that the landscape resources are preserved where appropriate.	Project Landscape Architect (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM- Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007, , HKPSG
11.9.5	CP1.6	The tree preservation works should be implemented by qualified softworks contractor. Works will be inspected by a competent person of the ET. A tree protection specification would be included within the contract documents.	To ensure the tree preservation and planting proposals are integrated with the existing landscape context and that the landscape resources are preserved where appropriate.	Project Proponent/Project Management Team	Site / Throughout design and construction phases	EIAO TM- Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.5	**CP3**	**Implementation of Mitigation Planting and Planting Species Selection**				
11.9.5	CP3.1	Replanting of existing/disturbed vegetation will be undertaken at the earliest possible stage of the construction phase.	To minimise the disturbance to existing landscape resources and minimise the impacts on the visual amenity of the area.	Contractor	Site / After the site formation or on completion of planting areas.	EIAO TM-Annex 18
11.9.5	CP3.2	Use of predominantly native and/or ornamental species and broadleaf plant species in the planting design.	To enhance the local landscape and ecological value.	Project Landscape Architect (Detailed Design Consultants)	Site / Throughout the design phase.	EIAO TM-Annex 18
11.9.5	CP3.3	Proposed mitigation planting will not only limit to conventional amenity planting, but also consider alternative greening measures such as vertical greening for screening and softening of the built structures and green roof on built structures for enhancing the visual amenity. Small shrubs, climbing plants, lawn and groundcovers shall be used in specific locations where technically feasible.	To maximise the greening opportunities and screening effects.	Project Landscape Architect (Detailed Design Consultants)	Site / Throughout the design phase.	EIAO TM-Annex 18
11.9.5	CP3.4	The tree planting works should be implemented by qualified softworks contractors. Inspected by the ET/Landscape Architects. A tree planting specification would be included within the contract documents.	To ensure the tree preservation and planting proposals are integrated with the existing landscape context and that valuable landscape	Project Proponent/Project Management Team/Project Landscape Architect (Detailed Design Consultants)	Site / Throughout design and construction phases	TM-EIA Annex 18
11.9.5	CP4	**Transplantation of Existing Trees**				
11.9.5	CP4.1	The tree transplanting works should be implemented by qualified softworks contractors. Inspected by the ET/Landscape Architects. A tree protection / transplanting specification would be included within the contract documents.	To ensure the success of tree transplanting	Project Landscape Architect (Detailed Design Consultants)	Site / Throughout design and	TM-EIA Annex 18

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
					construction phases	
11.9.5	CP4.2	Approximately 78 existing trees to be transplanted, majority of them shall be relocated to future planting areas within the development.	To retain their contribution to the local landscape context.	Project Landscape Architects (Detailed Design Consultants)/ Contractor	Site / Throughout design and construction phases	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAC PN 7/2007
11.9.5	CP4.3	Tree to be replanted will be kept in the temporary holding nurseries which closely monitoring by softwork contractors before replanting to the final recipient site.	To enhance the survival rate of the transplanted trees	Project Landscape Architects (Detailed Design Consultants)/ Contractor	Site / Throughout construction phase until the completion of new planting areas in the site	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAC PN 7/2007
11.9.5	CP4.4	Phased segmental root pruning for preparation of tree transplanting over a suitable period (determined by species and size).	To ensure the success of tree transplanting	Contractor	Site / Throughout construction phase	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAC PN 7/2007
11.9.5	CP4.5	Pruning of the branches of transplanted trees to be based on the principle of crown thinning that would maintain their original tree form and amenity value.	To ensure the success of tree transplanting	Contractor	Site / Throughout construction phase	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAC PN 7/2007
11.9.5	CP4.6	The implementation programme for the proposed works will reserve enough time for the advance tree transplanting preparation works.	To enhance the survival rate of the transplanted trees	Project Landscape Architects (Detailed Design Consultants)/ Contractor	Site / Throughout design and construction phases	TM-EIA Annex 18
11.9.5	CP4.7	Detailed tree transplanting proposals will be submitted to the relevant government departments for approval.	To enhance the survival rate of the transplanted trees	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAC PN 7/2007
During Operational Phase:						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.6, Table 11-14	**Table 9.2** **OP1**	**Roadside and Amenity Planting**				
11.9.6	OP1.1	Utilise native and ornamental species and broadleaf trees in combination of shade tolerant shrub planting and climbing plants in proposed landscape buffer to soften the horizontal emphasis of proposed noise barrier and fence wall.	Provide a linkage with the existing roadside landscape context and create a more coherent landscape framework	Project Landscape Architects(Detailed Design Consultants)	Site / Throughout design and operation phases	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.6	OP1.2	Enough soil depth of 1200mm will be reserved for tree planting area to ensure healthy planting establishment. High clearance tree planting will be utilised alongside of internal road and not to interfere the EVA requirement.	Healthy Tree Establishment	Project Landscape Architects(Detailed Design Consultants)/ Project Proponent	Site / Throughout design and operation phases	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.6	OP1.3	The implementation of new planting shall be undertaken as soon as technically feasible after completion of building works to ensure the effectiveness of this mitigation during operational stage.	To enhance the greening effect and shortening the duration of impact.	Contractor	Site / Throughout the construction abnd operation phases	V Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007.
11.9.5	**OP2**	**Compensatory Planting Proposals**				
11.9.6	OP2.1	Utilise all available spaces for new tree and shrub planting to create a comprehensive landscape framework which is connected to areas of retained and preserved vegetation and designed to integrate the proposals within their future landscape setting.	To restore and enhance the local landscape context and ecological value.	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.6	OP2.2	The new planting will be maintained in accordance with good horticultural practice in order to realise the objectives of the mitigation measures. This includes the replacement of defective plant species in the new planting areas to enhance the aesthetic, landscape and ecological quality of the proposals.	To restore and enhance the local landscape context and ecological value.	Contractor	Site / Throughout operation phase	TM-EIA Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.6	OP2.3	The planting proposals for the proposed development will achieve a compensatory planting ratio of minimum 1:1 (new planting: trees recommended for felling). Plant 126 compensatory trees and 65 amenity trees to compensate the loss of existing trees.	To compensate the loss of existing trees and restore the landscape context.	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.6	OP2.4	The proposed compensatory and new tree planting will utilise heavy standard size tree at selected area as accent, standard to light standard size tree in general landscape and roadside planting areas. Smaller planting stock will be used on slope and landscape buffer.	To ensure the planting proposals will create a naturalistic effect that responds to the existing and planned landscape context.	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	TM-EIA Annex 18, ETWB TCW No. 2/2004, LAO PN 7/2007
11.9.6	OP2.5	Detailed compensatory planting proposals will be submitted to the relevant government departments for approval.	To enhance the landscape context.	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18, DEVB TCW No. 7/2015, LAO PN 7/2007
11.9.6	OP2.6	Selection of native and ornamental planting species in proposed gardens and landscape buffer and bird-attracting and butterfly-attracting plant species in and surrounding the proposed landscape pond.	To enhance the landscape and ecological value of the Site.	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.6	**OP5**	**Design of Engineering Structures**				
11.9.6	OP5.1	Alternative greening measures including greening on the roof and/or vertical greening adjacent to the structures and regarded sloping areas will be used.	To ensure the proposals are integrated with the existing landscape and visual context, and avoid cluster effect.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.6	OP5.3	Treatment of Slopes should be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to give man-made slopes a more natural appearance blending into the local rural landscape.	To ensure the proposals are integrated with the existing landscape and visual context, and avoid cluster effect.	Project Engineer and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18
11.9.5	**OP6**	**Creation of Landscape Buffer**				
11.9.6	OP6.1	Native and ornamental tree and shrub mix, climbing plants will be utilised for the creation of landscape buffer (5-8m wide) along noise barrier and sewage treatment plant at Ha Chuk Yuen Road as well as Kam Pok Road and Fung Chuk Road.	To enhance the aesthetic and landscape diversity of the local context. These measures provide screening effect to the noise mitigation measures.	Project Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18
11.9.6	OP6.2	Treatment of Slopes should be aesthetically enhanced through the use of soft landscape works including tree and shrub planting	To create a more natural appearance blending into the local rural landscape	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18
11.9.5	**OP7**	**Provision of Landscape Pond**				
11.9.6	OP7	A Landscape Pond (110m^2) proposed in the landscape core of proposed development and will be composed of water plants and/or plant species attracting birds and butterfly.	To compensate the loss of abandoned ponds	Project Landscape Architects (Detailed Design Consultants)	Site / Throughout design and operation phases	EIAO TM-Annex 18
Visual Mitigation Measures						
During Construction Phase						

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9, Table 11-15	**Table 9.3 CP1**	**Preservation of Existing Vegetation**				
11.9.7	CP1.1	The tree preservation proposals will coordinate with the layout and design of the engineering and architectural works at detailed design stage.	To maintain visual quality of the context	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout the design phase	EIAO TM-Annex 18
11.9.7	CP1.2	The preservation of existing tree shall provide instant greening and screening effect for proposed works.	To maintain visual quality of the context	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout the design phase	EIAO TM-Annex 18
11.9.4	**CP2**	**Works Area and Temporary Works Areas**				
11.9.7	CP2.1	The landscape of the works areas will be restored to their original condition or enhanced through the introduction of new amenity planting areas or open spaces following the completion of the construction phase.	To minimise the duration of impact.	Contractor	Site / Throughout the construction phase	EIAO TM-Annex 18
11.9.7	CP2.2	Optimize the construction sequence and construction programme.	To minimise the duration of impact.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)/ Project Management Team	Site / Throughout the construction phase	EIAO TM-Annex 18
11.9.7	CP2.3	Construction site controls will be enforced including the storage of materials, the location and appearance of site accommodation and site storage; and the careful design of site lighting to prevent light spillage.	To minimise the source of visual impact.	Contractor/ Project Management Team	Site / Throughout the construction phase	EIAO TM-Annex 18

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.7	CP2.4	Hoarding designed with recessive colour shall be set up around the construction site providing screening effect for the construction works.	To minimise disturbance to the visual context.	Contractor/ Project Management Team	Site / Throughout the construction phase	EIAO TM-Annex 18
11.9.7	CP2.5	The site office or temporary above-ground structures shall be sited at less visual prominent locations.	To minimise the source of visual impact.	Contractor/ Project Management Team	Site / Throughout the construction phase	EIAO TM-Annex 18
11.9.4	**CP5**	**Coordination with Concurrent Projects**				
11.9.7	CP5.1	Coordinated implementation programme with concurrent projects.	To minimise cumulative impacts to the visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)/ Contractor	Site / Throughout design and construction phases	EIAO TM-Annex 18.
During Operational Phase						
11.9, Table 11-16	**Table 9.4 OP3**	**Responsive Design of Building and Structure**				
11.9.8	OP3.1	*Integrated Design Approach* Responsive design of built structures considered the location of houses and utilities structures. The disposition and height profile of the houses and above ground utilities structures respond to the existing context. Design measures include the creation of setbacks, articulating the development frontage and incorporation of view corridors/breezeway, avoid abrupt transitions between the existing and proposed built environment, reduce the apparent visual mass to enhance the sense of visual integration with the existing low-rise development context.	To soften the development mass and enhance their visual integration within the future landscape context.	Project Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.8	OP3.2	*Building Treatment* The architectural design seeks to reduce the apparent visual mass of the structures further through the use of recessive colour palette. Incorporation of alternative greening measures such as green roof /vertical greening on built structures where condition allows and particularly at where fronting to the public realm. Non-reflective finishes also recommended reducing the potential glare effect.	To restore and enhance existing landscape context and visual amenity.	Project Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.5	**OP4**	**Noise Mitigation Structures**				
11.9.8	OP4.1	The design of noise barrier should reduce the visual effect of the structure through the use of form, materials and textures colours. Setting back with articulated alignment from the site boundary to create a continuous landscape buffer (5-8m wide) with both preserved and new planted trees forming an instant screening effect to the engineering structures. Introduction of landscape berms, by virtue of its height and natural form, would reduce the perceived scale and height of the noise barriers. Integrated the proposed sewage treatment plant with noise barrier to reduce the engineering mass making the appearance blending into the rural setting	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.8	OP4.2	The design of engineering structures should avoid unnecessary visual cluster, this would be achieved through the co-ordination of the various engineering disciplines involved to arrive at innovative design solutions.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.5	**OP5**	**Design of Engineering Structures**				

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.8	OP5.1	The detailed design landscape consultants will work in liaison with the engineers on the aesthetic aspects of the structures and their relationship with the landscape.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.8	OP5.2	Alternative greening measures including greening on the roof and/or vertical greening on the structures and on regarded sloping areas will be used wherever possible to disguise their function appearance in both medium and long distance views and maximise the greening opportunities.	To enhance visual amenity	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.8	OP5.3	Tree preservation, new tree planting and alternative greening measures on and adjacent to the engineering structures will create an instant greening effect soften the visual mass.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.5	**OP6**	**Creation of Landscape Buffer**				
11.9.8	OP6.1	Native and ornamental tree and shrub planting and climbing plants will be utilised for the creation of landscape buffer along noise barrier and sewage treatment plant at Ha Chuk Yuen Road to enhance the aesthetic and landscape diversity of the local context.	To ensure the proposals are integrated with the existing landscape and visual context, and avoid cluster effect.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.8	OP6.2	Appropriate height and form of the landscape buffer/ berm to integrate with the noise mitigation measures and provide screening effect to the built structures.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18

EIA Ref.	EM&A Ref.	Recommended Environmental Protection Measures/ Mitigation Measures	Objectives of the recommended measures & main concerns to address	Who to implement the measures?	Location / Timing of implementation of Measures	What requirements or standards for the measures to achieve?
11.9.8	OP6.3	Treatment of Slopes should be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to create a more natural appearance blending into the local rural landscape.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18
11.9.8	OP6.4	The creation of landscape buffer at the periphery of the site, the height and form of the landscape berms and planting proposals have key role in mitigating the visual mass of the external fence walls of 2.5m high, the sewage treatment plant of roof at 10.4mPD and the noise barriers of height at 10.1mPD high.	To ensure the proposals are integrated with the existing landscape and visual context.	Project Engineers and Architects and Landscape Architects (Detailed Design Consultants)	Site / Throughout design phase	EIAO TM-Annex 18

15. CONCLUSIONS

15.1 Air Quality

Through implementation of dust control measures required under the Air Pollution Control (Construction Dust) Regulation; recommended specific measures in the EIA report; and good housekeeping practice by the works contractors, construction dust impacts can be controlled to acceptable levels. Practical mitigation measures have already been proposed for this Project to alleviate potential impacts. The concerned site formation works will only be short-term and potential air quality impacts have been reduced to a minimum through recommended mitigation measures and can comply with the relevant air quality criteria/ AQOs. Thus, no adverse impact is anticipated. There is no residual impact as a result.

During the construction, the concerned sediment at existing pond is intended to be left in place and not to be disturbed as far as possible. Potential odour impact is therefore not considered to be an issue.

During the operational stage, appropriate precautionary measures (e.g. peripheral set back from the site boundaries by means of landscape area) have been incorporated in the layout to alleviate potential vehicular emissions impacts. It was found that the Project Site can satisfy the buffer distance requirements stated in the HKPSG for both active and passive recreational uses, thus no unacceptable air quality impacts due to vehicular emission are expected. No unacceptable air quality impact due to industrial emission is expected as no industrial emission source has been identified within 500m from the Study boundary. The existing open storage site and an enclosed godown to the east of the Project Site are unlikely to have adverse air quality impact upon the development. Thus, no adverse air quality impact is anticipated.

Given the scale of the Project (for small houses development), there are no major planned dust generating or air pollutant emission sources from the proposed development that would contribute to any adverse impact on air quality. In addition, vehicular emission due to additional traffic generated/ attracted by this Project is found to be insignificant. Thus, the Project Site itself is unlikely to generate any air pollution nuisance. During the operational phase, licensed waste collector will be employed to collect domestic waste on a daily basis and RCP will be provided for the residential development. Localized impact and minimization of odour nuisance will be considered during detailed design. Thus, no adverse odour impact is anticipated.

During the operational stage, an interim sewage treatment plant may be proposed within the Project Site before connection to the public sewerage system becomes available. The interim sewage treatment plant will be within a totally enclosed building with biological treatment, membrane filtration and Reverse Osmosis processes to be located underground. The exhaust will be directed away from nearby ASRs and odour removal system will be provided. Thus, adverse odour impact is not expected. Brine disposal during maintenance will be away from residential area as much as possible and close to the vehicular access connecting the nearby road. With the careful design and odour control measures, adverse odour impact due to operation of the interim sewage treatment plant is not anticipated.

15.2 Noise

With the implementation of noise mitigation measures, construction noise levels at the NSRs will comply with the noise standard.

With the implementation of noise mitigation measures in terms of noise barrier along eastern boundary; placing noise tolerant uses such as the proposed STP between the proposed house and the industrial noise source; as well as recommended noise mitigation measures for the proposed interim STP (e.g. acoustic treatments such as provision of acoustic silencer and

acoustic enclosure), no adverse noise impact due to industrial noise sources in adjacent site as well as proposed interim STP is anticipated. No adverse noise impact is expected due to operation of the existing Chuk Yuen Floodwater Pumping Station.

With the proposed layout including setback from Kam Pok Road as shown in the MLP, no adverse traffic noise impact is anticipated for the proposed development.

15.3 Water Quality

The major impact during construction works of this Project is surface runoff and soil erosion due to exposed surfaces. Peripheral site drainage comprising precast concrete u-channels, sedimentation basins, sand traps and similar facilities together with those good site practices stipulated in ProPECC Note PN 1/94, have been recommended. Collected construction site runoff will be discharged into nearby existing stormwater drains, and via which into the NTMDC following the existing flow regime. With the adoption of the recommended good practices on-site, adverse water quality impact is not expected. The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence.

During operation, an interim sewage treatment plant will be used for treatment of sewage generated from the proposed development site until the public sewerage system becomes available. Treated effluent from the interim STP will be discharged to the adjacent NTMDC and it has demonstrated compliance with the no net increase in pollution loading requirement. Thus, no adverse water quality impact is anticipated. The discharge is also subject to EPD's discharge licence requirements.

Surface runoff from the development site will be discharged to the NTMDC. Pollutants, if any, will be pre-treated and settled before discharge. It was estimated that the increase in surface runoff due to this Project is negligible when compared with the design capacity of the NTMDC. Best Management Practices have been proposed in order to abate first flush pollution in stormwater runoff such as design measures to minimize soil erosion; design of drainage system to collect surface runoff; street level planting; selection of tree species; and control of application of fertilizer. In addition, screening facilities such as gully grating, trash frille, and road gullies with silt traps and oil interceptor will be incorporated into the drainage design to control pollution. Asides from the above, administrative measures such as regular cleaning and sweeping of road surface/ open area as well as stormwater gullies and ditches to remove pollution source by property management company, have also been recommended. With the recommended measures, there will be no unacceptable impacts to the water quality in the Deep Bay.

Potential cumulative impacts due to construction and operation of nearby approved designated projects as well as planned development sites, have been assessed. All these identified concurrent projects will implement their own mitigation measures to ensure discharge can comply with the relevant WPCO as well as EIA requirements. Project-specific mitigation measures are also recommended for this Project to ensure construction site runoff is collected and treated before discharge. The discharge will be controlled through implementation of committed measures described in the respective EIA reports of those projects as well as those recommended in this Project. Further site inspections and regular water quality monitoring are also recommended to monitor the water quality level at nearby drainage channels during the construction phase of this Project. Event and Action Plan will be implemented to rectify any deficiencies. Thus, no adverse cumulative impact is expected.

It is also recommended that emergency response plans to deal with inclement weather and emergencies for both construction and operation phases, will be developed.

No residual impact is anticipated during the construction or operation of the Project.

15.4 Sewerage and Sewage Treatment

Sewage generated from the proposed development will be discharged into the planned trunk sewer at Kam Pok Road under PWP No. 4235DS, as permanent measure. The quantity of sewage effluent generated from the proposed development is relatively small amount when compared with the spare capacity of the downstream sewerage facilities. Thus, no adverse impact is anticipated.

An interim STP has been proposed for treatment of sewage generated from the proposed development site until the planned public sewerage system becomes available. The proposed development will not impose any adverse sewerage impact on the surrounding areas by co-treatment of water abstracted from existing Ngau Tam Mei Drainage Channel. The interim STP has been designed such that it can meet the no net increase in pollution loading requirement in Deep Bay. The discharge of treated effluent from the interim STP should follow the discharge licence requirements under the WPCO as well as the terms and conditions specified in the EP under the EIAO. Thus, the development is considered acceptable in sewerage terms.

With the proposed measures, adverse environmental impacts due to the long term and interim sewerage scheme are not anticipated. No adverse sewerage impact will be incurred as a result of the development.

15.5 Waste Management

There is no historic and/ or existing land use at the Project Site in accordance with Sections 3.1 and 3.2 of Annex 19 in the EIAO-TM that would have potential land contamination issue. No potential land contamination of the Project Site is anticipated.

With the implementation of recommended measures, no waste related regulatory non-compliance and unacceptable environmental impacts are expected to arise during the construction phase. Waste management measures as well as control/ mitigation measures have been recommended during the construction accordingly. Opportunities for reduction in waste generation through recovery, reuse or recycling are also identified.

Refuse collection chambers will be provided and a licensed waste collector will be employed to collect domestic waste during the operational phase.

15.6 Ecology

A literature review and field surveys have been conducted to establish the ecological baseline condition of the Assessment Area and assessment of potential impacts conducted in accordance with the EIAO-TM requirements. The Project would cause losses of 3.17 ha of urbanized/disturbed, 0.3 ha of plantation and 0.33 ha of an abandoned pond of very low ecological value. With implementation of recommended mitigation measures, no significant residual ecological impact due to the Project during both construction and operational phases is anticipated. Ecological monitoring of utilization of the Ngau Tam Mei Channel by birds between October and March during construction phase is proposed.

15.7 Fisheries

A literature review has been conducted to establish the fisheries baseline condition of the assessment area and assessment of potential impacts conducted in accordance with the EIAO-TM requirements. The Project would cause a loss of 0.33 ha of an abandoned pond. Potential impacts on fisheries of the study area are ranked as minimal. No mitigation is

required and the residual impact is acceptable. Other than the water quality monitoring programme proposed during construction phase EM&A, no specific fisheries EM&A programme would be required.

15.8 Cultural Heritage

According to the assessment findings, no sites of archaeological interest or areas of archaeological interest, declared/ proposed monuments, historical villages, cultural landscaped features, and graves were identified within the Study Area. The identified Built Heritage Items (BH1 to BH4, i.e. the temple in Chuk Yuen Tsuen and three graded historic buildings in San Wai Tsuen) (about 250m-280m from the Project Site) are considerably far from the Project Site. No impact during construction and operational phase is anticipated.

The proposed development will not encroach upon any known sites of archaeological interest or areas of archaeological interest and will not have any direct or indirect impacts on any declared monuments, graded or proposed graded historic buildings, cultural landscape features, graves or historical village during construction and operational phases. No specific EM&A requirement is considered necessary.

15.9 Landscape and Visual

Proposed development will not lead to a degradation of the landscape setting of the area following full establishment of the recommended mitigation measures, on the contrary it is an improvement to the landscape setting along Ngau Tam Mei Channel. It will not affect its viability in terms of being a landscape planning designation. The introduction of high quality residential landscape within the development will assist the fading out of unpleasant open storage and warehouses uses in NT. Proposed development thus considered to be tolerable to the planning intention of development control framework and fit into the future outlook of this rural, recreation and residential landscape context.

Residual impact significance on the affected LRs and LCAs during the construction phase will be alleviated to moderate to slight adverse levels with mitigation measures. With the implementation of landscape mitigation measures and full establishment of planting proposals during the operational phase, the residual impact significance on the affected LRs and LCAs would be slight adverse to insubstantial. The development proposals will replace the unpleasant uses along the Channel, enhance and benefit the existing landscape and visual quality along Ngau Tam Mei Drainage Channel.

With the adoption of visual mitigation measures the potential significant to moderate adverse unmitigated impacts on the majority of VSRs will be mitigated to moderate to slight adverse (during construction phase/ Year 1 of operation phase) and slight adverse to Insubstantial (Year 10 of operation phase). The Project will also bring slight benefit to some VSRs during operation. These mitigation measures create high quality landscape areas for the enjoyment of future residents as well as provide enhanced visual amenity in the wider context of Ngau Tam Mei channelside rural and low-rise development context.

The compliance of landscape design and works are considered to be checked during design phase and upon completion of the softworks. Monitoring the condition of preserved trees required through site auditing programme. No other specific EM&A requirement is considered.

In accordance with Annex 10 of the EIAO-TM, the landscape and visual impacts as a result of the proposed development would be ‘acceptable with mitigation measures’ that is to say ‘there would be some adverse effects, but these can be eliminated, reduced or offset to a large extent by specific measures’.