

Hong Kong Housing Authority
Agreement No. CB20120293
Planning and Engineering Study
for the Public Housing Site and
Yuen Long Industrial Estate
Extension at Wang Chau

Final Technical Report No.3 (TR-3F)
Water and Utility Impact Assessment
Report

REP-015-01

Final | May 2014

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Job number 226464

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Job title		Agreement No. CB20120293 Planning and Engineering Study for the Public Housing Site and Yuen Long Industrial Estate Extension at Wang Chau		Job number 226464	
Document title		Final Technical Report No.3 (TR-3F) Water and Utility Impact Assessment Report		File reference 015	
Document ref		REP-015-01			
Revision	Date	Filename	REP-015-01_TR-3F_WUIA.docx		
Final	May 2014	Description	Final		
			Prepared by	Checked by	Approved by
		Name	[REDACTED]	[REDACTED]	[REDACTED]
		Signature	[REDACTED]	[REDACTED]	[REDACTED]
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
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		Signature			

Issue Document Verification with Document

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1 INTRODUCTION

1.1 Project Background

- 1.1.1.1 As stated in the Chief Executive's 2011-12 Policy Address, the Administration is committed to expanding the land resources and increasing housing land supply. To meet this policy objective, the Planning Department (PlanD) has carried out a comprehensive review of the areas zoned "Green Belt" (GB) on the Outline Zoning Plans (OZPs) focusing on sites which are no longer green or spoiled. A number of "GB" and "Open Storage" (OS) sites in Wang Chau, Yuen Long were identified as having potential for public housing (PH) development.
- 1.1.1.2 Subsequently, the Innovation and Technology Commission (ITC) and the Hong Kong Science and Technology Parks Corporation (HKSTP) advised of the need to expand the Yuen Long Industrial Estate (YLIE), in addition to the existing three Industrial Estates (IEs) at Tai Po, Tseung Kwan O and Yuen Long. It was requested to use a portion of the Wang Chau potential housing site for this purpose.
- 1.1.1.3 After due consideration, an agreement was reached between the Housing Department (HD) and ITC to share the site, tentatively with the northerly portion to be allocated for the YLIE extension (YLIEE), while the remaining south portion would be developed for public housing use. It was further agreed that no Potential Hazardous Installations (PHIs) would be located at the YLIEE so as to minimize the potential adverse impact on the neighbouring PH developments.
- 1.1.1.4 **Drawing No. 226464/OAP/C/011** shows the location of the Project site. The PH and YLIEE sites at Wang Chau are zoned GB and OS on the Ping Shan OZP No. S/YL-PS/14. It is currently occupied by open storage, vehicle parks, farmland, fallow land, grassland, rural residential dwellings and temporary structures.
- 1.1.1.5 Ove Arup & Partners Hong Kong Limited (Arup) was commissioned by Hong Kong Housing Authority (HKHA) under entrustments from the Government of the Hong Kong Special Administrative Region (HKSAR) & Hong Kong Science and Technology Parks Corporation (HKSTP) to conduct the Planning and Engineering Study for Public Housing Site and YLIEE at Wang Chau (the Study), which will examine the feasibility on developing public housing and YLIEE at Wang Chau by conducting planning, engineering and environmental assessments to formulate proposal for the PH site and YLIEE, and the implementation strategies and programme for the proposed development.

1.2 Objectives of the Report

- 1.2.1.1 Following on the endorsement of the Technical Report (TR) on Option Generation, Evaluation and Preliminary Assessments (TR-2) in the Study Steering Group Meeting on 28 June 2013, a preferred development option has been formulated. According to the Clause 5.3(c) of the brief, technical assessments are required to demonstrate the feasibility of the preferred development option.
- 1.2.1.2 The Technical Report (TR-3) – Preferred Option and Technical Assessments under this P&E study is to undertake the technical assessments including traffic and transport assessments, drainage and sewerage impact assessment, water supply and utilities impact assessments, geotechnical assessments, foundation assessment, natural terrain hazard study, environmental impact assessment, financial assessment, air ventilation assessment and land requirement study to confirm the feasibility of the preferred development option and ascertain the implications that may arise.
- 1.2.1.3 This report forms part of the TR-3 and is to present the Water Supply and Utilities Impact Assessment (WUIA) due to the proposed PH development and YLIEE at Wang Chau.
- 1.2.1.4 The report formulates the proposed water supply and utilities systems with mitigation measures with an aim to minimize both the short-term and long-term impacts on the existing system and to the general public.
- 1.2.1.5 The report further substantiates the feasibility of the Project (further to TR-2 report) in terms of capability and serviceability of the systems and satisfies the requirement of maintenance authorities.
- 1.2.1.6 Specifically, the objectives of this report are set out as follows:
- to take cognisance of the existing and proposed studies and projects which may have bearing on the development;
 - to assess the water and utility demands for the developments;
 - to assess the short-term and long-term impacts on water and utility mains and demands for the development;
 - to propose and design the water and utility supply schemes arising from the development including carrying out all necessary hydraulic analysis to substantiate the proposed water supply scheme;
 - to ensure that the interfaces with the works facilities are properly resolved, and that adequate mitigation and protection measures are practically developed for construction and operation phases of the developments and incorporated for future development into the detailed design;
 - to formulate and recommend suitable protection schemes and measures and/or diversion schemes and arrangements to protect the works facilities, and minimise the disturbance to the normal operation of the facilities during both construction and operation stages;

- to enable an agreement in principle to be reached with WSD and utility service providers in respect of mitigation and protection schemes, diversion schemes, re-provisioning works and/or modifications of facilities for incorporation in design and during construction of the development.

1.3 Structure of this Report

1.3.1.1 The structure of this Report is as follows:

- Section 1 Introduces the background of the study, as well as the purpose of this report.
- Section 2 Provides the site description and presents the preferred option and the key data of the proposed development on which the impact assessments is based.
- Section 3 Presents the water impact assessment which assesses the impacts on existing and planned water supply systems due to the development and formulates corresponding mitigation measures.
- Section 4 Presents the utility impact assessment which assesses the impacts on existing and planned utilities infrastructure due to the development and formulates corresponding mitigations measures.

1.4 Nomenclature and Abbreviations

1.4.1.1 The following **Table 1.4.1** lists out the meaning of abbreviation for expressions adopted in this report:

Table 1.4.1: Abbreviations

Abbreviations	Term
AT	Au Tau
CLP	China Light and Power Hong Kong Limited
DSD	Drainage Services Department
EPD	Environmental Protection Department
FSD	Fire Service Department
FWPSR	Fresh Water Primary Service Reservoirs
FWSR	Fresh Water Service Reservoirs
GB	Green Belt
GFA	Gross Floor Area
G/IC	Government/ Institution/ Community
HDLD	Highways Department Lighting Division
HGC	Hutchinson Global Communications Ltd
HKBN	Hong Kong Broadband Network Ltd
HKCG	The Hong Kong and China Gas Company Limited
HKCTV	Hong Kong Cable Television Ltd
HKPSG	Hong Kong Planning Standards and Guidelines
IL	Invert Level
ISWB	Integrated Social Welfare Building
LOS	Local Open Space

Abbreviations	Term
MDD	Mean Daily Demand
NT	New Territories
NTM	Ngau Tam Mei
NWT	New World Telecommunications Ltd
OS	Open Storage
OZP	Outline Zoning Plan
PCCW	Hong Kong Telecommunications Ltd
PE	Polyethylene
PH	Public Housing Site (This Project)
PR	Plot Ratio
PTI	Public Transport Interchange
TR-2	Technical Report No. 2
TR-3	Technical Report No. 3
TTFN	Towngas Telecommunications Fixed Network Ltd
TWL	Top Water Level
VE	Village Environs
WC	Wang Chau
WSD	Water Supplies Department
WT&T	Wharf T&T
WTW	Water Treatment Works
YLIE	Yuen Long Industrial Estate
YLIEE	Yuen Long Industrial Estate Extension (This Project)

2 PROJECT DESCRIPTION

2.1 Site Location

2.1.1.1 The Project site is bounded by the existing YLIE, Fuk Hi Street and Fuk Hing Garden and Sai Tau Wai to the east, Long Ping Road and Long Ping Estate to the south, Kai Shan to the west, as well as Shing Uk Tsuen, Tai Tseng Wai and Ng Uk Tsuen to the north as indicated in **Drawing No. 226464/OAP/C/011**.

2.2 Existing Conditions

2.2.1.1 According to the approved Ping Shan OZP No. S/YL-PS/14, the PH and YLIEE sites are currently zoned as “Green Belt” (GB) and “Open Storage” (OS) (**Drawing No. 226464/OAP/C/021**). It is occupied by open storage, vehicle parks, farmland, fallow land, grassland, rural residential dwellings and temporary structures.

2.2.1.2 The surrounding areas of the Project site are characterized by a mixture of various land use zonings as well as different existing major land uses. These include high-rise residential development, villages and low-rise residential developments, natural landscapes, burial grounds and graves, industrial uses, major roads and railway tracks.

2.2.1.3 The Project site is irregular in shape. In terms of topography, it is generally flat on its northern and central portions and has a slightly hilly terrain on the south strip. The major land uses within the Project site include open storage/workshops, residential dwellings, agricultural and vegetated land, nullah with footpaths and watercourses.

2.3 The Preferred Option

2.3.1.1 During the process of option generation, a number of key elements which play determining roles in the formulation of initial development options have been identified. The key elements that have been paid with due respect include the burial ground at Kai Shan, Village Environs (VE) of Wing Ning Tsuen (D.D. 122), VE of Fung Chi Tsuen and Shui Tin Tsuen (D.D 120 & 122) and the Umah International Primary School. A preferred development option for PH site and YLIEE site has been formulated in the TR-2 Option Generation, Evaluation and Preliminary Assessments.

2.3.1.2 Since the approval of TR-2, discussions with various government departments have been carried out; and subsequently the Project site boundary, site layout and development parameters of the preferred option have been slightly refined and optimised to address different concerns of particular departments. This TR-3 is

carried out based on the refined preferred option which is illustrated in **Drawing Nos. 226464/OAP/C/022 – 023**.

- 2.3.1.3 The revised Project site boundary, land use budget, site layout, urban design element and development scheme with parameters are briefly described in the following sections.

2.4 The Project Site Boundary

- 2.4.1.1 As recommended in TR-2, the Project site of the original preferred option is about 33.31 ha in size, with about 18.69 ha for the PH site and about 14.62 ha for the YLIEE site.
- 2.4.1.2 Taking into account the existing burial urns at Kai Shan, impacts to private land lots, woodland cutting, woodland compensation provision, existing boundaries of adjacent VE, interfacing with existing land use zonings and further optimisation of land use between PH and YLIEE sites, some minor refinements have been proposed.
- 2.4.1.3 The refined development site boundary is shown in **Drawing Nos. 226464/OAP/C/022 – 023**. With the refinement, the total area of the Project site is about 33.46 ha, with about 18.81 ha for PH site and about 14.65 ha for YLIEE site.

2.5 Land Use Budget

- 2.5.1.1 Subsequent to the refinement of the Project site boundary, with an aim to keep up with the development intensity and land use mix in the preferred option as generated under the guiding principles and relevant regulations, minor adjustments have also been made onto the land use budget.
- 2.5.1.2 **Table 2.5.1** below summarizes the land use budget for the refined site boundary.

Table 2.5.1: Proposed land use budget for the refined site boundary

Land Use	Land use budget
PH Site	
Residential	About 14.49 ha
School	About 1.94 ha (3 school sites)
G/IC (Integrated Social Welfare Building)	About 0.47 ha
Public Transport Interchange	About 0.41 ha
Roads, amenity greening and slope	About 1.49 ha
Total site area	About 18.81 ha
YLIEE Site	
Industrial	About 11.66 ha
Local Open Space (On-site preserved woodland area)	About 0.27 ha
Roads	About 1.81 ha
Slope	About 0.31 ha

Land Use	Land use budget
Woodland compensation area & on-site ecological compensation area	About 0.41 ha
Parking Spaces	About 0.19 ha
Total site area	About 14.65 ha

2.6 Proposed Development of the PH Site

2.6.1 Guiding Planning Design Principles for the Public Housing Site

2.6.1.1 There are three major planning & urban design guiding principles followed in the design of the preferred option. These include:

- Establishing view corridors to Kai Shan - This is achieved by aligning the northern road toward the foothills of the mountain, by strategically placing the schools to provide visual and spatial relief around the taller residential structures, and by utilizing the 50-metre buffer area separating the public housing site from the proposed industrial estate extension site.
- Placing public functions closer to the existing road networks - Commercial activities and the public transport interchange (PTI) have been placed along Fuk Hi Street and Long Ping Road in order to serve the greater community.
- Creating a tapering building height profile. The buildings taper down from 41 to 31 storeys. The tapering occurs at 5-storey intervals, in order to minimize the effect of the flat-head development.

2.6.2 Land Use Proposals

2.6.2.1 With the proposed refinement of the PH site boundary, types of land use remain unchanged. These include residential with local open space and parking spaces, retail, schools, integrated social welfare building (ISWB), PTI, roads, amenity greening and slope.

2.6.2.2 The PH site can be roughly divided into three portions. The southwestern portion of the PH site consists of the area around residential blocks 1 to 10 (Phase 1), the middle portion consists of the area around residential blocks 11 to 17 (Phase 2), and the northern portion consists of the area around buildings 18 to 24 (Phase 3). The middle and northern portions are bisected by the proposed northern access road.

2.6.2.3 **The Southwestern Portion:** The southwestern portion occupies an area of about 5.5ha. It consists of 10 residential buildings, two underground parking structures, a 2-storey commercial area, a social welfare building, i.e. ISWB, one school, and complementary recreational functions. All residential buildings in this portion will be of either 31 or 36 storeys. Single-aspect buildings have been

utilized in all of the residential buildings, except Block 3, in order to minimize any potential conflicts from traffic noise issues. A two-storey retail facility has been placed strategically along Long Ping Road to allow street-front retail as well as serve the residents within the proposed new residential housing estate. A footbridge tentatively linking the pedestrian walkway system of Long Ping Estate would land at the same level as the podium level. The ISWB at the southwestern tip of this portion will provide a minimum net operating floor area of approximately 6000 m² for various social welfare facilities. A site of a primary school is reserved and proposed with a maximum building height of 8 storeys. Areas for two children playgrounds, two badminton courts, and one basketball court have also been reserved to serve the future residents. An existing shrine exists adjacent to the ISWB. Minimal disturbance has been taken into consideration with site formation in order to preserve this shrine.

2.6.2.4 The Middle Portion: It has an area of about 5.8ha. It consists of 7 residential buildings, a commercial area, one underground parking area, and other complementary recreational functions as well as a new road. The residential buildings in this portion taper from tallest (41 storeys) to the west to lowest (31 storeys) to the east. A pedestrian corridor with retail facilities on both sides is proposed. This design will minimize the adverse interface conflict between pedestrians and vehicles. In terms of complementary recreational functions, areas for four children playgrounds, three badminton courts, and two basketball courts have been served. An existing well currently situated between the proposed Blocks 12 and 13 is proposed to be preserved and beautified to give the area more character.

2.6.2.5 The Northern Portion: This portion occupies an area of about 7.5ha. It consists of 7 residential buildings, a commercial area, a semi-covered PTI, a non-buildable area, one underground parking area, two schools and complementary recreational functions. The residential buildings taper from tallest to the west (41 storeys) to lowest to the east (31 storeys). This tapering is of similar nature as to the buildings tapering in the middle portion. The commercial area in this portion is placed in the vicinity of the PTI, and creates a gateway to the pedestrian street found in the middle portion with the intention that it would serve both the PH site as well as the YLIEE site. In order to minimize the adverse interface conflicts generated between the YLIEE and the PH sites, a 50-metre buffer has been created between these two distinct zones. The buffer area would comprise of open space, a football pitch, badminton courts, and two playgrounds. Due to the shape of the 50-metre buffer area, this area is also most suitable for an underground parking area. Two schools have been placed strategically at the end of the proposed road, in order to further expand the frame of vision toward Kai Shan, as well as to provide a visual buffer from the

high-density developments of the middle and northern portions. Apart from the recreational functions found along the 50-metre buffer, areas for two additional children playgrounds and two basketball courts have been reserved.

2.6.3 Development Schemes with Parameters

2.6.3.1 In the refined development scheme, the PH site has a site area of 18.81 ha. While the total site area is 18.81 ha, the total residential site area is of a total of 14.49ha which excludes 30-degree cut slope areas, local roads, and non-residential structures, like the PTI, the ISWB, and the three school sites, based on the abovementioned land use proposals. Taking the opportunities to further optimize housing supply in response to the territorial need for housing by visiting various factors with a plot ratio (PR) of 6.0 (i.e. 5.86 domestic and 0.14 non-domestic) and maximum building height of 41 storeys, a total of a domestic GFA of 848,750 m² and retail GFA of 19,760 m² will be accommodated (**Table 2.6.1**). The proposed development option could then provide a total of 16,975 flats to cater for around 52,113 populations (**Table 2.6.2**). The breakdown of the GFA of each portion is as follows:

Table 2.6.1: Domestic and Retail GFA of the Three Portions

	Domestic GFA (m ²)	Retail GFA (m ²)
Southwestern Portion	213,750	6,784
Middle Portion	324,000	8,589
Northern Portion	311,000	4,383
Total	848,750	19,756

Remarks: It is assumed that the social welfare facilities, PTI, underground parking areas, schools and recreational functions are not accountable for GFA.

Table 2.6.2: The Estimation and Number of Flats of the Three Portions

	Area of Residential Site (ha)	Number of Flats [^]	Population [*]
Southwestern Portion	3.83	4,275	13,124
Middle Portion	5.00	6,480	19,894
Northern Portion	5.68	6,220	19,095
Total	14.49#	16,975	52,113

An adjustment of 0.02ha has been applied and subtracted from the total site area to avoid overprovision of domestic GFA.

[^] It is also assumed that 50% of the flats will be for PRH and 50% will be for HOS.

^{*} It is assumed that the person per flat is 3.07.

2.6.3.2 A summary of the key planning parameters for the PH development is given in **Table 2.6.3** below.

Table 2.6.3: Summary of Key Planning Parameters for PH development

Development Parameters	Units
Residential Site Area	14.49 ha
Domestic Plot Ratio	5.86
Domestic GFA	848,750 m ²
Estimates No. of Flats	16,975
Estimated Population	52,113
Non-domestic Plot Ratio	0.14
Non-domestic GFA	19,760 m ²
Maximum Building Height (in storeys) (Ground floor included)	31 / 36 / 41
Maximum Building Height (in metres)	87.1m / 100.85m / 114.6m
Maximum Number of Residential Storeys	30 / 35 / 40
Assumed No. of Units Per Storey	11 - 29 units
No. of Towers	24

2.7 Proposed Development of the YLIEE Site

2.7.1 Guiding Planning & Design Principles for the YLIEE Site

2.7.1.1 There are four planning & design principles that should be considered:

- Optimising the development potential by partitioning the individual site with an optimal plot size between 0.65 and 0.75 ha as advised by HKSTPC.
- Minimising disturbance to existing woodland and providing an on-site woodland compensation area to minimise the need for off-site woodland compensation.
- Providing sufficient local open space for the enjoyment of local employees.
- Providing a pedestrian connection from the existing YLIE to the proposed YLIEE site.

2.7.2 Land Use Proposal

2.7.2.1 With the proposed refinement of the YLIEE site boundary, the major types of land use remain unchanged. These include industrial, local open space, car parking space, road and slope area. While chances have been taken to further bring forward capitalization on existing natural resources within the YLIEE site, it is proposed to allow more on-site woodland compensation and ecological conservation area.

2.7.2.2 The YLIEE site has an area of 14.65ha. It consists of 16 individual plots, connected by a local road that terminates at a roundabout.

Adequate Local Open Space (LOS) and parking areas have also been provided within the site. The LOS is currently occupied by woodland which will be preserved on-site. One on-site ecological compensation area has been proposed to the west of development plot VIII, and a woodland compensation area to the west of development plot VII has also been proposed.

2.7.3 Development Schemes with Parameters

2.7.3.1 In the refined preferred option, the total area for YLIEE site is 14.65 ha with 11.66 ha reserved for industrial use. A PR ratio of 2.5 and a maximum building height of 8 storeys for the industrial lots are proposed to remain unchanged. Chances were also taken to optimize industrial GFA provision and as a result, a maximum GFA of 291,545 m² will be provided to accommodate about 3,887 workers. A summary of the key planning parameters for the YLIEE development is given in **Table 2.7.1** below.

Table 2.7.1: Summary of key planning parameters for YLIEE development

Development Parameters	Units
Industrial Site Area	11.66 ha
Plot Ratio	2.5
Maximum GFA	291,545 m ²
Estimated No. of Worker*	About 3,887
Maximum Building Height (in storeys)	8 storeys
Maximum Building Height (in metres)	32m

* It is assumed that a worker density is 75 workers/ m².

2.7.3.2 In terms of the distribution of industrial lots, a summary is given in **Table 2.7.2** below.

Table 2.7.2: Summary of industrial lot sizes

Industrial lot size	Number of lots
1.10 ha - 1.19 ha	1
1.00 ha - 1.09 ha	0
0.90 ha - 0.99 ha	0
0.80 ha - 0.89 ha	2
0.70 ha - 0.79 ha	4
0.60 ha - 0.69 ha	8
0.50 ha - 0.59 ha	1
Total number of lots	16

2.8 Tentative Implementation Programme

2.8.1.1 The PH site would be implemented in three phases and the YLIEE site would be developed in a single phase. The following summarises the tentative commissioning dates for both the PH and the YLIEE sites:

- Year 2022: Granting of YLIEE's land starting from 2022 which will take about 4 years to complete
- Year 2024: Population intake of PH Site Phase 1
- Year 2026: Population intake of PH Site Phases 2 & 3

3 WATER IMPACT ASSESSMENT

3.1 Introduction

- 3.1.1.1 The proposed development scheme will generate large demands for fresh water supply. The expected impact on the existing water supply systems and the requirement for any upgrading works to meet such demands are discussed in this section.
- 3.1.1.2 Since the commencement of this Study, coordination has been held with WSD to obtain relevant information, including but not limited to the existing capacity of water supply system, water consumption statistic and planned waterworks near the Project site.
- 3.1.1.3 In addition, TR-2 report was issued in June 2013 to seek general consent from WSD. Several comments were received and this assessment is performed with incorporation of WSD's comments. Basically, this report follows the methodology in TR-2.

3.2 Methodology and Design Criteria

3.2.1 Design Guidelines

- 3.2.1.1 The following approach is adopted in carrying out the Water Impact Assessment:
- a) Review interface projects which may have bearing on the development;
 - b) Identify existing and planned water supply systems within the study area;
 - c) Assess the water demands for the development;
 - d) Propose the water supply scheme arising from the development including preparation of a hydraulic analysis;
 - e) Examine the short- and long-term impacts on existing water mains and any interface projects;
 - f) Recommend suitable mitigation measures and/or diversion schemes and arrangements to protect the works facilities, and minimise the disturbance to the normal operation of the facilities during construction stage;
 - g) Provide an implementation programme to facilitate the works to be implemented as scheduled.
- 3.2.1.2 Generally, the PH site and YLIEE are treated as a whole rather than as individual sites when conducting this impact assessment. Development phasing is considered such that public water mains are installed during earlier phases of construction.

- 3.2.1.3 The estimate of water demands for the proposed development is based on the development parameters shown in Section 2 above. Estimates are generally based on unit water demands provided by WSD Departmental Instruction (DI) No. 1309.
- 3.2.1.4 The assessment of water mains under Fire-fighting scenario is performed based on the requirement stipulated in WSD DI No.1309 and Fire Service Department (FSD) Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment (April 2012 revision).

3.2.2 Hydraulic Analysis

- 3.2.2.1 The existing fresh water trunk system is modelled under the following conditions:
Demand for fresh and flushing water = 1.5 x MDD (Mean Daily Demand)
- 3.2.2.2 The proposed fresh water distribution system is modelled under the following conditions:
Service Reservoir Water Level = $(TWL - IL)/2$
Demand for fresh water = 3 x MDD (Mean Daily Demand)
Demand for flushing water = 2 x MDD (Mean Daily Demand)
- 3.2.2.3 Under fire-fighting scenario, hydraulic analysis has taken account of additional withdrawal at the extremity of the system with adjustment on the demand as below:
Demand for fresh water = 1 x MDD (Mean Daily Demand)
Demand for flushing water = 1 x MDD (Mean Daily Demand)
- 3.2.2.4 The analysis assumes concurrent fires will not occur within the same supply zone.
- 3.2.2.5 The fire-fighting requirements are shown in **Table 3.2.1**. Moreover, reading in conjunction with Code of Practice for Minimum Fire Service Installations and Equipment, the hydrant shall be of an accepted standard pattern and, with one 65 mm outlet working, shall be capable of delivering not less than 2,000 litres per minute (33.3 litre/second) with a minimum running pressure of 17m at the outlet. The minimum output and pressure should be made available from two 65 mm outlets of a system delivering at the same time, i.e. a total output of not less than 4,000 litres per minute (66.7 litre/second).

Table 3.2.1: Fire Fighting Requirements

Land Use	MDD	Peak Flow Factor
Residential	6000 m ³ /d	1
Industrial	11,000 m ³ /d	1

- 3.2.2.6 Internal diameter of the water mains is used for hydraulic analysis. **Table 3.2.2** shows the nominal diameter and corresponding internal diameter for the common pipe sizes.

Table 3.2.2: Internal Diameter for Pipes

Nominal Diameter (mm)	Internal Diameter (mm)	
	Fresh Water Mains	Salt Water Mains
2000	1976	1932
1800	1776	1732
1600	1576	1532
1400	1379	1335
1200	1182	1150
1000	981	945
900	882	847
800	784	750
700	682	648
600	586	567
550	536	536
525	510	510
500	485	485
450	424	424
400	382	382
375	358	358
350	334	334
300	282	282
250	233	233
200	189	189
150	138	138
100	95	95
80	80	80
50	50	50
40	40	40
25	25	25
20	20	20

- 3.2.2.7 To cater for bend losses, the pipe length is factored by:

- a) For urban areas = 1.2
- b) For rural areas = 1.1

- 3.2.2.8 The pipeline headloss is calculated based on Hazen-Williams equation, the corresponding roughness coefficient is shown in **Table 3.2.3**:

Table 3.2.3: Hazen-Williams Roughness Coefficients

Water Main	Pipe Diameter (mm)	Roughness Coefficient
Fresh	< DN600	110
	≥ DN600	120
TMF	All	90

3.2.2.9 The design criteria for TMF will follow the salt water supply design criteria under DI 1309. The system should meet the criteria as shown in **Table 3.2.4** below.

Table 3.2.4: Design Criteria for Fresh Water Main and Temporary Main for Flushing

Scenario ID	Description	Minimum Residual Head (m)			Velocity of Distribution Pipeline under Peak Flow Condition (m/s)	
		Fresh Water Main	TMF	Fire Location	Minimum	Maximum
A	Daily Operation (Without Fire-Fighting)	20	15	N/A	0.9	3
B	With Fire-Fighting at YLIEE			17	N/A	N/A
C	With Fire-Fighting at PH Site					

3.2.2.10 The hydraulic analysis is performed by utilizing the software InfoWater. The analysis assesses the impact on existing water system as well as conducting hydraulic analysis on the proposed pipeline within the Project site with the aim to substantiate the proposed water supply scheme.

3.2.2.11 Three scenarios namely A, B and C are considered in the analysis as shown in **Table 3.2.5** below.

Table 3.2.5: Scenarios Considered in Hydraulic Modelling

Scenario ID	Water Demand	Description
A	Existing + Project Site	Daily Operation (Without Fire-Fighting)
B	Existing + Project Site	With Fire-Fighting at YLIEE
C	Existing + Project Site	With Fire-Fighting at PH Site

3.3 Existing and Planned Water Supply System

3.3.1.1 The Project site is located within the distribution zone of Ngau Tam Mei Water Treatment Works (NTM WTW) and Au Tau Water Treatment Works (AT WTW). According to WSD, the AT WTW has been mothballed while NTM WTW serves Wang Chau, Tin Shui Wai, Ngau Tam Mei, San Tin and Mai Po and the north-western part of Tuen Mun areas. Currently, NTM WTW can singly meet the existing water demands within the whole supply zone.

3.3.1.2 **Table 3.3.1** provides a summary of information obtained from WSD regarding the Water Treatment Works serving the Project site, which shows the NTM WTW has nearly reached its capacity. Therefore it alone does not have spare capacity to cater for additional water demand by the proposed development. Furthermore, it is anticipated that future development within North West NT will source water from the NTM WTW/AT WTW supply zone; therefore it is proposed to activate AT WTW and operate in parallel with NTM WTW.

Table 3.3.1: Existing daily water demand (m³/d) at Water Treatment Works in 2012

Water Treatment Works (WTW)	Recorded Maximum Outputs in 2012	Existing Capacity
NTM WTW	229,200 ⁽¹⁾	230,000
AT WTW	N/A ⁽²⁾	330,000

(1) As recorded at Ngau Tam Mei WTW in June 2012

(2) As per information provided by WSD, AT WTW has been mothballed

3.3.1.3 The Project site is located within supply zones served by the Ngau Tam Mei Fresh Water Primary Service Reservoirs (NTM FWPSR), Au Tau Fresh Water Primary Service Reservoirs (AT FWPSR), Wang Chau Fresh Water Service Reservoir (WC FWSR) and the Tan Kwai Tsuen North Fresh Water Service Reservoir (TKTN FWSR). The key waterworks and fresh water service reservoir supply zones are shown in **Drawing No. 226464/OAP/C/030**.

3.3.1.4 With reference to WSD record plans and WSD schematic layout of fresh water supply in Tuen Mun and Yuen Long areas, the existing fresh water supply services in the vicinity of the Project site comprise the following:

Table 3.3.1a: Existing Fresh Water Supply Services

Services	System	Location
DN900 pipe	Trunk water main delivery from NTM FWPSR to WC FWSR	Along Fuk Hi Street
DN250 and DN80 pipes	Distribution mains connected to DN900 trunk main to supply water for existing open storage area and housing within and near the Project site.	Along Long Ping Road
DN900 pipe	Distribution main (TMF) from WC FWSR serving Tin Shui Wai (TSW)	From WC FWSR to TSW
DN600 and	Distribution mains from WC FWSR	Along Fuk Shun

Services	System	Location
DN450 pipes		Street
DN300 pipes	Distribution mains from WC FWSR, branch of the above DN600 distribution main	Along Fuk Hi Street

3.3.1.5 A record of the existing fresh water supply services in the vicinity of the Project site is shown in **Drawing No. 226464/OAP/C/031**.

3.3.1.6 Estimation of water demand for service reservoirs in year 2012 as shown in **Table 3.3.2** is based on the Working Group on Population Distribution Projections (2013-2021) - by District Council District, New Town and Tertiary Planning Unit (March 2013). The unit demand for existing developments is derived based on the benchmark of maximum water daily consumption of service reservoirs in year 2012. It is assumed that the unit demand takes into account of the residential uses, industrial uses and other land uses. A review of benchmark maximum water consumption rates in **Table 3.3.2** reveals that the estimated demands are reasonably accurate. Detailed calculations are attached in **Appendix A**.

Table 3.3.2: Existing daily water demand (m³/d) at Fresh Water Service Reservoirs in Year 2012

Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand (m ³ /d)	Estimated Flushing Water Demand (m ³ /d)	Total Estimated Water Demand without Using Recycled Water (m ³ /d)	Benchmark of Maximum Water Consumption Rate in Year 2012 (m ³ /d) ⁽¹⁾	Required Capacity of FWSR in 2012 (m ³)	Existing Capacity of FWSR (m ³)
Ngau Tam Mei Primary	17,828 (Direct Feed)	5,963 (Direct Feed)	23,790 (Direct Feed)	127,090 ⁽²⁾ (Direct Feed)	66,195	40,750
Wang Chau	4,046	21,568	25,614	17,310	8,427	58,790
Tan Kwai Tsuen North	63,624	2,066	65,690	65,560	48,235	81,516
Au Tau Primary	43,178 (Direct Feed)	15,112 (Direct Feed)	58,290 (Direct Feed)	n/a	46,929	100,548
Tuen Mun North	39,880	13,958	53,838	n/a	33,400	60,564
Total	168,556	58,667	227,223 ⁽³⁾	229,200	n/a	342,168

(1) Data provided by WSD under letter dated 22 January 2013, Ref: (22) in WSD 1556/406/11 Pt.1

(2) Currently AT WTW is suspended, therefore NTM Primary S/R also serves AT Primary S/R supply zone. The total estimated water consumption of NTM Primary S/R (Direct Feed) is 23,790 + 58,290 + 53,838= 135,918 m³/d, which is comparable to the recorded consumption rate 127,090 m³/d.

(3) Total estimated consumption rate of NTM WTW is 227,223 m³/d which is comparable to the recorded consumption rate 229,200 m³/d

(4) Currently AT WTW is suspended, therefore NTM Primary S/R also serves AT Primary S/R, the required capacity summary includes AT WTW supply zone. No secondary storage allowance for San Tin/Mai Po area as stated in WSD's Planning Report No. 6/93.

(5) Capacity of FW S/R = 0.75 MDD (FW) + 0.25 MDD (TMF)

(6) Capacity of Primary FW S/R = 0.75 MDD (FW) + 0.25 MDD (TMF) + 0.2 MDD of S/R

3.3.1.7 It is anticipated that future developments at Yuen Long South and Hung Shui Kiu will have implications on AT FWPSR, as further explained in **Section 3.5** below. Furthermore, the TKTN FWSR is located far away from the Project site, it is not suggested to source water from this reservoir.

3.3.1.8 The Project Site is currently occupied by open storage, vehicle parks, farmland, fallow land, rural residential dwellings and

temporary structures etc. These facilities and residential dwellings near the Project Site currently source water from the DN900 fresh water trunk main directly feed from NTM FWPSR. In this connection, the Project could be served by the same DN900 trunk main with water supply from the NTM FWPSR. Alternatively, in view of the close proximity and available capacity of Wang Chau FWSR, the Project could also be served by this FWSR. The impacts and constraints associated with two alternative options has been explored and presented in **Section 3.7**.

- 3.3.1.9 Although NTM FWPSR is currently overloaded, the proposal to operate AT WTW in parallel with the NTM WTW will reduce the consumption rate from NTM FWPSR. Further explanations and assessment are provided in **Section 3.8**.
- 3.3.1.10 Although WSD showed their intention to have salt water supply to North West New Territories and Yuen Long under their Planning Report No. 10/2008 and the planned salt water supply system is under construction as shown in **Drawing No. 226464/OAP/C/031**, the proposed development has not been included in WSD's study. Therefore there is no existing salt water supply system available to the Project site for flushing.
- 3.3.1.11 **Table 3.3.4** provides a summary of information obtained from WSD which shows there is no existing or planned capacity in the salt water supply system to cater for the proposed development at this time.

Table 3.3.4: Planned Daily Water Demand (m³/d) within Tan Kwai Tsuen Salt Water Service Reservoir Supply Zone in Year 2012 and Later

	Year 2012 ⁽¹⁾	Later ⁽¹⁾
Residential		
Tan Kwai Tsuen Salt Water Service Reservoir Supply Zone (PWP No. 9045WS)	43,851	43,441
Tan Kwai Tsuen Salt Water Service Reservoir Extension Supply Zone (PWP No. 9048WS)	17,186	18,045
Industrial, Commercial & Hospital Uses	6,000	6,000
Total MDD	67,037	67,486
Salt Water Pumping Station at Lok On Pai (Required Capacity) ⁽²⁾	80,444	80,983
Salt Water Pumping Station at Lok On Pai (Planned Capacity)	83,000	83,000
Tan Kwai Tsuen Salt Water Service Reservoir (Required Capacity) ⁽³⁾	17,597	17,715
Tan Kwai Tsuen Salt Water Service Reservoir (Planned Capacity)	18,100	18,100

(1) Data provided by WSD under letter dated 22 January 2013, Ref: (22) in WSD 1556/406/11 Pt.1

(2) Required Capacity of Salt Water Pumping Station = 1.2*MDD

(3) Required Capacity of Salt Water Service Reservoir = 0.25*MDD*1.05

3.4 Water Demand Estimations

3.4.1 Water Demand Estimation and Projection – Wang Chau

- 3.4.1.1 The estimate of fresh and flushing water demand for the proposed development is 19,348 m³/d and 6,597 m³/d respectively. Thus, the total estimated water consumption for the proposed development is 25,945 m³/d.
- 3.4.1.2 With reference to Table 1 of DI No. 1309, water demand estimation for the proposed development (ultimate scenario) is provided in **Table 3.4.1** below.

Table 3.4.1: Estimated Ultimate Daily Water Demand (m³/d) from the Proposed Development

Accommodation Type	Data	Remarks
Residential - PRH & HOS		
Total PH Site Area	18.81	Project Planning Data
Residential Area	14.49	Project Planning Data
Population	57,409	For assessment purpose, 17000 max number of flats and total of 52,000 population is assumed and 10% increment is applied
Fresh Water Unit Demand (m ³ /person/day)	0.225	Assumed 50% of PRH and 50% of HOS, Tables 1 & 2, DI No. 1309; Included Service Trades
FWMDD (m ³ /day)	12,917	Fresh Water Mean Daily Demand
Flushing Water Unit Demand (m ³ /person/day)	0.070	Table 1, DI No. 1309
FLWMDD (m ³ /day)	4,019	Flushing Water Mean Daily Demand
Landscape Area (PH Site)	5.64	25% of Site Area
Irrigation Water Unit Demand (m ³ /ha/day)	100	Average daily requirement of 10mm for landscape
Irrigation Water MDD (m ³ /day)	564	Mean Daily Demand
Education - Schools		
No. of Schools	3.00	
Students per School	765	
No. of Students	2,295	
Fresh Water Unit Demand (m ³ /person/day)	0.025	Table 1, DI No. 1309
FWMDD (m ³ /day)	57	
Flushing Water Unit Demand (m ³ /person/day)	0.025	Table 1, DI No. 1309
FLWMDD (m ³ /day)	57	
Social Welfare Facilities		
NOFA (m ²)	5,908	Being conservative, taking Q1 amongst various types of facilities in Table 3, Chapter 3, HKPSG
NOFA per Person (m ² /employee)	5.70	
No. of Persons	1,036	
Fresh Water Unit Demand (m ³ /person/day)	0.28	Assume commercial activities J11
FWMDD (m ³ /day)	290	
Flushing Water Unit Demand (m ³ /person/day)	0.07	Assume commercial activities J11
FLWMDD (m ³ /day)	73	

Accommodation Type	Data	Remarks
Retail/Market		
Water Demand Included in Service Trades	-	Clause 3, DI No. 1309
YLIEE (Industrial)		
Total Site Area	14.65	Project Planning Data
Net Site Area	11.66	Project Planning Data
Fresh Water Unit Demand (m ³ /ha/day)	450	Table 1, DI No. 1309 ⁽¹⁾
FWMDD (m ³ /day)	5,247	Fresh Water Mean Daily Demand
Flushing Water Unit Demand (m ³ /ha/day)	210	Table 1, DI No. 1309
FLWMDD (m ³ /day)	2,449	Flushing Water Mean Daily Demand
Landscape Area (YLIEE)	2.72	25% of Site Area
Irrigation Water Unit Demand (m ³ /ha/day)	100	Average daily requirement of 10mm for landscape
Irrigation Water MDD (m ³ /day)	272	Mean Daily Demand
Total FWMDD (m³/day)	19,348	Total Fresh Water Mean Daily Demand
Peaking Factor for Distribution Mains	3	
Fresh Water Peak Flow (m³/day)	58,044	For FW Distribution Main Design
Total FLWMDD (m³/day)	6,597	Total Flushing Water Mean Daily Demand
Peaking Factor for Distribution Mains	2	
Flushing Water Peak Flow (m³/day)	13,194	For FLW Distribution Main Design
Total MDD (m³/day)	25,945	Total Mean Daily Demand

(1) The proposed YLIEE comprises three target industries: biotechnology related production, pharmaceuticals, and machinery and equipment manufacturing. No major water consuming industries, such as commercial laundry, are proposed.

3.4.1.3 For water infrastructure planning, YLIEE will be commissioned in Year 2022. For the PH Site, Phase 1 is anticipated to be commissioned in Year 2024, and Phases 2 and 3 commissioned in Year 2026. These demands are summarized in **Table 3.4.2** to **Table 3.4.4**.

Table 3.4.2: Wang Chau Water Demand Estimation in Year 2022

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2022 (m ³ /d)	Estimated Flushing Water Demand in Year 2022 (m ³ /d)	Total Estimated Water Demand in Year 2022 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	5,519	2,449	7,968
	Wang Chau	0	0	0
	Tan Kwai Tsuen North	0	0	0
Total		5,519	2,449	7,968

Table 3.4.3: Wang Chau Water Demand Estimation in Year 2024

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2024 (m ³ /d)	Estimated Flushing Water Demand in Year 2024 (m ³ /d)	Total Estimated Water Demand in Year 2024 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	9,024	3,527	12,552
	Wang Chau	0	0	0
	Tan Kwai Tsuen North	0	0	0
Total		9,024	3,527	12,552

Table 3.4.4: Wang Chau Water Demand Estimation in Year 2026

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2026 (m ³ /d)	Estimated Flushing Water Demand in Year 2026 (m ³ /d)	Total Estimated Water Demand in Year 2026 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	19,348	6,597	25,945
	Wang Chau	0	0	0
	Tan Kwai Tsuen North	0	0	0
Total		19,348	6,597	25,945

3.5 Interface Projects

3.5.1.1 In performing the impact assessment on the existing water supply system, the water demand will take into account the following existing, planned and proposed developments:

- Existing developments within supply zone of NTM WTW with planned population growth;
- North East New Territories (NENT) New Development Areas (NDA) Planning and Engineering Study;
- Salt Water Supply for Northwest New Territories (NWNT) – Mainlaying in Yuen Long;

- Salt Water Supply for Northwest New Territories – Construction of Tan Kwai Tsuen Salt Water Service Reservoir and Associated Works; and
- Replacement and Rehabilitation of Water Mains Stage 4.

3.5.2 Water Demand Estimation and Projection – Existing Development and Planned Growth

3.5.2.1 Population projections for existing developments within NTM WTW supply zone in year 2022, 2024 and 2026 are based on the Working Group on Population Distribution Projections (2013-2021) - by District Council District, New Town and Tertiary Planning Unit (March 2013). The corresponding estimated water demands are summarized in the **Table 3.5.1** to **Table 3.5.3** below.

Table 3.5.1: Water Demand Projection of Existing and Planned Growth in Year 2022

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2022 (m ³ /d)	Estimated Flushing Water Demand in Year 2022 (m ³ /d)	Total Estimated Water Demand in Year 2022 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	19,303	6,458	25,761
	Wang Chau	5,101	1,735	6,836
	Tan Kwai Tsuen North	66,310	1,067	67,377
Total		90,714	9,260	99,974

Table 3.5.2: Water Demand Projection of Existing and Planned Growth in Year 2024

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2024 (m ³ /d)	Estimated Flushing Water Demand in Year 2024 (m ³ /d)	Total Estimated Water Demand in Year 2024 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	19,351	6,475	25,826
	Wang Chau	5,312	1,809	7,121
	Tan Kwai Tsuen North	66,847	1,205	68,052
Total		91,509	9,489	100,998

Table 3.5.3: Water Demand Projection of Existing and Planned Growth in Year 2026

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2026 (m ³ /d)	Estimated Flushing Water Demand in Year 2026 (m ³ /d)	Total Estimated Water Demand in Year 2026 without Using Recycled Water (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary (Direct Feed)	19,399	6,492	25,891
	Wang Chau	13,023	4,383	17,406
	Tan Kwai Tsuen North	67,384	1,343	68,726
Total		99,805	12,217	112,023

3.5.3 NENT NDA Planning and Engineering Study

- 3.5.3.1 The Agreement No. CE61/2007(CE) NENT NDA planning and engineering study is underway. According to the latest Draft Technical Report No. 10E – WUIA issued on Nov 2013, the population within NDAs will be built up in stages with first population intake anticipated in 2023 and last population intake in 2031.
- 3.5.3.2 According to the above-mentioned report, it is recommended to source water from NTM WTW ultimately by laying a trunk main from NTM WTW to the proposed water supply facilities within the proposed development. The study proposed that the NTM WTW will be expanded with a design capacity increase from 230 MLD to 450 MLD to cater for the additional water demand (about 73 MLD) from the development.
- 3.5.3.3 It is noted that the expansion of NTM WTW will only be carried out under NENT NDA. Therefore, this impact assessment has been carried out assuming that the design capacity of the NTM WTW remains 230MLD. The additional impact on the current design capacity of NTM WTW (230MLD) arising from NENT NDA and corresponding mitigation measures should be confirmed in the NENT NDA study.

3.5.4 Other Planned Developments in NWNT

- 3.5.4.1 According to the Planning and Engineering Study reports of other planned developments including Hung Shui Kiu New Development Area and Yuen Long South Development, fresh water will be sourced from AT WTW via AT FWPSR or newly proposed FWSR which is independent of proposed NTM WTW supply zone. Therefore, there are no interfaces between the proposed developments and these planned developments.

3.5.5 Salt Water Supply for Northwest New Territories (NWNT) – Yuen Long

- 3.5.5.1 According to the information from WSD, a proposed salt water supply system to NWNT and Yuen Long is now under construction stage. It is anticipated that the works would be completed by June 2014.
- 3.5.5.2 The fresh water demand for flushing in Yuen Long area would be greatly reduced upon completion of the salt water supply system. In particular for Tin Shui Wai area with a total demand of about 20MLD for flushing purpose (currently source water from WCFWSR).

3.6 Total Water Demand Estimation

- 3.6.1.1 This section provides total water demand estimation from existing, planned and proposed developments in 2022, 2024 and 2026. The

total water demand projections include estimates of all known existing and proposed developments with the supply zones of NTM WTW, as summarized **Table 3.6.1** to **Table 3.6.3** below. These calculations are summarized in **Appendix A**.

Table 3.6.1: Total Water Demand Estimation in Year 2022

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2022 (m ³ /d)	Estimated Flushing Water Demand in Year 2022 (m ³ /d)	Total Estimated Water Demand in Year 2022 without Using Recycled Water (m ³ /d)	Required Capacity of FWSR ⁽¹⁾ in 2022 (m ³ /d)	Existing Capacity of FWSR (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary	24,822 (Direct Feed)	8,907 (Direct Feed)	33,729 (Direct Feed)	20,800	40,750
	Wang Chau	5,101	1,735	6,836	4,259	58,790
	Tan Kwai Tsuen North	66,310	1,067	67,377	49,999	81,516
Total		96,232	11,709	107,942	n/a	n/a

Table 3.6.2: Total Water Demand Estimation in Year 2024

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2024 (m ³ /d)	Estimated Flushing Water Demand in Year 2024 (m ³ /d)	Total Estimated Water Demand in Year 2024 without Using Recycled Water (m ³ /d)	Required Capacity of FWSR in 2024 (m ³ /d)	Existing Capacity of FWSR (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary	28,375 (Direct Feed)	10,002 (Direct Feed)	38,377 (Direct Feed)	23,931	40,750
	Wang Chau	5,312	1,809	7,121	4,436	58,790
	Tan Kwai Tsuen North	66,847	1,205	68,052	50,436	81,516
Total		100,534	13,016	113,550	n/a	n/a

Table 3.6.3: Total Water Demand Estimation in Year 2026

Water Treatment Works (WTW)	Existing Fresh Water Service Reservoirs (FWSRs)	Estimated Fresh Water Demand in Year 2026 (m ³ /d)	Estimated Flushing Water Demand in Year 2026 (m ³ /d)	Total Estimated Water Demand in Year 2026 without Using Recycled Water (m ³ /d)	Required Capacity of FWSR in 2026 (m ³ /d)	Existing Capacity of FWSR (m ³ /d)
Ngau Tam Mei WTW	Ngau Tam Mei Primary	38,747 (Direct Feed)	13,089 (Direct Feed)	51,836 (Direct Feed)	34,673	40,750
	Wang Chau	13,023	4,383	17,406	10,863	58,790
	Tan Kwai Tsuen North	67,384	1,343	68,726	50,874	81,516
Total		119,153	18,814	137,968	n/a	n/a

(1) Capacity of FW S/R = 0.75 MDD (FW) + 0.25 MDD (TMF);

(2) Capacity of Primary FW S/R = 0.75 MDD (Direct Feed FW) + 0.25 MDD (Direct Feed TMF) + 0.2 MDD of S/R;

(3) Required capacity of NTM Primary FW S/R is calculated without secondary storage allowance for San Tin/Mai Po area as of the existing situation

3.7 Proposed Water Supply Scheme and Hydraulic Analysis

- 3.7.1.1 Currently, there is no existing or planned delivery of salt water supply system within or in the vicinity of the Project site for flushing. Therefore, it is proposed to use Temporary Mains Water for Flushing (TMF) within the Project site. Separate fresh and flushing water supply mains within the Project site will allow the flexibility of changing the source of flushing water supply from fresh water to others, i.e. salt water or treated sewage effluent in the future by WSD if required.
- 3.7.1.2 The sustainable option for permanent flushing water supply source should be further developed in detailed design stage. For example, a proposal to reuse treated effluent from Yuen Long Sewage Treatment Works and adopt a grey water flushing system can be explored though certain degree of technical difficulties would have to be overcome.
- 3.7.1.3 In this study, it is assumed that flushing water will be supplied by fresh water supply system permanently. Therefore, the assessment on the capability of the existing / proposed fresh water distribution system has taken into account the flushing water demand.
- 3.7.1.4 Since the NTM WTW has nearly reached its capacity and it alone has no spare capacity to cater for additional water demand, it is proposed to operate the AT WTW in parallel with NTM WTW in the long term to supply fresh water to the proposed development.
- 3.7.1.5 It is proposed to shift the supply zone of AT FWPSR (direct feed) and Tan Kwai Tsuen South (TKTS) FWSR to AT WTW while NTM WTW supply zone comprising NTM FWPSR (direct feed), Wang Chau FWSR and TKTN FWSR as per the proposed supply scheme in WSD Planning Report No. 5/96. Under such case, it is anticipated that water consumption from NTM FWPSR will be reduced due to a portion of demand being offset by the AT WTW and AT FWPSR supply zone.

3.7.2 Proposed Water Supply Scheme – Option 1

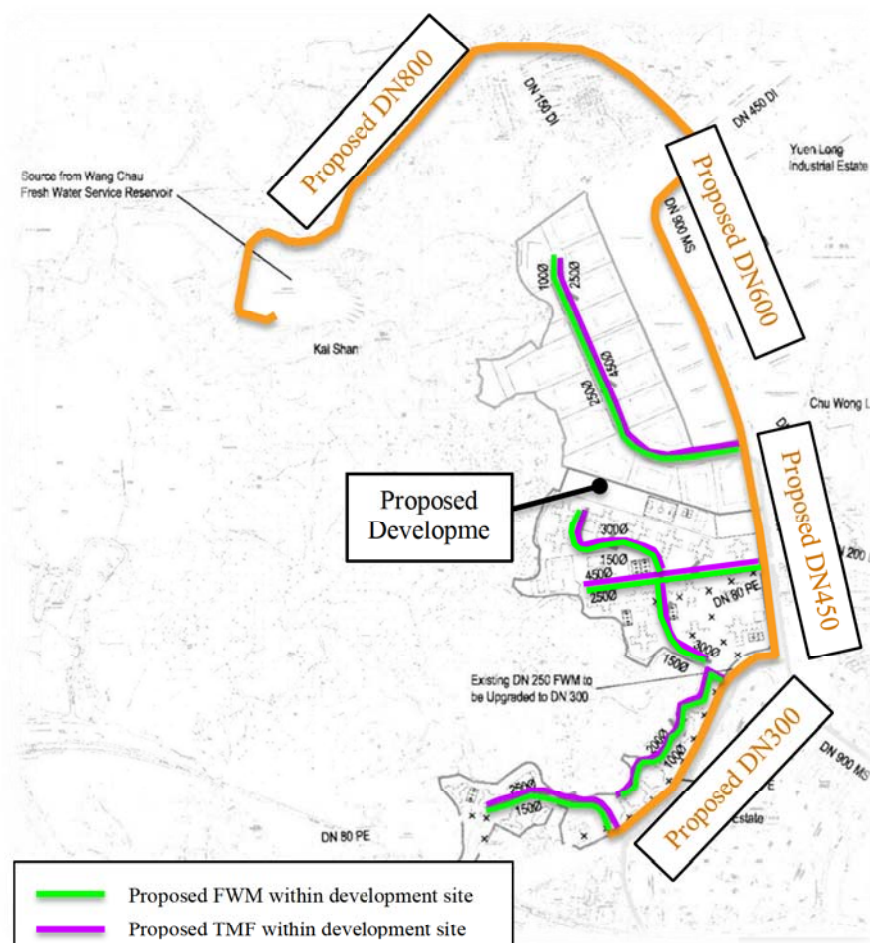
- 3.7.2.1 In view of the proximity of WC FWSR, it is proposed to source water from WC FWSR and corresponding distribution mains.
- 3.7.2.2 The fresh water distribution system under Option 1 is modelled under the following conditions:
- Wang Chau Service Reservoir Water Level = $(TWL - IL)/2 = (67.0 - 60.845) / 2 = 63.9\text{mPD}$
- Demand for fresh water = 3 x MDD (Mean Daily Demand)
- Demand for flushing water = 2 x MDD (Mean Daily Demand)
- 3.7.2.3 From the hydraulic analysis as shown in the **Table 3.7.1**, the capacity of the existing DN600 distribution main from WC FWSR is not

adequate to supply water for the proposed development even without considering the existing water demand of WC FWSR supply zone. It can be concluded that the existing DN600 cannot cater for the water demands of both the existing and proposed developments.

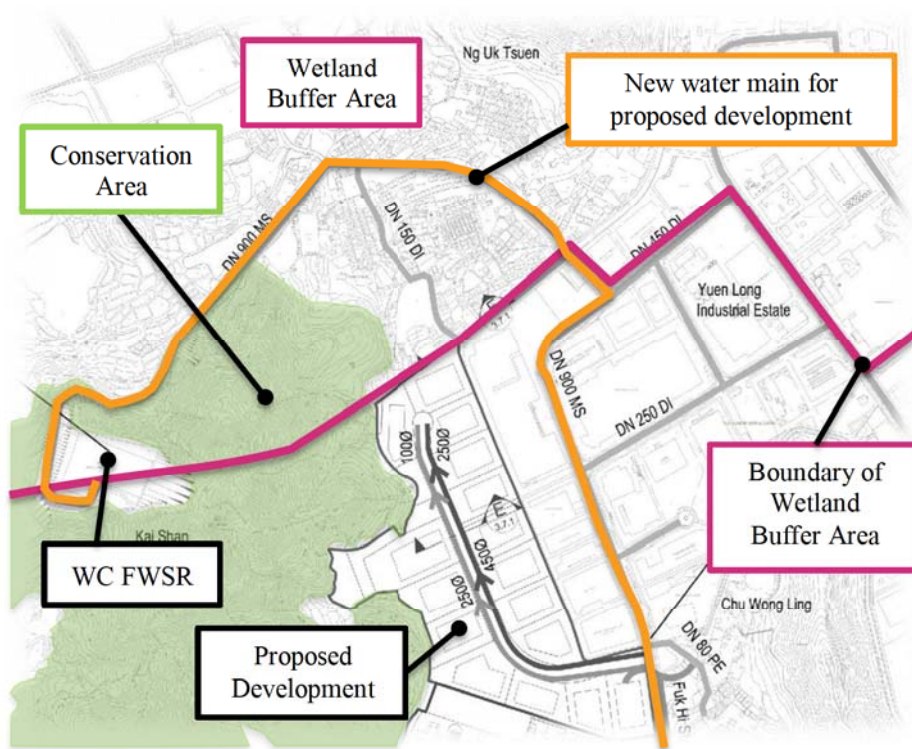
Table 3.7.1: Capacity Checking of Proposed Watermain

	Daily Water Demand of Proposed Development (m ³ /d)	Peaking Factor for Distribution Main	Design Demand (m ³ /d)
Fresh Water	19,348	3	58,044
Flushing Water	6,597	2	13,194
Total	25,945	N/A	71,238
Capacity of DN600 Pipe (Assuming maximum velocity of 3 m/s)			69,907 (Not enough capacity without considering existing water demand)

To supply water to the proposed development, it is proposed to lay a new distribution main (ranging from sizes DN800 to DN300) from the WC FWSR as shown in the schematic layout below. Corresponding hydraulic analysis and results are presented in **Appendix B**.



3.7.2.4 However, this option will require laying a new distribution main with a total length of approximately 3.3km which will encroach onto the Wetland Buffer Area (WBA) and Conservation Area (CA) in Kai Shan. There is a general presumption against development within any WBA and CA zone and they should always be conserved on top priority. This option will trigger potential ecological impacts and will very likely attract adverse comment and strong objection from AFCD/green groups. Hence, this option is not preferable from environmental point of view.



3.7.3 Proposed Water Supply Scheme – Option 2

3.7.3.1 In view of the proximity of the DN900 fresh water trunk main running adjacent to the Project site at Fuk Hi Street and the DN250 distribution main along Long Ping Road, it is proposed to utilize these watermains to supply water for this development. The water supply will be directly fed by the NTM FWPSR. The fresh water trunk system under Option 2 is modelled under the following conditions:

$$\text{Ngau Tam Mei Primary Service Reservoir Water Level} = (\text{TWL} - \text{IL})/2 = (104 - 94) / 2 = 5.0\text{m} = 99.0\text{mPD}$$

Length of DN1400 trunk main from NTM FWPSR is about 8800m

3.7.3.2 As a conservative analysis, the existing demand at Tan Kwai Tsuen North FWSR will be drawn from the most downstream part of the DN1400 trunk main system.

3.7.3.3 **Drawing Nos. 226464/OAP/C/032 and 301–308** illustrate the proposed water supply scheme. Common utility sections are provided in **Drawing No. 226464/OAP/C/701** to illustrate sufficient space is available within the street sections. It is proposed that mainlines be either ductile iron or polyethylene. Adherence to WSD standards for mainlaying and equipment shall be maintained during detailed design and construction.

3.7.3.4 Detailed hydraulic analysis and modelling results are provided in **Appendix B**.

3.8 Potential Impact to Existing and Planned Waterworks Facilities

3.8.1 Overview of Impacts

3.8.1.1 The impacts on NTM WTW, NTM FWPSR and corresponding trunk water supply system is more critical under Option 2 since the design demand for Option 2 (3 x MDD for fresh water and 2 x MDD for flushing water) is larger than that for Option 1 (1.5 x MDD for fresh water and flushing water). Therefore, no separate detailed impact assessment on NTM WTW, NTM FWPSR and corresponding trunk water supply system was performed for Option 1.

3.8.2 Impact on Water Treatment Works and Water Service Reservoirs

3.8.2.1 As AT WTW has been suspended and all water demand within the NTM WTW and AT WTW are supplied by NTM WTW and NTM FWPSR solely, currently the NTM WTW reached its design capacity while NTM FWPSR is overloaded.

3.8.2.2 There is insufficient capacity at NTM WTW alone to cater for the water demand arising from the proposed development, both in the short term (Year 2022) and long term (Year 2026 and later). Therefore

it is proposed that AT WTW will be operated in parallel with the NTM WTW.

- 3.8.2.3 Under such proposal, the total water demand of NTM WTW in year 2026 is estimated to be 138MLD approximately which is far lower than 230 MLD, the design capacity of NTM WTW. NTM WTW is capable to cater for the additional water demand arising from this Project.
- 3.8.2.4 The NTM FWPSR currently supplies water to San Tin and Mai Po areas directly via trunk main. According to WSD's planning report no. 6/93, the capacity of NTM FWPSR had been designed for the primary storage, which is equal to 20% of the maximum MDD of the NTM WTW. Secondary storage for direct supply areas (San Tin/Mai Po) was considered not necessary since it is a temporary arrangement.
- 3.8.2.5 Under the proposal that AT WTW operate in parallel with the NTM WTW, the consumption rate from NTM FWPSR will be reduced. The required capacity of the PSR in year 2026 is 34.7 MLD approximately which is lower than 40.8 MLD, the design capacity of NTM FWPSR. NTM FWPSR has adequate capacity to cater for the additional water demand arising from the Project. The required capacity of the NTM FWPSR is calculated based on the assumption that no secondary storage for San Tin/Mai Po area is allowed as per the existing situation. However, if necessity arises, the surplus storage at both NTM FWPSR and AT FWPSR will be available.
- 3.8.2.6 It is anticipated that AT WTW and AT FWPSR could cater for both the existing and planned developments within the proposed supply zone (TKTS FWSR and Tuen Mun North FWSR) as of WSD Planning Report No. 5/96. The detailed assessment on AT WTW and AT FWPSR will be performed under the Planning and Engineering Study of those planned developments as mentioned in section 3.5.4.
- 3.8.2.7 For the transfer system from NTM FWPSR to WC FWSR - DN1400 and DN900 trunk mains, the peak velocity and head loss in the pipeline will be increased due to additional draw-off from this Project. The residual hydraulic head at WC FWSR would be decreased from 21m to about 8.5m. While the reduction in residual head may be undesirable, it is still considered feasible.

3.8.3 Impact on Existing Water Main and Design of Proposed Water Main Network (Option 1)

- 3.8.3.1 Under daily operation scenario, the residual heads at the proposed distribution mains within the Project site are sufficient to meet the minimum requirement as stated in **Table 3.2.4**. The minimum residual heads for fresh water main and flushing water main are 27m and 25m respectively. The corresponding velocity within the proposed pipeline ranging from 0.87m/s to 2.53m/s which is also satisfactory in respect of meeting the requirement stated in **Table 3.2.4**.

- 3.8.3.2 Under the fire fighting scenario at YLEE/PH Site, the residual heads at the proposed distribution mains within the Project site are sufficient to meet the minimum requirement as stated in **Table 3.2.4**

3.8.4 Impact on Existing Water Main and Design of Proposed Water Main Network (Option 2)

- 3.8.4.1 There are no long-term (Year 2026) adverse impacts on the existing DN900 and DN1400 trunk mains as the maximum velocity increased to 1.95m/s and 2.1m/s respectively which satisfy the requirement stated in **Table 3.2.4**. However a 125-meter section of existing DN250 fresh water main along Long Ping Road will require permanent upgrading to DN300 to cater for the additional water demand and maintain minimum residual head.
- 3.8.4.2 Under daily operation of the water supply system (Scenario A), the residual heads at the proposed distribution mains within the Project site are sufficient to meet the minimum requirement as stated in **Table 3.2.4**. The minimum residual heads for fresh water main and flushing water main are 44m and 33m respectively. The corresponding velocity within the proposed pipeline ranging from 0.87m/s to 2.53m/s which is also satisfactory in respect of meeting the requirement stated in **Table 3.2.4**.
- 3.8.4.3 The proposed water mains within the Project site would connect to the existing DN900 fresh water main at Fuk Hi Street (two connection points) and existing DN250 fresh water main at Long Ping Road (two connection points) which would impose short-term (Year 2022) impact on the existing water supply system during construction stage.
- 3.8.4.4 The existing branches within the Project site and its corresponding connection points are to be modified or abandoned.
- 3.8.4.5 Further to the hydraulic analysis on daily operation scenario, fire-fighting scenarios at YLIEE / PH site (Scenario B / C) are also considered. Under the two scenarios, both the existing and proposed system performed satisfactory.
- 3.8.4.6 There is no spare capacity on the planned salt water supply system from Lok On Pai and Tan Kwai Tsuen to cater for the flushing water demand by the proposed development. Separate fresh and flushing water supply systems will be provided within the Project site to allow the flexibility of changing the source of flushing water supply to the Project site in the future. The project will carry long-term impacts on the fresh water supply network until such time that alternatively sourced flush water, such as salt water or treated sewage effluent (TSE) can be provided.

3.9 Proposed Mitigation Measures

- 3.9.1.1 To serve buildings in YLIEE, flushing mains from DN100 to DN250 and fresh water mains from DN250 to DN450 are proposed along the

- new YLIEE public street. They connect to the existing DN900 fresh water main at Fuk Hi Street (two connection points). The flushing main will be supplied with fresh water until such time that alternative water supply is provided at the Project site.
- 3.9.1.2 To serve buildings in PH Phases 2 and 3, DN250 flushing and DN450 fresh water mains are proposed along the new public road in the PH Phase 2 and 3 site. They connect to the DN900 fresh water main at Fuk Hi Street (two connection points). The flushing main will be supplied with fresh water until such time that alternative water supply is provided at the Project site.
- 3.9.1.3 A section of existing DN250 fresh water main along Long Ping Road is proposed to be permanently upgraded to DN300 to cater for the additional water demand of the proposed development and ensure residual head at the downstream meets WSD minimum requirement. In view of the existing DN250 pipe is under operation, off-line rehabilitation is proposed to minimize impacts to the user.
- 3.9.1.4 To serve buildings in PH Phase 1, flushing mains from DN100 to DN150 and fresh water mains from DN200 to DN250 are proposed along the new public roadway within PH Phase 1 site. They connect to the DN250 fresh water main at Long Ping Road (two connection points). The flushing main will be supplied with fresh water until such time that alternative water supply is provided at the Project site.
- 3.9.1.5 PH buildings that are not adjacent to flushing and fresh water mains at public roadways will be served by internal private water mains and maintained by Housing Authority.
- 3.9.1.6 Due considerations (in terms of schedule of works and detailing) should be given on developing the detailed design of proposed connection points to DN900 and DN250 fresh water mains in order to minimize the short-term impact to the public and user. The short-term diversion of water mains may be necessary only to make the connection between existing and proposed water mains.
- 3.9.1.7 Due care should be taken during detailed design and construction to protect existing waterworks, including all above- and below-grade equipment, so as to retain original working condition and full operation at all times. **Drawing Nos. 226464/OAP/C/301-308** illustrate the proposed fresh and flushing water connections and mitigation works.

3.10 Conclusion and Recommendation

- 3.10.1.1 Since the NTM WTW has nearly reached its capacity and it alone has no spare capacity to cater for additional water demand, it is proposed to operate the AT WTW in parallel with NTM WTW in the long term to supply water to the proposed development.
- 3.10.1.2 From the hydraulic point of view, both Option 1 and Option 2 are viable of supplying water to the proposed development with no

adverse impacts on the existing water supply systems. However, Option 1 will require laying a new distribution main which will encroach onto the WBA and CA in Kai Shan. There is a general presumption against development within any WBA and CA zone. This option will trigger potential ecological impacts and will very likely attract adverse comment and strong objection from AFCD/green groups. Hence, this option is not preferable from environmental point of view.

- 3.10.1.3 Option 2 is recommended in this study, such that fresh water will be supplied from the existing trunk main system served by NTM FWPSR. The capacity of NTM FWPSR is sufficient to supply water to the proposed development under year 2026 scenario (fully commission of the proposed development) and therefore the trunk main system is not burdened by adverse impacts.
- 3.10.1.4 According to the comments from WSD, Option 2 is not preferred from operation and maintenance point of view despite the DN900 trunk main is readily available for connection. Despite this, the recommended Option 2 (which is the critical scenario) for water supply under this study demonstrates the feasibility of the proposed development and the recommended connection points are subject to confirmation by WSD. WSD also considers that alternative proposals should be further explored and studied at next stage.
- 3.10.1.5 The water demand, in particular the unit demand, for YLIEE should be further reviewed for any changes/update on the industrial characteristic especially if major water consuming industries will be allowed.
- 3.10.1.6 The water demand and corresponding mitigation measures of other interfacing proposed developments, in particular for those currently at feasibility study stage, should be further reviewed and confirmed.

3.11 Implementation Programme

- 3.11.1.1 To cope with the intake scheduled of the proposed development, the following implementation programme is proposed for the planned and proposed water infrastructure works:

Table 3.11.1: Implementation Schedule of Key Water Infrastructure Works for Proposed Development

Item Ref	Main Proposed Water Works	Target Date Completion
1	Existing DN250 FWM Upgrade at Long Ping Road	Before 2022
2	Fresh and Flush Distribution Mains within YLIEE	Before 2022
3	Fresh and Flush Distribution Mains within PH Site Phase 1	Before 2024
4	Fresh and Flush Distribution Mains within PH Site Phases 2 & 3	Before 2026

- (1) Concurrent WSD project Salt Water Supply for Northwest New Territories - Construction of Tan Kwai Tsuen Salt Water Service Reservoir and Associated Works has an estimated completion date of 2013.
- (2) Concurrent WSD project Salt Water Supply for Northwest New Territories - Mainlaying in Yuen Long has an estimate completion date of 2014.
- (3) Concurrent WSD project Replacement and Rehabilitation of Water Mains - Stage 4 has an

- estimated completion date of 2015.
- (4) Concurrent project Housing Sites in Yuen Long South is under Planning and Engineering Investigation by PlanD with an anticipated construction schedule of 2020-2030.
 - (5) Concurrent project Hung Shui Kiu New Development Area is under Planning and Engineering Investigation by PlanD with an anticipated construction schedule of 2024-2034.

4 UTILITY IMPACT ASSESSMENT

4.1 Methodology and Design Criteria

- 4.1.1.1 Utilities required for assessment at Wang Chau include power supply, highway lighting, gas supply, and telecommunication services.
- 4.1.1.2 Generally, the PH site and YLIEE are treated as a whole rather than as individual sites when conducting this impact assessment. Development phasing is considered such that primary works are installed during earlier phases of construction.
- 4.1.1.3 For purposes of the feasibility study, the general requirements for utility installations are referenced from the Hong Kong Planning Standards and Guidelines (HKPSG) and Highways Department Technical Circular 3/90.
- 4.1.1.4 The relevant utility service providers listed in **Table 4.1.1** have been consulted to identify the existing and planned utility services and their capacities to extend into the proposed development.

Table 4.1.1: Utility service providers serving the Project site

Service Type	Utility Service Provider
Power Supply	China Light and Power Hong Kong Limited (CLP)
Street Lighting	Highways Department Lighting Division (HDLD)
Gas Supply	The Hong Kong and China Gas Company (HKCG)
Telecommunications (Local Fixed Operators)	Hutchison Global Communications Limited (HGC)
	Hong Kong Cable Telecommunications Limited (PCCW)
	Hong Kong Cable Television Limited (HKCTV)
	Wharf T&T Limited (WT&T)
	New World Telecommunications Limited (NWT)
	Hong Kong Broadband Network Limited (HKBN)

- 4.1.1.5 The general requirements for various utility installations according to the Highways Department Technical Circular 3/90 are summarised in **Table 4.1.2**.

Table 4.1.2: Typical cover and separation of installed underground utilities

Common Utilities	Minimum Cover		Separation from Other Utilities & Planting
	Footpath / Areas without Vehicular Traffic	Road/Areas with Vehicular Traffic	
CLP cables - 132 kV - 11 kV	1000mm 750mm	1200mm 900mm	Working clearance of 300mm from other utilities 150mm (1m between 132 kV and 11 kV)
HKCG pipes - low pressure - intermediate pressure	700mm 1000mm	1100mm 1100mm	600mm for steel gas pipes, 300mm for other gas pipes
PCCW cables HGC cables HKBN cables Wharf T&T cables NWT cables CTV cables	450mm 450mm 450mm 450mm 450mm 450mm	900mm 900mm 900mm 900mm 900mm 900mm	Working clearance of 300mm from other utilities, or as required by the service provider

4.2 Power Supply

- 4.2.1.1 Power supply record plans showing the extent of existing power supply network has been obtained from China Light and Power Hong Kong Limited (CLP). The existing and planned power supply network is presented in **Drawing Nos. 226464/OAP/C/401-408**.
- 4.2.1.2 With reference to CLP load density rates, the power demand for the proposed development is estimated to be 112MVA and assumes a diversity factor of 0.8. See **Appendix C** for this calculation.
- 4.2.1.3 Existing 11kV cables run adjacent to the Project site below grade at Long Ping Road and Fuk Hi Street. According to CLP these cables are serving existing developments and do not have spare capacity to serve the Project site.
- 4.2.1.4 An existing 132kV power cable runs adjacent to the Project site below grade along Long Ping Road and along Fuk Hi Street between Long Tin Road and Wang Lok Street. The network ultimately connects to the Yuen Long Power Sub-Station located nearby the Tin Shui Wai MTR Station.
- 4.2.1.5 According to CLP, a new 132kV power substation will be required to deliver power from the 132kV cables at Long Ping Road to the proposed development. A land allowance of 32m X 62m is required to accommodate the substation transmission equipment. According to CLP, the orientation of equipment within the substation plan may be negotiated as part of the detailed design.
- 4.2.1.6 It is proposed to install new 11kV cable circuits from the proposed power substation to development platforms via onsite roadways.

- 4.2.1.7 As advised by CLP, the land application process for a primary substation typically takes 1 year to receive government approval, 2.5 years to acquire the land and another 2.5 years for design, construction and commissioning. Consultation with CLP has been made and it was agreed that CLP would approach LandsD for a site search for the new substation.

4.3 Highway Lighting

- 4.3.1.1 Record plans showing the extent of the existing highway lighting ducts have been obtained from the Highways Department Lighting Division (HDL) and are presented in **Drawing Nos. 226464/OAP/C/401-408**. The lighting ducts can be found in the vicinity of the Project site comprising:

- The roadway centreline of Long Ping Road between Fung Chi Road and Fuk Hi Street;
- The roadway centreline of Fuk Hi Street between Long Ping Road and Wang Lok Street;
- The east and west kerb line of Fuk Hi Street from Long Ping Road to Wang Lee Street.

- 4.3.1.2 Street lights are required along all public roads within the Project site including the emergency vehicle access roadways. These lights shall be powered by low voltage cable from the CLP network. The space requirements for the cables and pillar boxes are minor and considered to be feasible for incorporation into the proposed development.

- 4.3.1.3 The highway lighting will form part of the detailed design of the proposed roadwork. Adherence to HDL standards for mainlaying and equipment shall be maintained during detailed design and construction.

4.4 Gas Supply

- 4.4.1.1 Gas supply record plans have been obtained from The Hong Kong and China Gas Company Limited (HKCG). Currently there is no existing gas main within the Project site. The existing and planned gas supply network is presented in **Drawing Nos. 226464/OAP/C/501-508**. Existing services in the vicinity of the Project site comprise:

- 315Ø medium pressure polyethylene (PE) gas main running along Fuk Wang Street from Wang Lee Street to Fuk Hi Street, turning down Fuk Hi Street to Long Ping Road;
- 355Ø medium pressure polyethylene (PE) gas main running along Fuk Hi Street from Long Ping Road to Wang Lok Street;
- Medium pressure polyethylene (PE) gas mains ranging from 300Ø to 355Ø and low pressure PE gas mains ranging from 200Ø to

2500 running Long Ping Road from Fuk Hi Street to Fung Chi Road.

- 4.4.1.2 It is proposed to connect low to medium pressure gas services to medium pressure mains at Long Ping Road and Fuk Hi Street if predicted gas demands of the proposed developments do not exceed the spare capacity of the existing pipeline. Otherwise a new gas pipeline may need to be installed along the existing roads.
- 4.4.1.3 The gas supply network will form part of the detailed design of the proposed development. It is proposed that mainlines be polyethylene or as required by HKCG. Adherence to HKCG standards for mainlaying and equipment shall be maintained during detailed design and construction.

4.5 Telecommunications

- 4.5.1.1 With reference to various record plans provided by Hutchinson Global Communications Ltd (HGC), Hong Kong Telecommunications Ltd (PCCW), Hong Kong Cable Television Ltd (HKCTV), Wharf T&T Ltd (WT&T), New World Telecommunications Ltd (NWT), and Hong Kong Broadband Network Ltd (HKBN), the existing telecom services in the vicinity of the Project site comprise the following:
- HGC, PCCW, and WT&T have service feeds running adjacent to the project site at Fuk Hi Street and Long Ping Road;
 - HKCTV, NWT and HKBN have service feeds running adjacent to the project site at Long Ping Road;
 - Towngas Telecommunications Fixed Network Ltd (TTFN) does not have existing facilities in the project vicinity.
- 4.5.1.2 A record of the existing and proposed telecom routing in the vicinity of the Project site is attached as **Drawing Nos. 226464/OAP/C/601-608**. Proposed networks can be extended to serve the development project via the new local road network.

4.6 Impacts and Mitigation Strategies

- 4.6.1.1 CLP has agreed to deliver the necessary power demand to the site via new 132kV power substation. A land allowance of 32m X 62m is required to accommodate the substation transmission equipment, see correspondence in **Appendix D**. There are no adverse impacts on the CLP power network resulting from the proposed development. Consultation with CLP to determine an appropriate location for the substation is being undertaken.
- 4.6.1.2 The space requirements for highway lighting cables and pillar boxes are minor and considered to be feasible for incorporation into the proposed development.

- 4.6.1.3 The future plan for HKCG gas supply to the project site will depend on the predicted gas demand of the proposed development. It is possible that the existing low- and medium-pressure mains at Long Ping Road and Fuk Hi Street are insufficient and an additional main line serving the project site would be needed. Discussions with HKCG will be necessary during detailed design.
- 4.6.1.4 Given the variety of existing telecommunication services adjacent to the project site, it is anticipated that providers will be capable of fitting service feeds from the proposed development to existing facilities along the local road network.

4.7 Implementation Programme

- 4.7.1.1 To cope with the intake scheduled of the proposed development, the following implementation programme is proposed for the planned and proposed utility infrastructure works:

Table 4.7.1: Implementation Schedule of Key Utility Infrastructure Works for Proposed Development

Item Ref	Main Proposed Utility Works	Target Date Completion
1	CLP to obtain land ownership, receive government approval, design, construct and commission the 132kV power substation at the agreed location	Before 2022
2	Power, Highway Lighting, Gas, and Telecom Mains and Equipment within YLIEE	Before 2022
3	Power, Highway Lighting, Gas, and Telecom Mains and Equipment within PH Site, Phase 1	Before 2024
4	Power, Highway Lighting, Gas, and Telecom Mains and Equipment within PH Site, Phases 2 and 3	Before 2026

4.8 References

- Advice Note No. 1 – Application of the Drainage Impact Assessment Process to Private Sector Projects issued by Drainage Services Department, September 2010.
- Drainage Services Department Stormwater Drainage Manual, December 2000.
- EPD Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning No.: EPD/TP 1/05.
- Hong Kong Planning Standards and Guidelines, August 2011.
- Planning Department – Projections of Population Distribution (2013-2021) by District Council District, New Town and Tertiary Planning Unit, March 2013.
- Agreement No. CE 2/2001 (CE) Hung Shui Kiu New Development Area Planning and Engineering Study.
- PWP Item No. 752CL Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation