

Appendix E

Sewerage Impact Assessment

CONFIDENTIAL

Civil Engineering and Development
Department

**Application for Permission under Section
16 of the Town Planning Ordinance (Cap.
131) for Proposed Temporary Centralised
Quarters for Imported Labour in
Construction Sector for a Period of 3
Years in “Industrial” Zone and Area
Shown as ‘Road’ of Planning Area 36 of
Hung Shui Kiu/ Ha Tsuen New
Development Area**

Sewerage Impact Assessment

| August 2026

This report takes into account the particular
instructions and requirements of our client.

It is not intended for and should not be relied
upon by any third party and no responsibility
is undertaken to any third party.

Job number 278463

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ARUP

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1. Introduction

1.1 Background

1.1.1 Ove Arup and Partners Hong Kong Limited (Arup) was commissioned by the Civil Engineering and Development Department (CEDD) to submit a Section 16 Planning Application for Proposed Temporary Centralised Quarter for Imported Labour in Construction Sector within “Industrial” (“I”) Zone and area shown as 'Road' of Planning Area 36 of the draft Hung Shui Kiu and Ha Tsuen Outline Zoning Plan (“the HSK/HT OZP”) No. S/HSK/3 for a Period of 3 Years (“the proposed development”).

1.1.2 The proposed development will have a total PR of about 0.456 with domestic GFA of about 13,414m² and non-domestic GFA of about 1,065m² respectively. The 8 nos. of two-storey residential blocks will provide about 450 residential module of Modular Integrated Construction (MiC) to provide accommodation for about 1,800 numbers of imported labour. The Proposed Development is targeted to commence operation in Q3 2027.

1.2 Site Location

1.2.1 The Application Site, with an area of about 31,787 m², is situated at the western part of HSK/HT NDA adjacent to the planned high-density development under the Second Phase Development of Hung Shui Kiu / Ha Tsuen New Development Area (HSK/HT NDA), of which the construction works have commenced since 2024. The Application Site itself is part of the Advance Works phase 3 of HSK/NT NDA for implementation of site clearance/ site formation and associated infrastructure works.

1.3 Scope of Updated Technical Assessments

1.3.1 The scope of updated technical assessment for sewerage comprises the following:

- Undertake a review of the proposed sewerage network and identify if there would be any deficiency / inadequate capacity based on the development parameters;
- Propose the preliminary modification measures for the purpose of the SIA; and
- Submit the SIA to support S16 application.

1.3.2 This section outlines the assessment of the sewerage impact potentially induced by the proposed development and includes:

- Estimation of sewage flows arising from the proposed development;

- Assessment of potential impact on the existing and planned sewerage system imposed by the proposed development; and
- Proposed preliminary sewerage system modification works, if considered necessary.

2. Planning Data and Sewage Flow Estimation

2.1 Proposed Development

2.1.1 The development information is summarized in **Table 2.1**. The Indicative Scheme of the proposed development is shown in **Appendix A**.

Table 2.1 Proposed Development Parameters

Site Area (about)	31,787 m ²
Total Plot Ratio (about)	0.456
• Domestic PR	0.422
• Non-domestic PR	0.034
Total GFA (about)	14,479 m ²
• Domestic GFA	13,414 m ²
• Non-domestic GFA	1,065 m ²
Building Height	Residential Blocks: 2 storeys Ancillary Blocks: 1 to 2 storey(s)
Number of Blocks	8 Residential Blocks 6 Ancillary Blocks (including 3 Management Offices)
Population	About 1,800
Employment	About 100

2.2 Sewerage Parameters and Assumptions

2.2.1 The following unit flow factors for domestic and commercial activities in accordance with EPD's Guidelines for Estimating Sewage Flows for Sewerage Infrastructure Planning (GESF) are adopted:

Table 2.2 Unit flow Factors for Different Land Uses

Land Use specified in GESF	Unit Flow Factor (m³/person/day)	Remark
<i>Domestic</i>		
Public rental	0.19 ⁽¹⁾	Adopted for residents in labour quarters
<i>Commercial</i>		

Land Use specified in GESF	Unit Flow Factor (m ³ /person/day)	Remark
J11 – Community, Social & Personal Services	0.28 ⁽¹⁾	Sum of flows due to employee (0.08m ³ /person/day) & commercial activities (0.20m ³ /person/day)
J12 – Public Administration	0.08 ⁽¹⁾	Sum of flows due to employee (0.08m ³ /person/day)

Notes:

(1) Referenced from EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning Table T-1 and T-2.

2.2.2

As human activities fluctuate throughout the day, sewage flow is likewise not uniform with peaks in certain periods. As such, peaking factor is proposed to accommodate for potential spike in sewage flow. Peaking factor serves to cater for seasonal/diurnal fluctuation and normal amount of infiltration and inflow. Peaking factors (including stormwater allowance) have been adopted in accordance with EPD's GESF as shown in **Table 2.3**.

Table 2.3 Peaking Factors for Various Population Ranges

Population Range	Peaking Factor (including stormwater allowance) for facility with existing upstream sewerage	Peaking Factor (excluding stormwater allowance) for facility with new upstream sewerage
<i>Sewers</i>		
< 1,000	8	6
1,000 – 5,000	6	5
5,000 – 10,000	5	4
10,000 – 50,000	4	3
> 50,000	Max (7.3/N ^{0.15} , 2.4)	Max (6/N ^{0.175} , 1.6)
<i>Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations</i>		
< 10,000	4	3
10,000 – 25,000	3.5	2.5
25,000 – 50,000	3	2
> 50,000	Max (3.9/N ^{0.065} , 2.4)	Max (2.6/N ^{0.065} , 1.6)

Notes:

(1) Referenced from EPD's GESF Table T-5; N = Contributing population in thousands.

2.2.3

Average dry weather flows (ADWF) were estimated by applying appropriate unit sewage flow factors according to their development type, and peak flows were calculated by multiplying the ADWF by the

peaking factor, which account for the peak flows and provide adequate safety margin in planning sewage facilities.

3. Assessment of Sewerage Impact

3.1 Existing and Planned Sewerage Infrastructure

- 3.1.1** The sewerage system in North-west New Territories (NWNT) serves the major urban developments in Tin Shui Wai and Tuen Mun - Yuen Long Corridor and small developments on the periphery of Yuen Long. Two sewerage catchments, Yuen Long Sewerage Catchment and San Wai Sewerage Catchment, correspond to two sewage treatment works, Yuen Long Sewage Treatment Works (YLSTW) and San Wai Sewage Treatment Works (SWSTW) respectively.
- 3.1.2** SWSTW is planned to serve major developments in Yuen Long Town, Au Tau, Tin Shui Wai, Ping Shan, Lau Fau Shan, Shap Pat Heung and covered part of the area within HSK/HT NDA including Hung Shui Kiu and Ha Tsuen. The remaining areas within HSK/HT NDA are unsewered areas. YLSTW serves the eastern part of the NWNT.
- 3.1.3** To cater for the forecast sewage flow due to population growth in the NWNT, DSD commenced the works contract no. DC/2013/10 in May 2016 - "Upgrading of San Wai Sewage Treatment Works – Phase 1" to upgrade the SWSTW from preliminary treatment to chemically enhanced primary treatment plus disinfection facilities and increase the ADWF treatment capacity to 200,000 m³/day. Phase 1 upgrading works of SWSTW at a site adjacent to the existing SWSTW had been completed in the end of 2020.
- 3.1.4** Under DSD Agreement No. CE30/2006 (DS), Ha Tsuen Sewage Pumping Station (HTSPS) was expanded with an additional 1200mm diameter rising main constructed in parallel with the existing twin 1200mm diameter rising mains. Upon completion of the expansion works in 2014, the design capacity of HTSPS has been increased to 193,100 m³/day.
- 3.1.5** Four new sewage pumping stations (SPS) (i.e. SPS1 to SPS4) are proposed to convey sewage flow from the HSK/HT NDA to the upgraded SWSTW – Phase 1 and the planned Hung Shui Kiu Effluent Polishing Plant (HSKEPP) (ADWF treatment capacity of 90,000 m³/day).
- 3.1.6** The effluent of the upgraded SWSTW and the HSKEPP will be discharged to the existing NWNT Effluent Tunnel which has a total hydraulic capacity of 440,000 m³/day and subsequently discharged via the existing Urmston Road Submarine Outfall.
- 3.1.7** The proposed development will be implemented before the commissioning of the aforementioned new SPSs. There is also no existing sewerage network in the vicinity for sewage conveyance.

3.2 Sewerage Impact

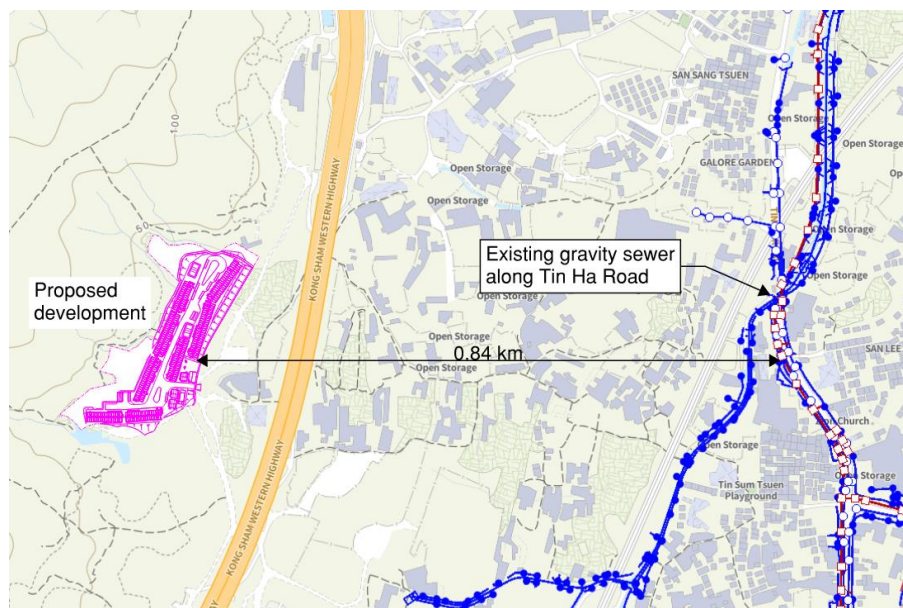
3.2.1 The ADWF generated from the proposed development is estimated in accordance with EPD's GESF. **Table 3.1** below summarises the sewage flow generation.

Table 3.1 Summary of ADWF from the Proposed Development

Flow Generation	Population	UFF	ADWF (m ³ /day)
Domestic (R1)	1,800	0.19	342
Cleaners (J11)	20	0.28	5.6
Office staff, security, technician (J12)	80	0.08	6.4
Total			354

3.2.2 According to **Section 3.1.7**, there is no existing sewerage network near the proposed development by the time of commissioning. The nearest existing gravity sewer is located approximately 850m away from the proposed development, as illustrated in **Figure 3.1**.

Figure 3.1 Distance between Proposed Development and Existing Sewer



3.2.3 Given the temporary nature of the development and limited space for application site, a sewage holding tank scheme is proposed to tank away the sewage to the nearby sewage pumping station or sewage treatment works for disposal.

3.2.4 Based on the coordination with DSD, it is identified that there are 3 existing designated DSD disposal plants for discharge of domestic liquid waste with limited capacity, including Pillar Point Sewage Treatment Works (PPSTW), Ap Lei Chau Preliminary Treatment Works (ALCPTW) and Sai Kung Sewage Treatment Works (SKSTW). DSD advised that the design capacity of septic waste reception facilities

at PPSTW is 1,200 m³/day with a remaining capacity of approximately 220m³/day as of 31 March 2026. It is also noted that the reception capacity of domestic liquid waste at SKSTW has already been overloaded. HTSPS's reception facilities are only for temporary measures in basic design for receiving a limited volume of domestic liquid waste (currently approximately 180 m³/day being receipted is the upper limit). The reception capacity at HTSPS is constrained by potential odour nuisance and traffic impacts on the surrounding area, rendering it insufficient to fully accommodate the ADWF generated from the proposed development.

With consideration of various constraints including odour control and impact to surrounding, traffic impact due to additional tankers and septic waste reception capacity at HTSPS and PTSTW, the total discharge is proposed to be diverted to PPSTW (location 1) and HTSPS (location 2). The upstream SPSs of Yuen Long Effluent Polishing Plant (YLEPP) (location 3) would be used as backup reception facility in case HTSPS or PPSTW could not handle the above assigned reception volume due to conditions such as severe operation conditions, public complaints or other constraints. For details, please refer to **Section 0**.

3.2.5

Table 3.2 summarises the proposed sewage flow to the aforesaid sewerage infrastructures. Based on the proposed discharge volume, no adverse sewerage impact is envisaged.

Table 3.2 Existing Sewage Infrastructure Capacities and Sewage Flow Comparison

Location	Sewerage Infrastructures	Capacity of Septic Waste Reception Facilities (m ³ /day)	Flow Increment in ADWF (m ³ /day) ⁽¹⁾
1	PPSTW	220	174
2	HTSPS	180	180
3	Upstream SPSs of YLEPP	To be confirmed with DSD	Back-up
Total			354

Notes:

- (1) Assume volume of sewage truck to be 12 m³ and maximum 6 nos. sewage trucks in operation.

4. Proposed Sewerage Works

4.1.1 The design guidelines, standards and criteria used for the preliminary design of the proposed sewerage system and the proposed sewerage improvement schemes are as follows:

- EPD's Technical Paper Guidelines for Estimating Sewage Flows (GESF) for Sewerage Infrastructure Planning Version 1.0; and
- DSD's Sewerage Manual Part 1 (Key Planning Issues and Gravity Collection System) and Part 2 (Pumping Stations and Rising Mains), Third Edition, May 2013.

4.1.2 Referencing **Section 3.2.3**, sewage holding tanks are proposed within the development site for sewage disposal. Based on DSD's advice, since all STWs and SPSs, including the designated plants, will be closed during the period of typhoon signal no. 8 or above, the capacity of the on-site buffer / storage tank(s) shall be able to store the sewage generated for a period of at least 24 hours in order to prevent the risks of sewage overflow. As such, the tanks design storage capacity will be equivalent to 1 day of ADWF with 100% safety margin to cater for incidents. Two sewage holding tanks are proposed such that sewage trucks can perform desludging operation concurrently. The corresponding sewerage catchment of each sewage holding tank is summarised in the **Table 4.1**. The proposed sewerage layout plan is shown in **Appendix B**.

Table 4.1 Sewerage Catchment of Sewage Holding Tanks

Sewage Holding Tank No.	Sewerage Catchment	ADWF (m ³ /day)	Required Storage Volume (m ³) ⁽¹⁾
1	Block 6 to 8	151	302
2	Office 1 to 3, Block 1 to 5	203	406
Total			708

Notes:

(1) Storage volume is provided based on 1 day of design ADWF which includes a 100% safety margin.

4.1.3 The frequency of tank-away operation is presented in **Table 4.2**. The estimated tank-away duration per day is approximately 7 hours. The actual sewage generation will vary depending on the resident population. Accordingly, desludging and tanker collection will be carried out on a need basis, subject to the actual sewage accumulation rate, to ensure adequate storage capacity is maintained and no overflow occurs. Regular inspection and maintenance of the sewage holding tank system will be undertaken throughout the operation period.

Table 4.2 Envisaged Frequency of Tank-away Operation

Septic Waste Reception Facilities	Location	
	1 – PPSTW	2 – HTSPS
Maximum ADWF for discharge (m ³)	220	180
No. of trips ⁽¹⁾ (truck no. [A] x trip no. [B])	6 x 2 + 3 x 1 (Total 15 nos.)	6 x 2 + 3 x 1 (Total 15 nos.)
Estimated tank- away volume (m ³)	174	180
Assumed duration for sewage suction and discharge per trip (hours)	0.75	0.75
Assumed commuting time per trip (hours) ⁽²⁾	0.5	0.25
Total duration per trip (hours) [T]	1.25	1
Tank-away duration (hours/day) ⁽³⁾ [B] / [T]	3.75	3

Notes:

- (1) Assume volume of sewage truck to be 12 m³ and maximum 6 nos. sewage trucks in operation.
- (2) Assume each sewage truck undertakes a single trip to the septic waste reception facility.
- (3) DSD advised that the opening hour (Monday to Sunday, include public holidays) of PPSTW and HTSPS is 9:00 to 18:00 hours and 9:00 to 16:00 hours respectively.

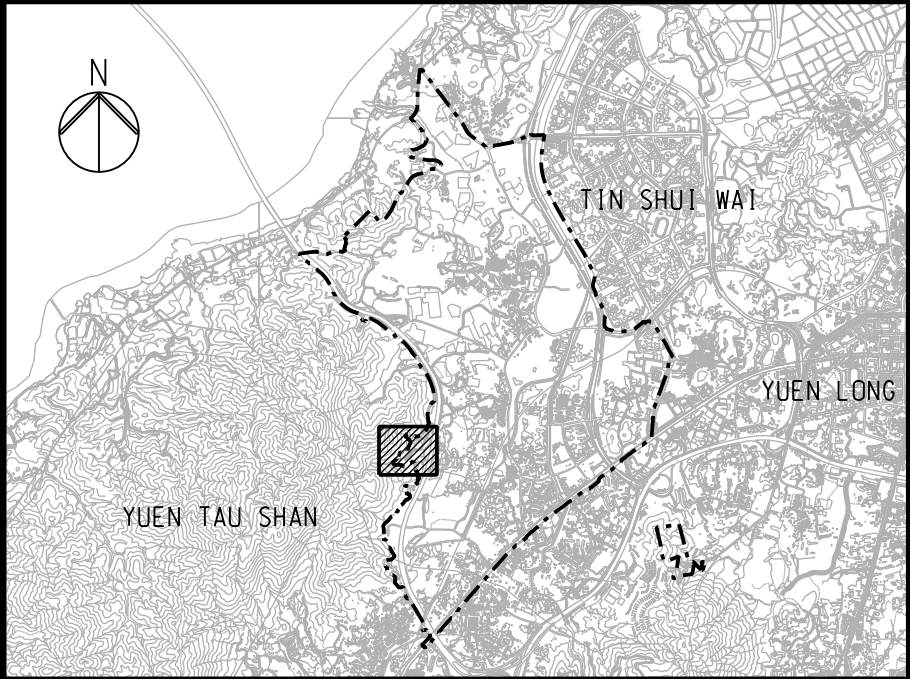
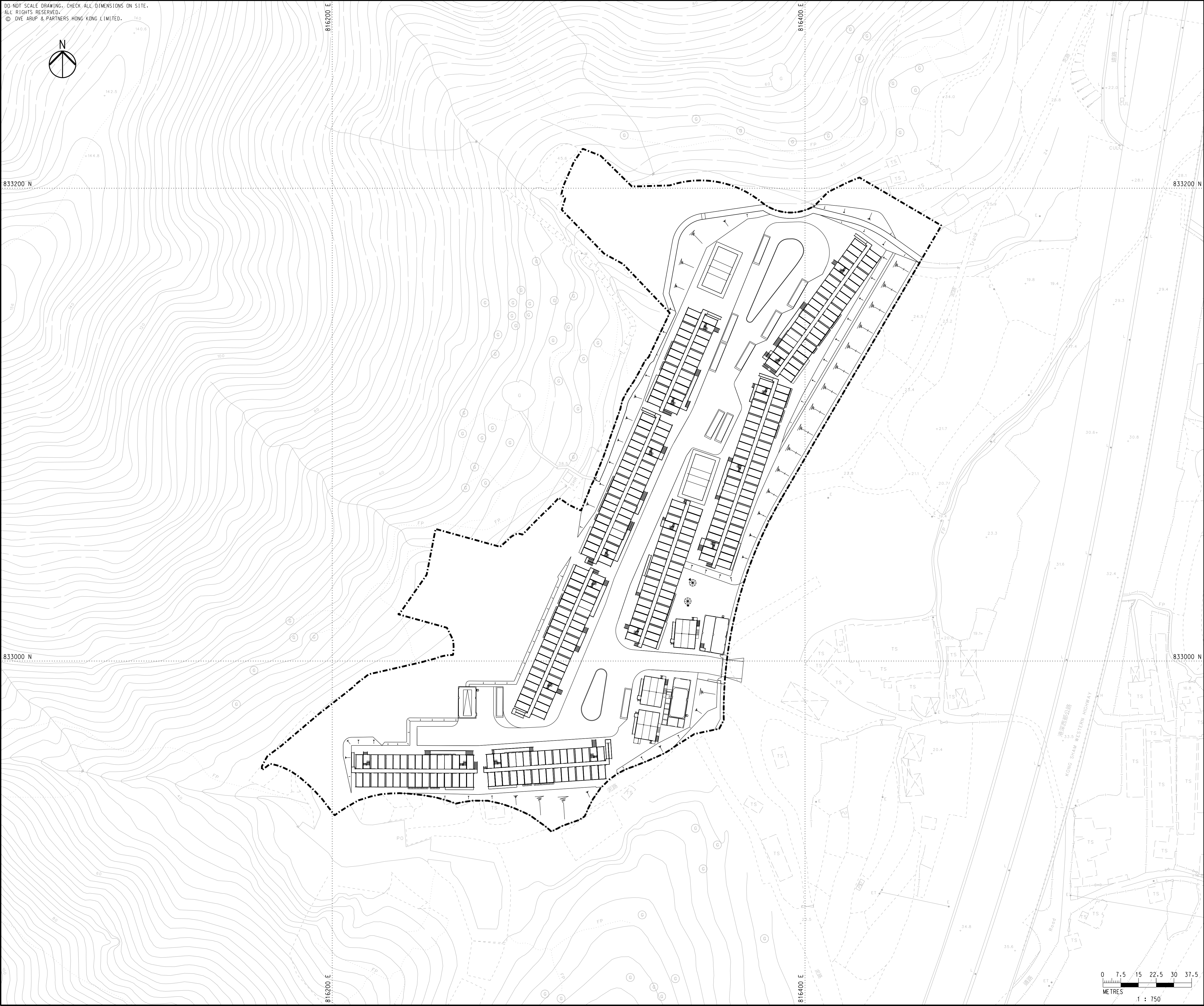
5. Summary

- 5.1.1** This report estimated the sewage flow generated from the proposed development, assessed the potential impact and recommended sewerage modification works to mitigate the potential impact.
- 5.1.2** According to the assessment, the proposed development would induce an ADWF of 354 m³/day.
- 5.1.3** Given that there is no existing sewerage in the vicinity of the proposed development by the time of commissioning, it is proposed to construct sewage holding tanks within the development site for sewage disposal. The tanks' design storage capacity will be equivalent to 1 day of ADWF with 100% safety margin to cater for incidents (i.e. required total storage capacity of 708 m³). The future proponent will be responsible for the operation and maintenance of the proposed sewage holding tanks.
- 5.1.4** The sewage will be tanked away to the nearby PPSTW (location 1) and HTSPS (location 2) for disposal. The upstream SPSs of YLEPP (location 3) would be used as backup reception facility in case HTSPS or PPSTW could not handle the above assigned reception volume due to conditions such as severe operation conditions, public complaints or other constraints.
- 5.1.5** Consider the order of sewage flow increment, the sewerage impact to existing sewerage infrastructures under the proposed condition is insignificant.
- 5.1.6** Upon implementing the proposed sewerage works, no adverse impact to the existing sewerage system is envisaged due to the proposed development.

Appendix A

Indicative Scheme for the Proposed Development

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KEY PLAN

LEGEND
[Dashed Box] APPLICATION SITE

A	FIRST ISSUE	KF	07/26
Rev	Description	By	Date
Consultant			
ARUP			
Project Title			
Agreement No. CE 1/2020 (CE) Hung Shui Kiu / Ha Tsuen New Development Area Package A Works for Second Phase Development – Design and Construction			
Drawing title			
HSK / HT NDA SECOND PHASE DEVELOPMENT IMPORTED LABOUR QUARTERS GENERAL LAYOUT PLAN			
Drawing no.		Rev.	
278463/SK/C/479		A	
Drawn	Date	Checked	Approved
RY	06/26	EH	KKC
Scale	Status		PRELIMINARY
1:750 @ A1			
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Appendix B

Proposed Sewerage Layout Plan

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KEY PLAN

LEGEND

- APPLICATION SITE
- PROPOSED SEWERAGE CATCHMENT
- PROPOSED SEWERAGE HOLDING TANK
- PROPOSED SEWERAGE CONNECTION

A		FIRST ISSUE	KF	07/26
Rev	Description	By	Date	

Consultant

ARUP

Project Title

Agreement No. CE 1/2020 (CE)

Hung Shui Kiu / Ha Tsuen

New Development Area Package A

Works for Second Phase Development

– Design and Construction

Drawing title

HSK / HT NDA

SECOND PHASE DEVELOPMENT

IMPORTED LABOUR QUARTERS

PROPOSED SEWERAGE

LAYOUT PLAN

Drawing no.		Rev.	
278463/SK/C/SIA/001		A	
Drawn	Date	Checked	Approved
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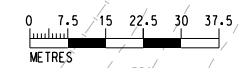
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Civil Engineering and

Development Department

Sewerage Catchment and Design Storage Volume of Holding Tanks

Sewage Holding Tank	Sewerage Catchment of Respective Tank	Total ADWF (m ³ /day)	Design Storage (m ³ /day)
1	Block 6 - 8	151	302
2	Office 1 - 3, Block 1 - 5	203	406



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Date : 31/7/2026

Appendix C

Sewerage Calculations

Appendix C - Sewerage Calculation

Flow Build Up for Proposed Labour Quarter							
Catchment	Use	Population / Employment	UFF (m ³ /head/day)	ADWF (m ³ /day)	Safety Margin	Design Storage (m ³)	Convey to Sewage Holding Tank No.
Office 1, 2, 3	Cleaners (J11)	20	0.28	5.6	100%	11.2	2
	Office staff, security, technician (J12)	80	0.08	6.4	100%	12.8	2
Block 1	Domestic (R1)	176	0.19	33.4	100%	66.9	2
Block 2	Domestic (R1)	176	0.19	33.4	100%	66.9	2
Block 3	Domestic (R1)	252	0.19	47.9	100%	95.8	2
Block 4	Domestic (R1)	252	0.19	47.9	100%	95.8	2
Block 5	Domestic (R1)	148	0.19	28.1	100%	56.2	2
Block 6	Domestic (R1)	240	0.19	45.6	100%	91.2	1
Block 7	Domestic (R1)	304	0.19	57.8	100%	115.5	1
Block 8	Domestic (R1)	252	0.19	47.9	100%	95.8	1
Sum				354	Sum	708	

Sewerage Catchment and Design Storage Volume of Holding Tanks			
Sewage Holding Tank	Sewerage Catchment of Respective Tank	Total ADWF (m ³ /day)	Design Storage (m ³ /day)
1	Block 6 - 8	151	302
2	Office 1 - 3, Block 1 - 5	203	406