Appendix 4 – Water Quality Assessment

Section 12A Rezoning Application for Ching To Yuen

Water Quality Assessment Report

Ching To Yuen Limited

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Contents

Figures

Appendices

1 Introduction

1.1 Background

1.1.1 “Ching To Yuen” (“the Application Site” or “the Site”) owned by “Ching To Yuen Limited” (the Applicant) is located at the upper part of To Fung Shan, which is a traditional religious district in Shatin and is presently zoned “Green Belt” (“GB”) under the Draft Sha Tin Outline Zoning Plan (“OZP”) No. S/ST/39. The Site is currently occupied by a single-storey columbarium building that can accommodate 6,396 niches, of which 2,255 niches have been sold.

1.1.2 The Applicant is submitting a planning application to the Town Planning Board (“TPB”) to rezone the Site from “GB” to “Other Specified Uses” annotated "Columbarium(3)" ("OU(Columbarium)3"), to allow the continued operation of the columbarium uses. To facilitate the continued operation of Application Site, some minor improvement works will be required to upgrade the overall environmental facilities of the Application Site.

1.1.3 Continuing operation of the Application Site can also help facilitate government’s commitment to provide columbarium facilities at suitable locations throughout Hong Kong to meeting the urgent demand for niche spaces resulting from an increase aging population.

1.1.4 Aurecon Hong Kong Ltd (“Aurecon”) has been appointed to conduct this Water Quality Assessment (“WQA”) to support the planning application.

1.2 Objectives of the Water Quality Assessment

1.2.1 The objective of the report aims to assess the potential water quality impacts creating from operation of the Application Site. Proper mitigation measures will be recommended to minimize the water quality impacts.

1.3 Report Structure

1.3.1 The remaining chapters of this report are shown below:

Chapter 2 – Site Context

Chapter 3 – Description of Existing Environment and Baseline Conditions

Chapter 4 –Sewage and Wastewater Analysis

Chapter 5 - Conclusion

2 Site Context

2.1 Site Location and Its Environments

2.1.1 The Site is located at several lots in D.D. 186, To Fung Shan. Part of the Application Site is located within the boundary of a Lower Indirect Water Gathering Ground ("LIWGG"), for which the Water Supplies Department ("WSD") takes responsibility. Water collected in the LIWGG is stored in Lower Shing Mun Reservoir for future potable use after treatment.

2.1.2 As shown on **Figure 2.1**, the Site is surrounded by a natural landscape with shrubs, slope, mature trees and burial ground. The Lutheran Theological Seminary, Yau Oi Tsuen and To Fung Shan Christian Cemetery are located to the south of the Application Site. To the east of the Application Site are Lin Yuen, Ten Thousand Buddhas Monastery, and Po Fook Memorial Hall. The Site is accessible from To Fung Shan Road via a local access road.

2.1.3 The Site has a long history of institutional use since it was first built as the Bishop's House as early as 1957. It was later renovated as a columbarium, i.e., the Site, to accommodate the needs of a columbarium to continue the traditional institutional and religious uses at the Application Site. No additional building has been added to the Site. As such, sewage/ wastewater has been generated from the Application Site for almost sixty years.

2.2 Proposed Application Site

2.2.1 The existing layout of the Site can be referred to the Planning Statement, which mainly includes the following structures:

- A single-storey columbarium building with 6,396 niches.
- A two-storey management office building.

2.2.2 The Application Site are operated from 9:30am to 5:30pm during both non-festival periods and festival periods (i.e. Ching Ming Festival and Chung Yeung Festival).

2.2.3 No catering service or kitchen facility is or will be provided to the visitors or staff on site, so there will be no wastewater generated from these sources.

2.2.4 As described above, the Application Site has been in operation for almost sixty years without adverse impact to the LIWGG and there are no other new uses or activities proposed in this planning application that will increase the risk of pollution.

2.2.5 For this proposed application, minor improvement works including the replacement of existing toilets with portable toilet facilities adjacent to the management office building will be conducted during improvement works stage.

3 Description of Existing Environment and Baseline Conditions

3.1 Site Location

3.1.1 As the mentioned in section 2.1.1, the Site is located at several lots in D.D. 186, To Fung Shan. It is classified to “Green Belt” (“GBG”) under the Draft OZP No. S/ST/39 and is surrounded by steep slopes with mature trees, shrubs, and a burial ground.

3.1.2 As shown on **Figure 3.1**, and with reference to WSD’s reply on 12 September 2014 in **Appendix 3.1**, part of the Site is located within the boundary of LIWGG, for which WSD takes responsibility. Water collected in the LIWGG is stored in Lower Shing Mun Reservoir for future potable use after treatment.

3.2 Existing Baseline Conditions

3.2.1 There is no public sewer in the vicinity of the Site in accordance with the DSD sewerage/ drainage plans (7-SW-15A-2 and 7-SW-15B-1).

3.2.2 Since there is no public sewer, sewage generated from the existing toilet on-site is collected and treated by using a three-stage septic tank, located adjacent to the Office Building, as shown on **Figure 3.1**. this septic tank has been in use, but it could be dated back to the official residence of the Moroccan Consul in 1970s, or even as the “Bishop’s House” in the 1950s.

3.2.3 The existing columbarium is not provided with catering service or kitchen facilities to the visitors or staff. The Applicant also confirms that no such facilities will be provided in the future. Therefore, there is and will be no wastewater generated from these sources.

3.2.4 As described above, the Site has been in operation for almost sixty years and there are no new uses or activities at the Site proposed in this planning application that will increase the risk of pollution.

4 Sewage and Wastewater Analysis

4.1 Sewage Analysis

Feasible Options

4.1.1 According to the DSD website, there is no plan to extend the public sewer network to the vicinity of the Site in the near future. In order to avoid significant water quality impact due to use of the existing septic tank/ soakaway pit system, adequate sewage treatment facilities or portable toilets should be provided on-site to replace the existing septic tank/ soakaway pit system, which will be decommissioned.

4.1.2 Considering the constraints of the site, the use of portable toilets presents the most cost-effective and environmentally friendly method for collecting sewage generated on-site. This approach eliminates the need for a connection to an existing sewage system.

4.1.3 Portable toilets are commonly utilized throughout Hong Kong, particularly in remote areas without sewage infrastructure, such as country parks. They are also effective during instances of temporary population surges, such as one-off entertainment events.

4.1.4 **Figure 4.1** shows two possible options for providing toilets at the Site:

- **Option 1:** Providing container toilet block installed with vacuum toilets of low flush volume (~1.2L /flush) with an aboveground sewage storage tank.
- **Option 2:** Providing sufficient number of individual chemical toilets with integral sewage storage tanks.

4.1.5 An example of low flush toilet and portable chemical toilets, which are available in Hong Kong, are shown in **Appendix 4.1**.

4.1.6 Sewage in the sewage storage tanks will be required to empty by a registered contractor under both options. Typically, sewage from these tanks is disposed of at the government sewage treatment facilities. For this site, it is anticipated that the sewage will be taken to the nearby Shatin Sewage Treatment Works, which offers secondary sewage treatment.

4.1.7 While both options ensure full containment of sewage under normal operating conditions, the risk of accidental overflow or spillage cannot be entirely eliminated. To mitigate this risk, it is advisable to position the portable toilets outside and downhill from the LIWGG. This placement will help ensure that any potential effluent from the sewage storage tanks does not contaminate the LIWGG.

4.1.8 Options 1 or 2, with above ground sewage storage tanks, should be located outside the LIWGG. One possible location is on a platform adjacent to the Ching To Yuen office building, as shown on **Figure 4.1**. This platform is positioned outside and downhill from the LIWGG, ensuring that any potential spillages would flow away from the LIWGG. Therefore, this platform is deemed the most preferable location for the portable toilets.

Assumptions and Methodology

4.1.9 Based on historical operation records and the anticipated operational timeline for the site, two scenarios are identified:

1. **Peak Periods**: Including Ching Ming and Chung Yeung Festivals
2. **Non-Peak Periods**: Normal Operation

4.1.10 The numbers of visitors and staff on-site during peak periods and non-peak periods are presented in **Table 4.1**.

Table 4.1 Estimated Populations On-site during Peak and Non-Peak Periods

Period(s)	No. of Visitors per day (1)	No. of Full-time Staff per day
Peak Period	2,553	17 (2)
Non-Peak Period	10 (2)	5 (2)

Remarks:

1. Estimated maximum number of visitors attending the Application Site during the Ching Ming Festival sweeping day (the Peak Period).
2. As advised by the Applicant.

4.1.11 The existing record shows no more than 10 visitors per day go to the Application Site during non-festival periods and not more than 900 visitors per day at the Ching Ming Festival in 2024. Since 2,255 of 6,396 niches were occupied in now, the possible number of visitors is calculated as:

Number of visitors = 900 x 6,396 / 2,255 = 2,552.73 ≈ 2,553

4.1.12 As the Application Site will mainly provide niches, there will be fewer activities on site to more well-known columbaria, such as Yuen Yuen Institute and Ten Thousand Buddhas Monastery, which offer ceremony or event facilities. Therefore, visitors to the Application Site are expected to stay for less than *an* hour.

Volume of Flushing Water from Visitors

4.1.13 Most people urinate about 4 to 6 times a day, mostly in the daytime. Normally, adults pass between 700 mL and 3 L of urine a day Ref (1). Therefore, on average, visitors are assumed to urinate less than once during their visit of less than an hour. Based on the existing columbarium operator's observations, around 10% of visitors will use toilets. Nevertheless, 50% of visitors using the toilet is assumed for the worst-case scenario given that no catering service is provided on-site and the visitors will not be likely to stay long on-site, while visitors pass around 500 mL / time (3 L / 6 times = 500 mL / time). To reduce the volume of flushing water used, toilets with using 1.2L or less per flush will be used (see **Appendix 4.1**).

Reference:

1. Geetha Maddukuri, MD, Saint Louis University, Modified Apr 2025, Excessive or Frequent Urination, (https://www.merckmanuals.com/home/kidney-and-urinary-tract-disorders/symptoms-of-kidney-and-urinary-tract-disorders/excessive-or-frequent-urination)

Volume of Hand Washing from Visitors

4.1.14 For hand washing, the wastewater (grey water) generation has been estimated in accordance with the Table 3.3 of Technical Specifications on Grey Water Reuse and Rainwater Harvesting (2nd Edition, established on Sep 2024) from Water Supplies Department (WSD) Ref (2) and an example of a Wash-hand basin taps (Model: Kovic + Kims KV-83-01 + E09-2405-4L) (See **Appendix 4.1**) Ref (3) , in which the default assumptions estimate water consumption at 6.48 L/min for 10s per hand washing.

4.1.15 The unit rate of total sewage generation per visitor to use the toilet is therefore:

Unit Flow of Toilet Flushing = 500mL (Human Urinate/ Time) + 1.2L (Vacuum Toilet Flushing Volume) = 1.7 L/Flush

Estimated Grey Water Yield of Wash-hand Basin Taps = 3.1 L/min x 1.58 + 1.58 = 6.48 L/min

Unit Flow of Hand Washing = 6.48 L/min / 60s x 10s = 1.08 L/Hand Washing

Unit Flow of Sewage per Visitor = 1.7 L/Flush + 1.08 L/Hand Washing = 2.78 L/Visitor (0.0028 m^3)

Sweage Generated from On-site Staff

4.1.16 The unit flow rate of sewage generated from the on-site staff is assumed to be 0.08 m^3/person/day, which is the global unit flow factor for commercial employee as recommended in the Table T-2 of Guidelines for Estimating Sewerage Flows for Sewerage Infrastructure Planning Version 1.0 published by EPD in 2005 Ref (4).

4.1.17 It should be noted that the above estimates of 0.0028 m^3/visitor/day and 0.08m^3/staff/day are conservative. There are a number of options available to further reduce wastewater generation. These include waterless urinals (e.g. using "Desert" waterless cubes, which are used elsewhere in Hong Kong) and water-free hand washing (e.g. using antiseptic gels, which are widely used in public places in Hong Kong). The use of such water-saving approaches will prolong the period between emptying the sewage storage tanks or, alternatively, can reduce the size of the sewage storage tanks that are required.

Reference:

2. *Water Supplies Department (WSD), Sep 2024, 2nd Edition, Technical Specifications on Grey Water Reuse and Rainwater Harvesting,* (*https://www.wsd.gov.hk/filemanager/en/content_1459/technical_spec_grey_water_reuse_rainwater_harvest.pdf*)

3. Water Supplies Department (WSD), Register of Wels Products, (*https://www.waterconservation.gov.hk/tc/register-wels-products/index.html*)

4. Environmental Protection Department (EPD), 2005, Version 1.0, Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning,

(https://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/water/guide_ref/files/gesf.pdf)

4.1.18 Other kinds of wastewater will include daily cleaning such as toilet washing and floor mopping. Generally portable toilets will be thoroughly washed by the licensed collector when emptying the sewage holding tanks. For the daily toilet washing during non- festival days, the volume of wastewater for toilet washing will be minimal. Similarly, the volume of wastewater for floor mopping will also be minimal. Therefore, minor wastewater generation for daily cleaning was not included in the calculations.

Results and Discussion

4.1.19 Based on the calculations for above two scenarios (i.e. Peak and Non-Peak Periods) presented in **Appendix 4.2**, the peak daily flows generated during Peak and Non-Peak Periods are shown in **Table 4.2** (these assume that water-saving approaches have not been adopted.):

Table 4.2 Estimated Peak Daily Flow during Peak and Non-Peak Periods

Period(s)	Flow from Visitors (m^3/day)	Flow from Staff (m^3/day)	Total Flow (m^3/day)
Peak Period	3.57	1.36	4.93
Non-Peak Period	0.01	0.4	0.41

4.1.20 The total peak flow from the Application Site has been estimated to be approximately 4.93 m^3/day during Peak Period (i.e. Ching Ming and Chung Yeung Festivals) and 0.41 m^3/day during Non-Peak Period.

4.1.21 The sewage effluent generated from the Project will be collected to sewage storage tanks with a minimum capacity of 1 m^3 which will be considerably enough for the sewage generated on non-peak periods.

4.1.22 To ensure collecting the sewage generation during festival periods fully, the numbers of portable toilets required for the two options recommended in Section 4.1.4 are estimated as follows:

- **Option 1:** Provide a container toilet block with aboveground sewage storage tanks with a minimum total capacity of 6 m^3, and toilets with flush of not more than 1.2 L.
- **Option 2:** Provide at least 15 nos. individual chemical toilets with integral sewage storage tanks of 400 L each, with a total capacity of 6 m^3.

4.1.23 The sewage storage tanks will need to be taken off-site for emptying at least once per day during festival periods and around once per week during non-festival periods. Emptying will be carried out by licensed contractors who have the training and equipment to ensure that the wastewater is handled properly and that there will be no spillage or accidents.

4.1.24 Since the sewage storage tanks are enclosed, there should not be any significant odour problems from storing the sewage for the durations specified. The sewage stored inside the holding tanks of the container toilet block (Option 1) or chemical toilets (Option 2) will be collected by collection tanker using a vacuum system and so there will be no significant odour emissions. No toilet facilities will be provided within LIWGG and the sewage storage tanks will also be outside of and downhill from the LIWGG.

4.1.25 The existing site access road allows sewage pumping vehicles to access the existing septic tank and so there should be no problem for sewage collection by access the proposed portable toilets on the platform for maintenance or emptying the sewage storage tanks. The section of To Fun Shan Road north of its junction with Pak Lok Path will be closed from 9am to 5pm during festival periods. The Applicant will arrange for sewage to be collected by the licenced contractor outside the road closure period.

4.1.26 Either Option 1 or Option 2 provides an acceptable approach to deal with the wastewater that will be generated on Site in an environmentally friendly method that will not cause adverse impacts to the LIWGG.

4.2 Wastewater Analysis

No Catering Service or Kitchen Facility

4.2.1 As mentioned in Section 3.2, no catering service or kitchen facility is or will be provided to the visitors or staff, so there will be no wastewater generated from these sources.

Operation of Smokeless Furnace (If any)

4.2.2 The operation of air pollution control equipment of the smokeless furnace (if any) will, however, generate wastewater of approximately 400 L/day, as advised by the supplier, the Hong Kong Productivity Council (HKPC). The wastewater will be stored in wastewater storage tanks with a total capacity of 3 m^3.

4.2.3 If it will be decided to provide smokeless furnace in the future, smokeless furnace will be located outside of and downhill from the LIWGG as illustrated on **Figure 3.1**. The wastewater stored in the wastewater storage tanks will be collected by a licensed collector at least once per week for proper disposal of wastewater to avoid contamination to the LIWGG. The Applicant will arrange a licensed contractor outside the road closure period to collect the wastewater. The Applicant will ensure no spillage or accidents due to improper handling of wastewater.

4.2.4 Based on the above, wastewater from the operation of the smokeless furnace (if any) will not have any adverse impacts in terms of wastewater generation.

4.3 Conclusion

Sewage Impact

4.3.1 Provision of a container toilet block with aboveground sewage storage tanks and toilets with flush of no more than 1.2 L (Option 1), or provision of at least 15 nos. of individual chemical toilets with integral sewage storage (Option 2), provides an acceptable approach to collecting sewage that will be generated on Application Site. Sewage from the storage tanks will be emptied by licensed contractors and taken off-site for treatment. In either case, sewage will be dealt with in an environmentally friendly method that will not cause any adverse impacts to the LIWGG.

Wastewater Impact

4.3.2 As mentioned in Section 3.2, no catering service or kitchen facility is or will be provided to the visitors or site staff, so there will be no wastewater generated from these sources. The only wastewater generated will be from the smokeless furnace (if any) and will be stored in wastewater storage tanks that will be located outside of and downhill from the LIWGG. These will be emptied by licensed contractors and wastewater will be taken off-site for treatment. As such, there will be no impact on the LIWGG from the operation of smokeless furnace even if smokeless furnace will be provided in the future.

4.3.3 The sewage and wastewater impacts due to the operation of Application Site are therefore considered to be acceptable and no adverse impact on the LIWGG is anticipated.

5 Conclusion

5.1.1 In conclusion, the Water Quality Assessment (WQA) has been conducted to evaluate the possible sewerage impacts and recommend suitable sewage treatment measures associated with the planning application for the Application Site.

5.1.2 Since there is no public sewer in the vicinity of the Site, sewage generated from the existing toilet facility is collected and treated by using a three-stage septic tank, located adjacent to the access road. Although part of the Application Site is located within the boundary of a LIWGG, the septic tank is located adjacent to the access road which is outside of and downhill from the LIWGG.

5.1.3 There is no plan to extend the network of public sewers to the vicinity of the Application Site in the near future. This implies the necessity to provide adequate sewage treatment facilities or portable toilets on site. Taking into consideration the Site constraints, provision of portable toilets is the most cost-effective and environmentally sound approach for collecting and treating (off-site) the sewage generated from the Site. Two options were recommended – a container toilet block with aboveground sewage storage tanks (Option 1), and individual chemical toilets with integral sewage storage tanks (Option 2) which will replace the existing toilet block and the septic tank.

5.1.4 The total peak flow from Project has been estimated to be approximately 4.93 m^3/day during peak period (i.e. Ching Ming and Chung Yeung Festivals) and 0.41 m^3/day during non-peak period.

5.1.5 To handle this quantity of wastewater, the container toilet block would require aboveground sewage storage tanks with a minimum total capacity of 6 m^3, and toilets with flush of not more than 1.2L. Alternatively, at least 15 nos. of individual chemical toilets with integral sewage storage tanks of 400L each with a total capacity of 6 m^3 could be provided.

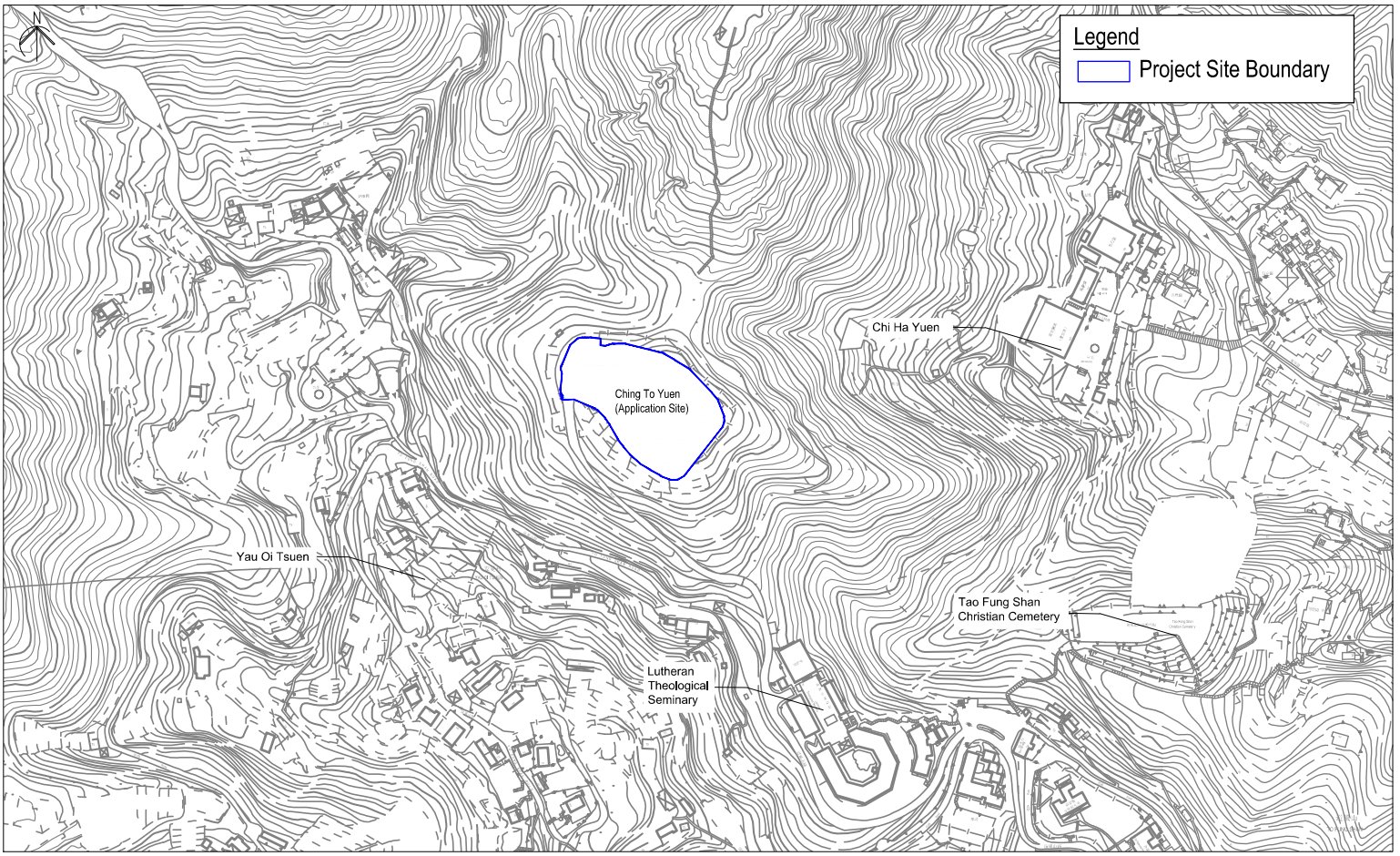
5.1.6 There is a flat piece of land adjacent to the office building to locate a container toilet block or individual chemical toilets. This piece of land is both outside of and downhill from the LIWGG.

5.1.7 In conclusion, either Option 1 or Option 2 provides an acceptable approach to dealing with the sewage that will be generated on Application Site in an environmentally sound manner that will not cause any adverse impacts to the LIWGG.

5.1.8 If smokeless furnace will be installed, the proposed location will be outside the LIWGG and wastewater generated from the operation of smokeless furnace will be tankered away to avoid any contamination to LIWGG.

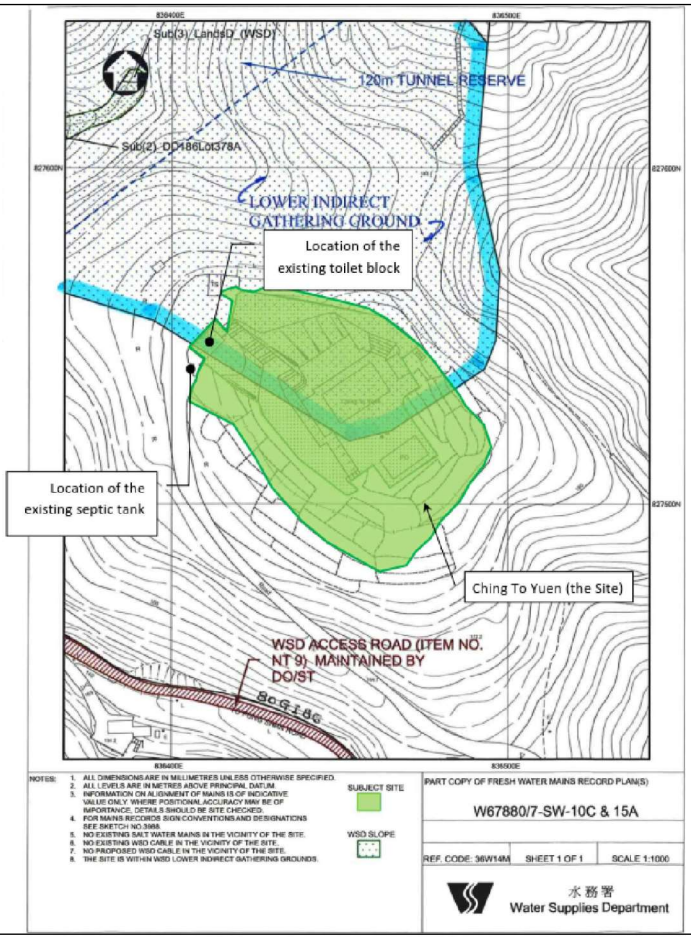
5.1.9 As described above, the Application Site has been in operation for almost sixty years without adverse impact to the LIWGG and there are no new uses or activities at the Site proposed in this planning application that will increase the risk of pollution.

Figure 2.1 Site Location and its Environ



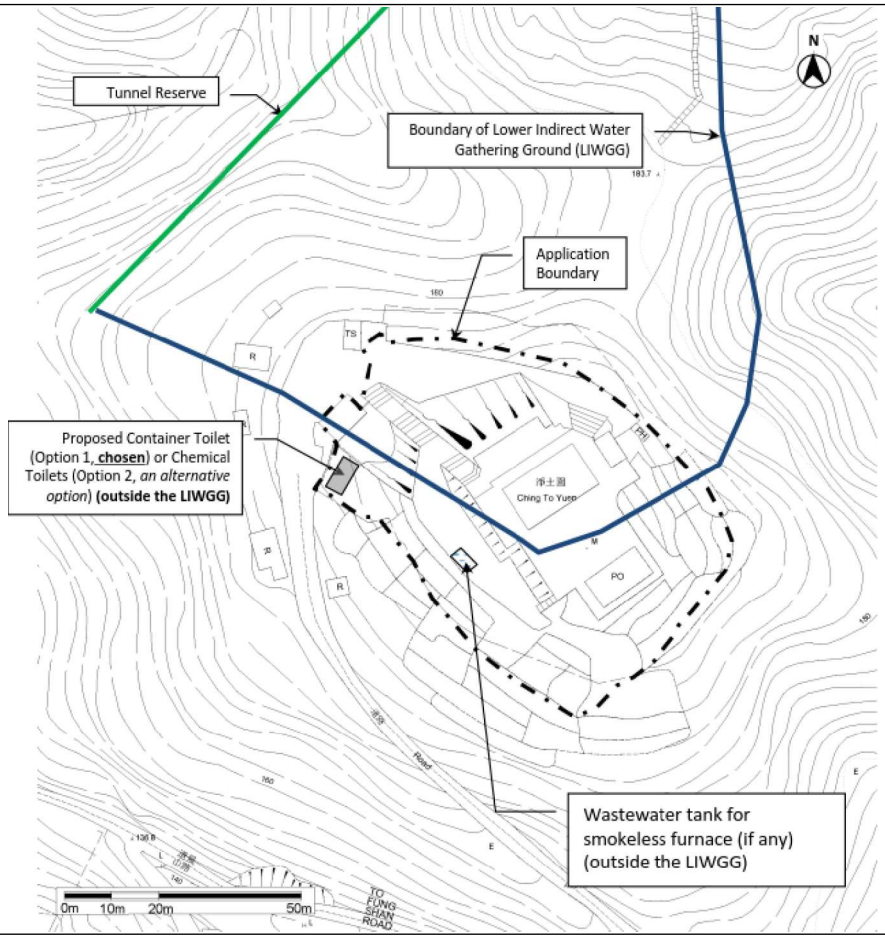
aurecon Aurecon Hong Kong Limited	Rezoning Application for a Proposed Columbarium for Ching To Yuen Site Location and its Environs	Figure 2.1

Figure 3.1 Boundary of Lower Indirect Water Gathering Ground



aurecon Aurecon Hong Kong Limited	Rezoning Application for a Proposed Columbarium for Ching To Yuen Boundary of Lower Indirect Water Gathering Ground	Figure 3.1

Figure 4.1 The Proposed Options for On-site Wastewater Facilities



aurecon Aurecon Hong Kong Limited	Rezoning Application for a Proposed Columbarium for Ching To Yuen The Proposed Options for Onsite Wastewater Facilities	Figure 4.1

Appendix 3.1 Information from Water Supplies Department (WSD)

水務署
Water Supplies Department
九龍灣辦事處
Kowloon Bay Office
九龍 九龍灣 大業里十一號
11 Tai Yip Lane, Kowloon Bay, Kowloon
電話 *Telephone* 2152 5610
圖文傳真 *Facsimile* 2354 5737

檔號 *Reference* (3) in WSD 3051/7/1S/95 Pt 2 12 Sep 2014

SMEC Asia Limited

[redacted]

Dear Sirs,

Development at Lots 374, 375 A (Part) and 375 B (Part)
in DD 186, To Fung Shan, Sha Tin
Request for Information

Your letter dated 18 August 2014 about the captioned issue refers.

We return herewith one copy of our plan with the existing water mains and waterworks installations indicated. You are requested to note that the alignment of the water mains shown on the plan returned is indicative only. Although it is our intention to provide you with the most up-to-date information, we cannot guarantee that the information returned to you is exhaustive. In particular, we cannot guarantee that all our water mains, especially those laid only recently, have been incorporated in our central records and hence on the plan returned. A copy of "Mains Records Sign Conventions and Designations" (SK3988B) is also attached for your reference.

In addition, please note that the water collected in the Water Gathering Grounds in the vicinity will be stored in Lower Shing Mun Reservoir for future potable use.

SMEC ASIA LTD

To	Action	Info	Copy	Sign	Date
AB					
AHJ					
JDM					
Rec'd	19 SEP 2014				
	707631/2				
Doc. Reg. No.	4860				

Yours faithfully,

(Ricky LIU)
for Chief Engineer/New Territories East
Water Supplies Department

Encl.

SIGN CONVENTIONS

TYPE	LEGEND
MAINS	
FRESH/SALT WATER MAINS	
RAW/UNTREATED WATER MAINS/CONDUIT	
BEING LAID MAINS	
PROPOSED MAINS	
WASHOUT PIPE	
SLUDGE PIPE	
TREATED EFFLUENT MAINS	
WATER MAINS REQUIRE REGULAR FLUSHING	
PRIVATE MAINS (SEE NOTE 2)	
MAINS OF OTHER DEPARTMENTS (SEE NOTE 3)	
REPLACEMENT AND REHABILITATION MAINS PENDING HANDOVER TO WSD	
FIRE SERVICES	
PEDESTAL FIRE HYDRANT	PH
GROUND FIRE HYDRANT	GH
HEAVY DRAW-OFF FIRE HYDRANT	HD
SWAN NECK FIRE HYDRANT	SN
TWIN OUTLET SWAN NECK FIRE HYDRANT	SN
FIRE SERVICES CONNECTION	F
VALVES	
BUTTERFLY VALVE	BV
SLUICE VALVE	SV
GATE VALVE	GV
STOP COCK	SC
SINGLE AIR VALVE	SAV
DOUBLE AIR VALVE	DAV
WASHOUT VALVE	WOV
NON RETURN/REFLUX VALVE	NRV
FLOW REGULATING VALVE	FRV
NORMALLY CLOSED VALVE	
PRESSURE CONTROL/REDUCING/RELIEF VALVE	PRV
FLAP VALVE	FV
OTHERS	
STANDPIPE	STP
VENTURI TUBE	VEN
INSPECTION MANHOLE TEE	IT
AIR VALVE ON INSPECTION MANHOLE TEE	ITV
INSPECTION MANHOLE	IMH
WATER TUNNEL	
ESSENTIAL VALVE REFERENCE NUMBER	C 600123
LEAKAGE COLLECTION CHAMBER	LCC
LEAK NOISE CORRELATION POINT	LNC
CATHODIC PROTECTION POINT	CPP
CHECK METER/FLOWMETER	FM
WASTE DETECTION METER	WDM
DISTRICT METER WITH STRAINER	DM
FLOW MEASUREMENT CHAMBER FOR ULTRASONIC FLOW METER	FMC
SHALLOW COVERED WATER MAINS	SCM
CHANGE IN PIPE	
BLANK FLANGE/END CAP	
PIPES CONNECTED	
PIPES CROSS OVER	

NOTES:

1. WSD MAINS INCLUDE:
   (a) MAINS LAID AND MAINTAINED BY WSD.
   (b) MAINS LAID BY OTHER DEPARTMENTS OR PRIVATE PARTIES BUT MAINTAINED BY WSD AT WSD'S COST.
2. PRIVATE MAINS INCLUDE MAINS IN PRIVATE ROADS, PRIVATE HOUSING ESTATES, ETC. NOT MAINTAINED BY WSD.
3. MAINS OF OTHER DEPARTMENTS INCLUDE MAINS LAID BY OTHER GOVERNMENT DEPARTMENTS NOT MAINTAINED BY WSD.

ABBREVIATIONS

PIPE MATERIALS

AC	ASBESTOS CEMENT
CI	CAST IRON
CONC	CONCRETE
COPP	COPPER ALLOY
DI	DUCTILE IRON
GI	GALVANIZED IRON
GIL	LINED GALVANIZED IRON
GRP	GLASS FIBRE REINFORCED PLASTIC
HDPE	HIGH DENSITY POLYETHYLENE
MDPE	MEDIUM DENSITY POLYETHYLENE
PE	POLYETHYLENE
GMS	GALVANIZED MILD STEEL
MS	MILD STEEL
S	STEEL
UPVC	UNPLASTICISED POLYVINYL CHLORIDE

REHABILITATION METHODS

RA	CURED IN PLACE PIPE (CIPP)
RB	CLOSE FIT ("FOLD AND FORM" SYSTEM)
RC	PIPE BURSTING
RD	SLIP LINING/SLIP INSERTION
RE	CLOSE FIT ("SWAGELINING" SYSTEM)
RF	FIBRE REINFORCED PLASTIC (FRP) SYSTEM
RG	INTERNAL LINING REPAIRED
RH	EXTERNAL COATING REPAIRED
RJ	CATHODIC PROTECTION INSTALLED

DESIGNATIONS

'450DI99' DESIGNATES 450mm DIAMETER DUCTILE IRON PIPE LAID IN 1999.

'600S03(E)' DESIGNATES 600mm DIAMETER STEEL PIPE LAID IN 2003 (ENTRUSTMENT).

'600DI97(W10582/2B)' DESIGNATES 600mm DIAMETER DUCTILE IRON PIPE LAID IN 1997 WITH DRAWING REFERENCE (W10582/2B).

'150DI04WO, 150DI04F, 150DI04OF' DESIGNATES 150mm DIAMETER, DUCTILE IRON PIPE MATERIAL, LAID IN 2004, OF TYPE WASHOUT PIPE, FIRE SERVICE MAINS AND OVERFLOW PIPE RESPECTIVELY.

'150CIRA04' DESIGNATES 150mm DIAMETER CAST IRON PIPE REHABILITATED IN 2004 BY CURED IN PLACE PIPE METHOD (SEE ABBREVIATIONS).

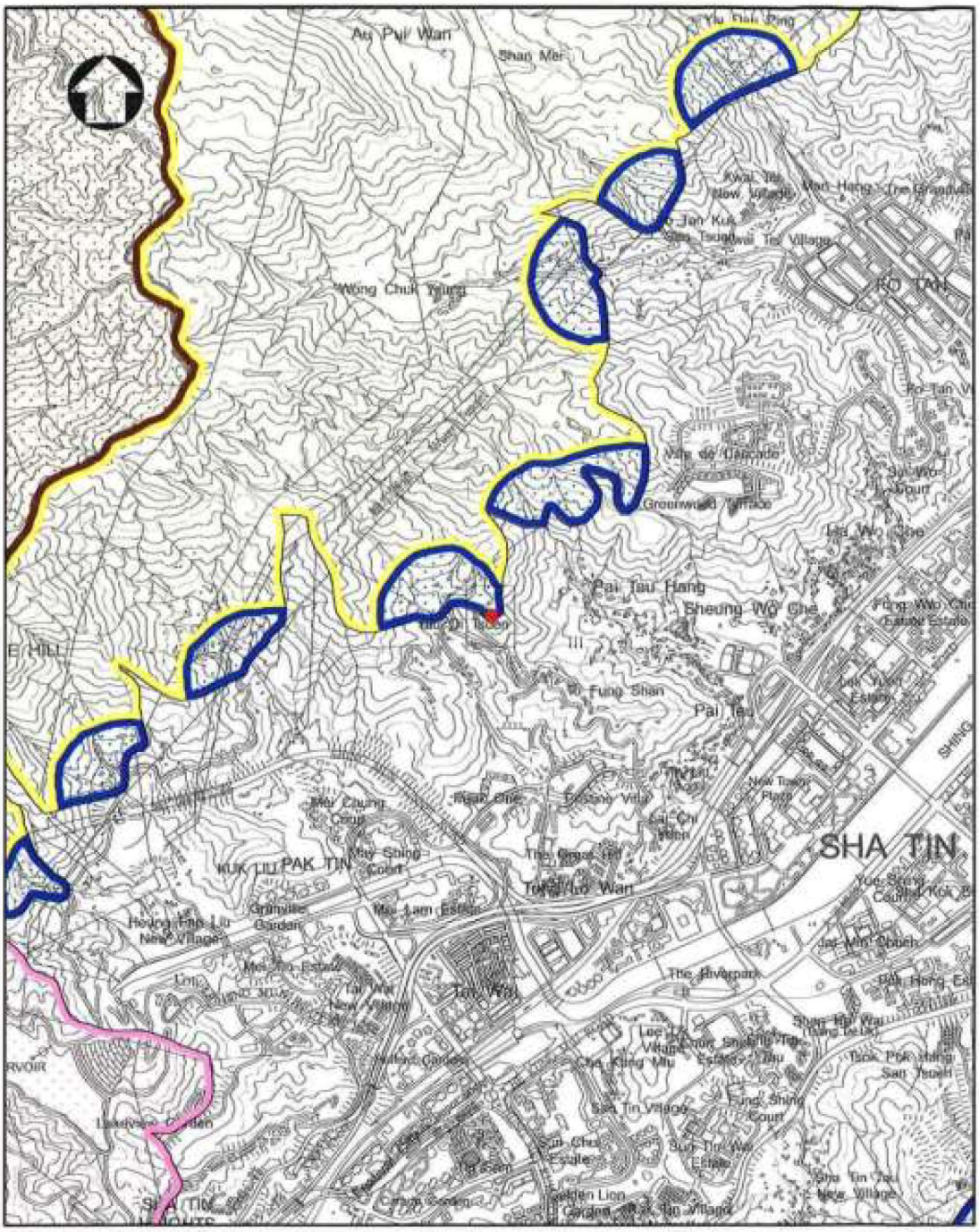
'600S03(L), 600S03(DRY), 600S03(PC)' DESIGNATES 600mm DIAMETER, STEEL PIPE MATERIAL, LAID IN 2003 WITH LEAKAGE COLLECTION SYSTEM, DRY MAINS AND PENDING COMMISSION MAINS RESPECTIVELY.

'80PE09(TMF)' DESIGNATES 80mm DIAMETER, POLYETHYLENE PIPE MATERIAL, LAID IN 2009, TEMPORARY MAINS FOR FLUSHING.

REVISION 修訂

編號 no.	日期 date	摘要 description	簽署 initial
B	11/02/11	GENERAL REVISION	SE/Dev(SD)
A	16/06/05	GENERAL REVISION	(Signed) K.T. CHAN SE/AM

圖則名稱 drawing title	簽署 initial	日期 date	圖則編號 drawing no.	比例 scale
MAINS RECORDS SIGN CONVENTIONS AND DESIGNATIONS	繪製 drawn (Signed) C.M. CHAN	16/06/05	SK 3988B	NOT APPLICABLE
	核對 checked			
	加簽 endorsed			
	核准 approved (Signed) C.C. CHAN CE/RA	12/03/98	水務署 Water Supplies Department	



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.
3. THE SITE IS WITHIN LOWER INDIRECT GATHERING GROUNDS.
4. THIS PART PRINT IS EXTRACTED FROM WSD GATHERING GROUNDS DRAWING W7955 SERIES.
5. THIS PART PRINT IS MARKED UP WITH DIRECT, INDIRECT & FLOOD PUMPING GATHERING GROUNDS DELINEATION, IF ANY. THE INFORMATION IS BASED ON DRAWING W10246 SERIES.

LEGEND:

- SUBJECT SITE
- WSD GATHERING GROUNDS
  - UPPER DIRECT
  - LOWER DIRECT
  - FLOOD PUMPING
  - UPPER INDIRECT
  - LOWER INDIRECT

PART COPY OF WSD GATHERING GROUNDS DRAWING(S)

W7955/7

REF. CODE: 36W14M	SHEET: 1 OF 1	SCALE 1:20000

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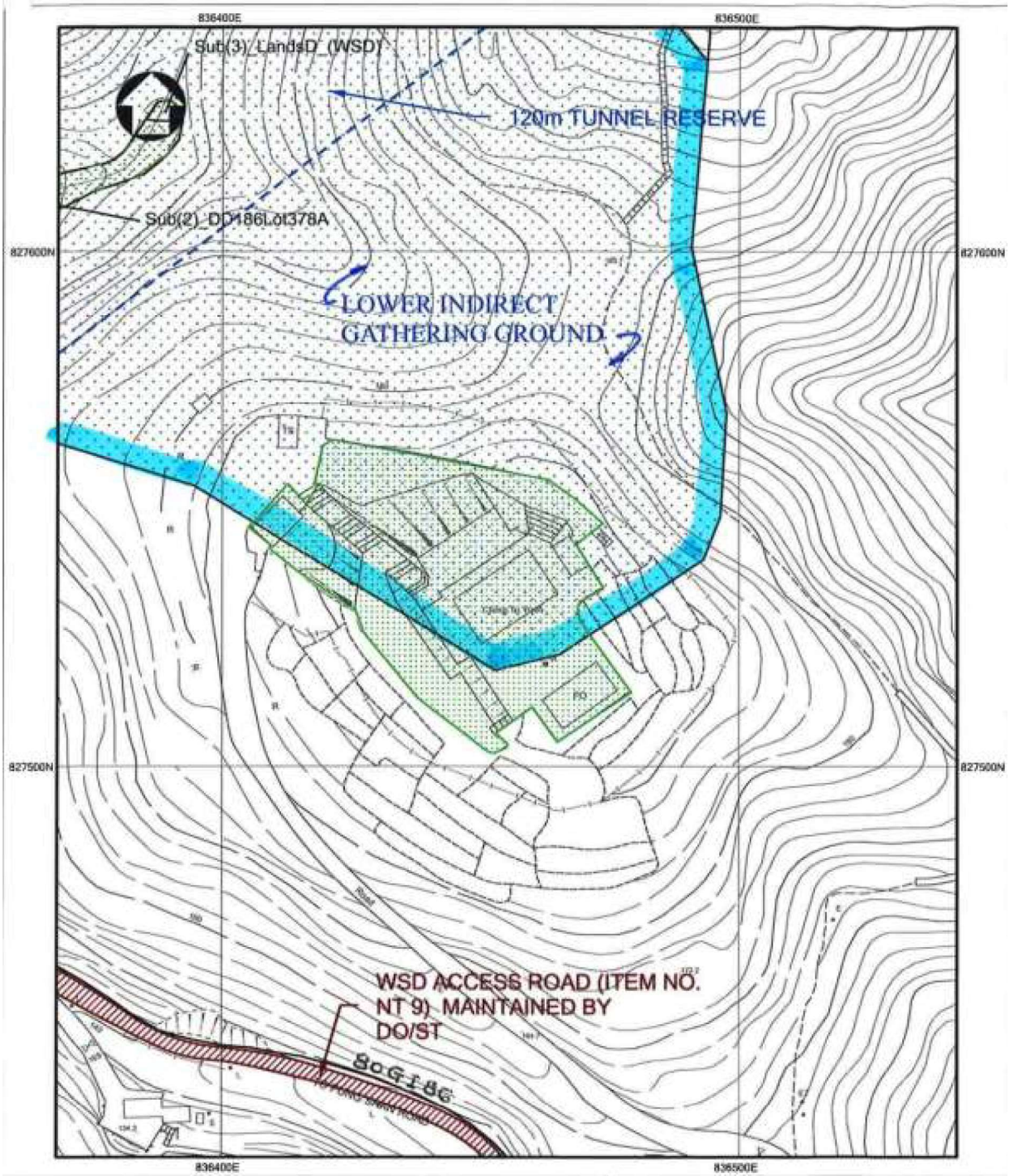
Water Supplies Department



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.
3. INFORMATION ON ALIGNMENT OF MAINS IS OF INDICATIVE VALUE ONLY. WHERE POSITIONAL ACCURACY MAY BE OF IMPORTANCE, DETAILS SHOULD BE SITE CHECKED.
4. FOR MAINS RECORDS SIGN CONVENTIONS AND DESIGNATIONS SEE SKETCH NO.3988.
5. NO EXISTING SALT WATER MAINS IN THE VICINITY OF THE SITE.
6. NO EXISTING WSD CABLE IN THE VICINITY OF THE SITE.
7. NO PROPOSED WSD CABLE IN THE VICINITY OF THE SITE.
8. THE SITE IS WITHIN WSD LOWER INDIRECT GATHERING GROUNDS.

SUBJECT SITE

WSD SLOPE

PART COPY OF FRESH WATER MAINS RECORD PLAN(S)

W67880/7-SW-10C & 15A

REF. CODE: 36W14M	SHEET 1 OF 1	SCALE 1:1000

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Appendix 4.1 Catalogues of Portable Toilets and Wash-hand Basin Tap

An Example of a Vacuum Toilet with Flushing Volume of no more than 1.2L per flush

Jets™ 50M FD/VPC-V

Toilet

Jets™ 50M is a floor model vacuum toilet in a modern design.
The toilet is equipped with the Jets™ FD-Valve- VPC-V controller, vacuum operated, featuring low water consumption, reliable flushing and discharge.

Technical Data:

Outside Dimensions:	385x590x465 (WxLxH)
Bowl Material:	Vitreous china
Bowl Weight net:	19,5 kg
Total Weight:	24 kg
Water Connection:	BSP 1/2" male ball valve
Discharge Outlet:	Outside diameter Ø 50mm
Part No.:	063600200

Deviation for main dimentions china products: +/-2%

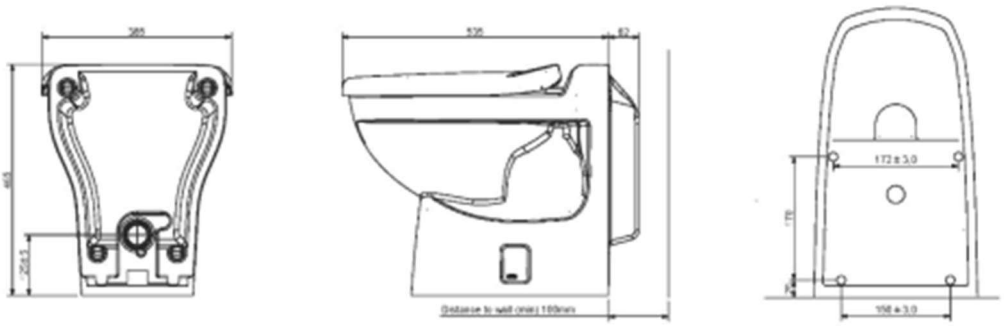
Note: Changes without prior notice

www.jets.no
Myravegen 1, N-6060 Hareid Norway Tel. + 47 70 03 91 00. Fax + 47 70 03 91 01. E-mail: post@jets.no

Jets™ 50M FD/VPC-V

Toilet

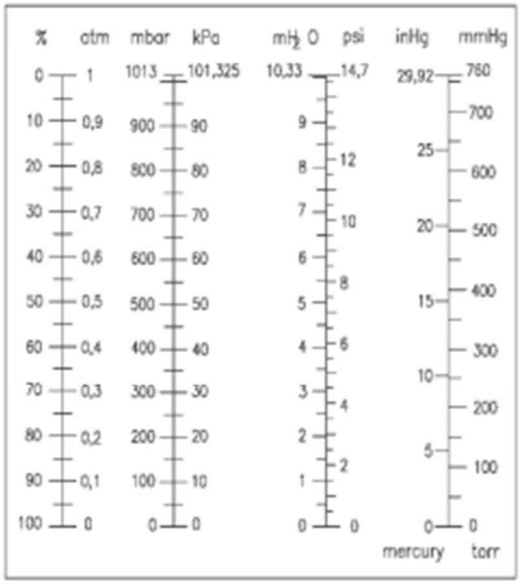
Dimensions JETS 50M



Operating Data

Flushing Time:	Adjustable (5 seconds)
Discharge Time:	Adjustable (2 seconds)
Water Pressure:	2-7 bar (200-700 kPa)
Operating Vacuum:	30-55%
Water Consumption:	Adjustable (1,2 litres)
Air Consumption:	Adjustable (Appr. 60 litres at 50% vacuum)

Vacuum Translation Table



www.jets.no
Myravegen 1, N-6060 Hareid Norway Tel. + 47 70 03 91 00. Fax + 47 70 03 91 01. E-mail: post@jets.no

Kovic + Kims

KV-83-01 + E09-2405-4L

混合式

註冊號碼	TM 20-0202
公司名稱	堅成塑膠五金製品廠有限 公司
公司網址	www.kimsion.com
公司電話號碼	2493 0257
原產地	China (Mixer and Flow Controller)
一般認可信編號	C20200881
一般認可到期日（水龍頭）	21.07.2025
一般認可信編號（節流器）	C20190319
標稱流量（公升 / 分鐘）	3.1
簽發日期	28.10.2020
用水效益級別 (1/2/3/4)	💧

Rainbow Fresh Toilet

彩虹型流動廁所

Enjoy Your Time

舒適~環保~

衛生的最佳選擇

An Example of a Chemical Toilet (Page 1/2)

彩虹型流動廁所

環保性： 產品爲高密度聚乙稀製成，具有可回收性，
表面採平滑設計易清潔，不積存臭味和細菌
實用性：不怕風吹日曬雨淋，堅固耐用外觀優美大方，
適合公眾場所使用
衛生性：特殊空氣對流設計，通風性良好，
特殊除臭消毒劑，清香無異味
靈活性：不受地形場所限制，無須水，電及排水設備
美觀性：色彩多樣，單選，複選多重搭配

TOI TOI 已正式成爲認可的專業
環保處理公司，並且獲得ISO 9001認可證書，此外，
能夠嚴格地執行內部品質稽核，尤其在環保普世
之中，是用戶最佳選擇

TOI TOI 所提供的專業服務：

＊提供高壓專業清洗機清潔廁所內外（客戶可以要求安排定期服務或每日服務）
＊依據香港政府法規，將污水排放於合法的污水處理廠內
＊提供定期補充藥水服務
＊供應適量的衛生紙
＊使用結束後，提供完善清潔服務

產品規格：

尺寸規格：１０６０mm長ｘ
１０６０mm寬ｘ
２４００mm高
重　　量：７０kg
容　　量：４００公升或以上
設　　備：
1. 脚踏式藥水沖洗系統
2. 小便斗
3. 衛生紙架
4. 洗手樓
5. 鏡子
6. 衣物掛勾
7. 男女廁所標誌
8. 室內通風管
9. 透氣窗

Rainbow Toilet

VIP East 東方式貴賓廁

東方式貴賓蹲廁是眾多類型中設備最完善及設計最新穎的款色，其中渦流式沖水的設計更增加了其衛生程度，另外更有多種廁內配套可供選擇。

This is our top of the range model. It provides the maximum hygiene standard due to the special flushing system and the additional toiletries provided.

高度 Height	: 2.29 M (7 ft.)
寬度 Width	: 1.12 M (4 ft.)
縱深 Length	: 1.22 M (4 ft.)
重量 Weight	: 112.5 kg. (empty)
牆身厚度 Wall Thickness	: 3.05mm
款式 Type	: 蹲廁 Squatting
污水缸容量 Holding Tank	: 400 L
清水缸容量 Flushing Water Tank	: 100L 高速渦流式沖水系統, 密封式廁缸 100 L high velocity flushing system with concealed toilet bowl

Appendix 4.2 Calculation of Sewage Generation during Peak and Non-Peak Periods

Estimation of Sewage Generation during Peak Period

Sewage Generation

Item	Desciption		Value	Unit	Remarks
(a)	Total Visitors	=	2553	vistors/day	Refer to Section 4.1.11 of WQA Report
(b)	Unit Flow Rate (For Visitors)	=	0.0028	m^3/person/visit	Unit Flow of Toilet Flushing = 500mL (Human Urinate/ Time) [Note(1)] + 1.2L (Vacuum Toilet Flushing Volume) [Note(2)] = 1.7 L/Flush Estimated Grey Water Yield of Wash-hand Basin Taps = 3.1 L/min x 1.58 + 1.58 = 6.48 L/min Unit Flow of Hand Washing = 6.48 L/min / 60s x 10s = 1.08 L/Hand Washing [Note(3)]
(c)	Percentage of visitors will go to toilet	=	50	%	As advised by the Applicant based on the experience of actual operation, 10% of the visitors will use toilets. For the worst-case scenario, 50% of visitors using toilets is assumed. [Note(4)]
(d)	No. of Staff	=	17	staff	As advised by the Applicant
(e)	Unit Flow Rate (For Staff)	=	0.08	m^3/person/day	Refer to EPD GESF [Note(5)]
(f)	Total Unit Flow Rate (Visitors+Staff)	=	4.93	m^3/day	Total Unit Flow Rate (Visitors+Staff) = Sewage from Visitors + Sewage from Staff = (a x b x c) + (d x e)

Measure (Option 1 - Aboveground Sewage Tank with Water Saving Toilet)

	Desciption		Value	Unit	Remarks
	Total Storage Capacity of Portable (Container) Toilet	=	6,000	L	Flush volume is less than 1L. Two containers (3,000L each) will be installed as advised by the Supplier.
	No. of Container Required (3,000L each)	=	2		

Measure (Option 2 - Chemical Toilets)

	Desciption		Value	Unit	Remarks
	Storage Capacity of a Chemical Toilet	=	400	L/Toilet	With reference to the Supplier's catalogue
	No. of Chemical Toilet	=	15	Toilet	

Note

1 Human Urinate is assumed to be 500mL in accordance with Geetha Maddukuri, MD, Saint Louis University, Modified Apr 2025, Excessive or Frequent Urination (https://www.merckmanuals.com/home/kidney-and-urinary-tract-disorders/symptoms-of-kidney-and-urinary-tract-disorders/excessive-or-frequent-urination)

2 Refer to Section 4.1.13 & 4.1.16

3 Refer to Section 4.1.15 & 4.1.16

4 Refer to Section 4.1.14

5 Environmental Protection Department (EPD) publication Guidelines for Estimating Sewage Flows (GESF) for Sewage Infrastructure Planning Version 1.0, March 2005, (https://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/water/guide_ref/files/gesf.pdf)

Estimation of Sewage Generation during Non-Peak Period

Sewage Generation

Item	Desciption		Value	Unit	Remarks
(a)	Total Visitors	=	10	vistors/day	Refer to Section 4.1.11 of WQA Report
(b)	Unit Flow Rate (For Visitors)	=	0.0028	m^3/person/visit	Unit Flow of Toilet Flushing = 500mL (Human Urinate/ Time) [Note(1)] + 1.2L (Vacuum Toilet Flushing Volume) [Note(2)] = 1.7 L/Flush Estimated Grey Water Yield of Wash-hand Basin Taps = 3.1 L/min x 1.58 + 1.58 = 6.48 L/min Unit Flow of Hand Washing = 6.48 L/min / 60s x 10s = 1.08 L/Hand Washing [Note(3)]
(c)	Percentage of visitors will go to toilet	=	50	%	As advised by the Applicant based on the experience of actual operation, 10% of the visitors will use toilets. For the worst-case scenario, 50% of visitors using toilets is assumed. [Note(4)]
(d)	No. of Staff	=	5	staff	As advised by the Applicant
(e)	Unit Flow Rate (For Staff)	=	0.08	m^3/person/day	Refer to EPD GESF [Note(5)]
(f)	Total Unit Flow Rate (Visitors+Staff)	=	0.41	m^3/day	Total Unit Flow Rate (Visitors+Staff) = Sewage from Visitors + Sewage from Staff = (a x b x c) + (d x e)

Measure (Option 1 - Aboveground Sewage Tank with Water Saving Toilet)

	Desciption		Value	Unit	Remarks
	Total Storage Capacity of Portable (Container) Toilet	=	2,000	L	Flush volume is less than 1L. One container (2,000L each) will be installed as advised by the Supplier.
	No. of Container Required (2,000L each)	=	1		

Measure (Option 2 - Chemical Toilets)

	Desciption		Value	Unit	Remarks
	Storage Capacity of a Chemical Toilet	=	400	L/Toilet	With reference to the Supplier's catalogue
	No. of Chemical Toilet	=	2	Toilet	

Note

1 Human Urinate is assumed to be 500mL in accordance with Geetha Maddukuri, MD, Saint Louis University, Modified Apr 2025, Excessive or Frequent Urination (https://www.merckmanuals.com/home/kidney-and-urinary-tract-disorders/symptoms-of-kidney-and-urinary-tract-disorders/excessive-or-frequent-urination)

2 Refer to Section 4.1.13 & 4.1.16

3 Refer to Section 4.1.15 & 4.1.16

4 Refer to Section 4.1.14

5 Environmental Protection Department (EPD) publication Guidelines for Estimating Sewage Flows (GESF) for Sewage Infrastructure Planning Version 1.0, March 2005, (https://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/water/guide_ref/files/gesf.pdf)

Document prepared by

Aurecon Hong Kong Limited

W aurecongroup.com