Agreement No. CE 92/2017 (CE)

Site Formation and Infrastructure Works for Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction

FINAL WATERWORKS IMPACT ASSESSMENT REPORT FOR S16 PLANNING APPLICATION (INTENSIFICATION SCHEME)

199086/BIN/089/Issue 3

JULY 2023

CEDD 土木工程拓展署
Civil Engineering and Development Department

binnies

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Final Waterworks Impact Assessment Report for S16 Planning Application (Intensification Scheme)

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July 2023

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1 INTRODUCTION

1.1 General

1.1.1 As a prevailing policy to increase land supply to meet the housing demand in the short, medium and long terms, the Government has identified sites in various districts with the potential to be developed for residential use. Amongst others, a site near Tan Kwai Tsuen (the Site), Yuen Long for public housing developments. The location of the Site is shown on ***Drawing No. 199086/BIN/GEN/001***.

1.1.2 In view of the acute shortage of housing, the domestic plot ratio of the Application Site is proposed to be intensified to 6.5 with an aim to increase flat production. The Application Site will provide a total of 7,420 public housing units with planned population intake from 2030 by phases. The site formation layout plan is shown on ***Drawing No. 199086/BIN/SFAI/001***. An "Application for Permission under Section 16 of the Town Planning Ordinance" is being prepared for the Proposed Development in order to obtain planning permission from the Town Planning Board for minor relaxation of the following restrictions:

- Maximum plot ratios:
    - Phase 1: from 6.5 to 7.0 (i.e. domestic PR of 6.5 and non-domestic PR of 0.5)
    - Phase 2: from 6.5 to 7.2 (i.e. domestic PR of 6.5 and non-domestic PR of 0.7)
    - Phase 3: from 6.5 to 7.3 (i.e. domestic PR of 6.5 and non-domestic PR of 0.8)
- Maximum building heights:
    - Phase 1: from 205 mPD to 240 mPD
    - Phases 2 and 3: from 205 mPD to 235 mPD

1.2 Project Description

1.2.1 Binnies Hong Kong Limited was requested by the Civil Engineering and Development Department (CEDD) to prepare necessary technical assessments of Section 16 (S16) planning application for minor relaxation of PR and building height restriction for the agreement of the Town Planning Board (TPB).

1.3 Interfacing Projects

1.3.1 Notable potential interfacing projects include:

- CE 2/2011 (CE) - Hung Shui Kiu (HSK) New Development Area (NDA) Planning and Engineering Study
- CE 19/2015 (TP) - Preliminary Land Use Study for Lam Tei Quarry and the Adjoining Areas – Feasibility Study

- CE 35/2012 (CE) - Planning and Engineering Study for Housing Sites in Yuen Long South – Investigation
- CE 32/2017 (CE) – Yuen Long South Development – Stage 1 – Design and Construction
- PWP Item 7259RS and 7279RS - Cycle Tracks connecting North West New Territories with North East New Territories
- CE 46/2007 (DS) - Review of Drainage Master Plans (DMP) in Yuen Long and North Districts – Feasibility Study
- PWP Item 4223DS - Yuen Long and Kam Tin sewerage treatment upgrade – Upgrading of San Wai Sewage Treatment Works
- CE 26/2015 (CE) - Site Formation and infrastructural works for the Development at Long Bin, Yuen Long – Feasibility Study
- CE 56/2016 (CE) - HSK NDA Stage 1 Works – Design and Construction
- CE 39/2016 (CE) - HSK NDA Advance Works, Phases 1 & 2 – Design and Construction
- CE 42/2016 (CE) - Environmental Friendly Transport Services in HSK - NDA and Adjacent Areas – Feasibility Study
- CE 86/2017 (CE) - Fostering a Pedestrian and Bicycle-friendly environment in HSK NDA and YLS Development – Feasibility Study
- CE 41/2015 (GE) – Landslip Prevention and Mitigation Programme, 2015, Package G – Landslip Prevention and Mitigation Works and Provision of Emergency Works Services for Natural Terrain Landslides Occurring in Mainland West (North) – Investigation, Design and Construction
- CE 51/2016 (HY) - Route 11 (between North Lantau and Yuen Long) - Feasibility Study
- CE 65/2016 (CE) – Further Study on Tuen Mun Western Bypass – Investigation
- CE 39/2018 (WS) – Strategic Cavern Areas to Accommodate Existing and Proposed Service Reservoirs in Lam Tei and Adjoining Areas – Feasibility Study
- CE 6/ 2019 (DS) – Hung Shui Kiu Effluent Polishing Plant and Yuen Long South Effluent Polishing Plant– Investigation
- CE 1/2020 (CE) - Hung Shui Kiu/Ha Tsuen New Development Area Package A Works for Second Phase Development - Design and Construction
- CEDD's project "Greening Master Plan"
- EDB/ ArchSD's primary school projects
- Relocation of Existing Services Reservoirs to Cavern and Proposed Service Reservoirs in Cavern in Lam Tei – Feasibility Study by Project Management Division of WSD

- Holistic Review Study on the Use of Reclaimed Water in Northwest New Territories by West Development Office of CEDD
- Other utilities supply to the Development
- Other relevant projects of planned/committed developments as advised by PlanD, HKHA/ HD, CEDD and other Government B/Ds
- Any other relevant projects and assignments, which may arise during the course of the Assignment.

1.4 Purposes and Scope of this Report

1.4.1 The purpose of this report is to evaluate the potential waterworks impacts associated with the proposed housing development due to the proposed increase in maximum plot ratio and building height.

1.5 Structure of the Report

1.5.1 This report comprises the following sections: -

Section 1 introduces the project background and project description.

Section 2 describes the methodology ad design criteria for the report.

Section 3 presents the existing and planned waterworks facilities around the Site.

Section 4 conducts the water demand estimate of fresh water and salt water supplies by the Site.

Section 5 assesses the potential impact to waterworks facilities arising from the Site.

Section 6 proposes the mitigation and water supplies schemes due to the Site.

Section 7 presents the preliminary design of the water supply system.

Section 8 concludes the findings and makes recommendations.

2 METHODOLOGY AND DESIGN CRITERIA

2.1 Information Available for WIA Study

2.1.1 To conduct the study on the waterworks, we have adopted the following available information:

- Existing water mains records provided by WSD;
- As-built drawings on existing waterworks; and
- WSD's Planning Report.

2.2 Methodology

2.2.1 The Development will generate water demands of fresh and flushing waters. The expected impact on the existing water supplies system and their requirement for any upgrading works or new facilities to meet such demands and the correspondence implementation programme, if necessary, will be discussed in this report.

2.2.2 Coordination with Water Supplies Department (WSD) was conducted to acquire relevant information and data, including but not limited to existing capacities of water supplies systems and etc. serving the Site. Meetings with PlanD, CEDD and WSD and other relevant departments will be conducted for further discussion if needed.

2.2.3 Under this report, the following approach has been adopted to carry out the study:

- To identify the scope of the developments at the Site;
- To determine the water demands of the developments at the Site;
- To assess the adequacy of the existing and planned water supply facilities within and in the vicinity of the proposed development boundary;
- To examine the impact arising from additional water demands from the developments at the Site on the existing source of supply and the system capacity; and
- To propose the required water mains layout.

2.2.4 The estimation of the water demands of the Development is based on the latest development parameters provided by Housing Department (HD) and relevant government departments as indicated in ***Table 2.2*** and are generally with reference to the unit water demands as recommended under WSD's Departmental Instruction (DI) No. 1309 and "Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning" published by EPD.

2.2.5 This report has been undertaken in accordance with the following standards, Code of Practice and Design Manuals:

- WSD's Civil Engineering Design Manual;
- EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning;

- WSD's Manual of Mainlaying Practice (2012 Edition); and
- WSD's Departmental Instruction (DI) No. 1309.

2.3 Design Parameters

2.3.1 In accordance with WSD's DI 1309, Review of Planning Standards - Part I: Balancing Storage for Fresh Water Service Reservoir and Review of Planning Standards – Part V: Fire Fighting Water Requirements, and AD/Dev's memo of ref. (8) in WSD 3608/50/3/02 Pt.2 dated 11 May 2006, the following design parameters and peak demand factors are adopted for the design of proposed water supply system for the Development. ***Table 2.1*** lists the relevant design criteria to be used for the assessment.

Table 2.1 – Design Criteria from WSD's DI 1309 and AD/Dev's memo of ref. (8) in WSD 3608/50/3/02 Pt.2

Waterworks / Facilities	Requirements
Service Reservoir Capacity	• Fresh water system (i) Supply Zone – Interconnected Supply System: 0.75MDD – Isolated Supply Zone: 0.85MDD (ii) Fire-fighting Requirements – For R1 = [0.4MDD + 9,900/2] / 0.9 – For R2 = [0.4MDD + 6,600/3] / 0.9 – For R1 = [0.4MDD + 3,300/4] / 0.9 (iii) With Critical Customer – Add 0.05MDD Storage Capacity • Flushing water system – 64% of MDD (for reclaimed water)
Pumping Station Capacity	• Fresh water system (i) Pump Rate – 1.5MDD (About 8330 m^3/d) • Flushing water system (ii) Pump Rate – 1.2MDD (About 1810 m^3/d)
Peak Flow Rates in Distribution Main	• Fresh water system – 3 times mean daily demand • Flushing water system – 2 times mean daily demand

Waterworks / Facilities	Requirements
Residual Head	• Fresh water system – 20m • Fresh water system for firefighting – 17m • Flushing water system – 15m
Fire Fighting	• Fire-fighting requirements for Zone R1 = 9,900 m^3/d for 12 hours; Zone R2 = 6,600 m^3/d for 8 hours & Zone R3 = 3,300 m^3/d for 6 hours.

2.4 Development Parameters

2.4.1 The latest development parameters of the Development is shown below in ***Table 2.2*** and ***Table 2.3***.

Table 2.2 - Latest Development Parameters

Domestic	
Plot Ratio	6.5
Total No. of Flats	7,420
Non-domestic	
GFA for Welfare Facilities (m^2)	15,849
GFA for Retail Complex (m^2)	5,912
GFA for Car Parking (m^2)	42,850
GFA for Ancillary Facilities(1) (m^2)	1,098
GFA for Other Facilities(1) (m^2)	8,800
Total GFA(2) (m^2)	31,658
School	
No. of Kindergarten	2
No. of Primary School	1

Notes:
(1) Ancillary facilities and other facilities include office, workshop, PTI and covered walkway etc.
(2) Excluding GFA for carparking.

Table 2.3 – Design Populations

Domestic	
No. of Population	20,034(1)
Retail and Welfare	
No. of Employees (2)(3)	1,986
Primary School and Kindergarten	
No. of students and teachers (4)(5)	1,223

Notes:
(1) Person per flat = 2.7
(2) Worker densities of 3.5 workers (Retail Trade) and 3.3 workers (Community, Social & Personal Services) per 100m^2 GFA are adopted based on Table 8 of Commercial and Industrial Floor Space Utilization Survey published by Planning Department for the estimation of employees in retail and welfare / ancillary facilities, respectively.
(3) The provision of welfare facilities is subject to the approval of Social Welfare Department.
(4) Two kindergartens was planned with 180 students per kindergarten; 25.5 students per class for primary school are assumed based on Chapter 3 of Hong Kong Planning Standards and Guidelines.
(5) Pupil-Teacher ratios of 8.6:1 (kindergarten) and 13.8:1 (primary school) are assumed based on Education Bureau's 2017/18 figures and statistics available on Education Bureau's website.

2.4.2 The latest Preliminary Layout Plan of the Development at the Site provided by HD is enclosed in ***Appendix E*** for reference.

3 EXISTING AND PLANNED WATERWORKS FACILITIES

3.1 Existing Water Treatment Works

3.1.1 Au Tau Water Treatment Works (ATWTW) is the current major water source to the Tan Kwai Tsuen area. Treated fresh water is transferred from ATWTW via Au Tau Primary Service Reservoir to Tan Kwai Tsuen South Fresh Water Service Reservoir (TKTS FWSR).

3.2 Existing Service Reservoirs

Fresh Water Service Reservoirs

3.2.1 The Site is located adjacent to the TKTS FWSR which supplies fresh water to Tan Kwai Tsuen and the surrounding areas.

3.2.2 The Site is located within the fresh water supply zone of the existing TKTS FWSR. The above key waterworks and fresh water service reservoir supply zones are shown in ***Appendix A.***

3.2.3 ***Table 3.1*** summarizes the information on the capacity, top water level and invert level of the existing TKTS FWSR.

Table 3.1 – Information on Existing Tan Kwai Tsuen South Fresh Water Service Reservoir

Service Reservoir	Capacity (m^3)	Top Water Level (mPD)	Invert Level (mPD)
Tan Kwai Tsuen South FWSR	77,742 (1)	67.00	60.00

Notes:
(1) The capacity of the service reservoirs is obtained from the record plans provided by WSD.

Salt Water Service Reservoirs

3.2.4 The Site is located in close proximity of the salt water supply zone of the existing Tan Kwai Tsuen Salt Water Service Reservoir (TKT SWSR) which is sourced from Lok On Pai Salt Water Pumping Station (LOP SWPS). The above key waterworks and salt water service reservoir supply zones are shown in ***Appendix B***.

3.2.5 ***Table 3.2*** summarizes the information on the capacity, top water level and invert level of the existing TKT SWSR.

Table 3.2 – Information on Existing Tan Kwai Tsuen Salt Water Service Reservoir

Service Reservoir	Capacity (m^3)	Top Water Level (mPD)	Invert Level (mPD)
Tan Kwai Tsuen SWSR	18,100(1)	67.50	60.00

Notes:
(1) The capacity of the service reservoirs is obtained from the record plans provided by WSD.

3.3 Existing Water Mains

Fresh Water Supply

3.3.1 With reference to WSD's mains record plans (MRPs), the alignment of the existing fresh water mains in the vicinity of the Site are shown in ***Drawing Nos. 199086/BIN/WIA/002 to 005***. The existing fresh water supply services in the vicinity of the Site are described as follows:

3.3.2 There are three existing fresh water mains, including DN1400 and DN1800 trunk mains and DN150 pipe, running along the future alignment of the northern section of the proposed road. The interface between the DN1400 and DN1800 trunk water mains and the proposed road ends near the north tunnel portal of the WSD tunnel, while the DN150 pipe continues to run along the future alignment of the proposed road.

3.3.3 There are existing DN50 to DN80 galvanized iron pipes serving the cottages within the Site. A DN150 ductile iron fire main is also located along Yuen Long Highway at the west of the Site connecting the fire hydrants on the carriageway.

3.3.4 There are three existing fresh water mains, including DN300, DN150 and DN1400 fresh water mains, along the future alignment of the proposed road near the North West N.T. Refuse Transfer Station.

Salt Water Supply

3.3.5 With reference to the WSD's MRPs, the existing salt water mains in the vicinity of the Site are shown in ***Drawing Nos. 199086/BIN/WIA/006 to 008***. The existing salt water supply services in the vicinity of the Site are described as follows:

3.3.6 A section of DN1000 trunk salt water main is identified crossing the future alignment of the proposed road at Shui Fu Road connecting to Tan Kwai Tsuen Salt Water Service Reservoir.

3.3.7 No existing salt water main is identified within the Site.

3.4 Planned Waterworks Facilities

Planned Waterworks

3.4.1 The interfacing projects are summarized in ***Table 3.3*** as follows:

Table 3.3 – Summary of Interfacing Projects and Planned Waterworks

Projects/ Planned Waterworks
1. CE 39/2018 (WS) Strategic Cavern Areas to Accommodate Existing and Proposed Service Reservoirs in Lam Tei and Adjoining Areas – Feasibility Study
2. CE 56/2016 (CE) HSK NDA Stage 1 Works – Design and Construction
3. CE 39/2016 (CE) HSK NDA Advance Works, Phase 1 & 2 – Design and Construction
4. CE 35/2012 (CE) Planning and Engineering Study for Housing Sites in Yuen Long South - Investigation
5. CE 71/2020 (CE) Hung Shui Kiu/Ha Tsuen New Development Area Package B Works for Second Phase Development – Design and Construction

Projects/ Planned Waterworks
6. CE 78/2020 (WS) Ngau Tam Mei WTW PSR Ext – IDC
7. CE 1/2020 (CE) - "Hung Shui Kiu/Ha Tsuen New Development Area Package A Works for Second Phase Development - Design and Construction"

Planned Fresh Water Supply System

3.4.2 According to the advice of WSD, the feasibility study for relocating the proposed service reservoirs and existing service reservoirs in Lam Tei and adjoining areas to strategic cavern areas has just been awarded in July 2019. Close liaisons with WSD will be carried out to address the interface issues.

3.4.3 There are also potential interfaces with the water supply systems proposed under HSK NDA and Yuen Long South (YLS) Development. Close liaisons with the project offices of HSK NDA and YLS Development projects will be conducted to address the interface issues.

Planned Salt/Flushing Water Supply System

3.4.4 In the coordination meeting held on 18 February 2019 with the project team of the YLS Development Project and PlanD, CEDD/WDO advised the latest arrangement on the storage and reuse of reclaimed water from the planned YLS Effluent Polishing Plant (EPP). The reclaimed water from the YLS EPP would be conveyed and stored in a proposed service reservoir named Tan Kwai Tsuen East Reclaimed Water Service Reservoir (TKT RWSR) in the vicinity of the TKT Development for serving the HSK NDA and the surrounding areas. Close liaisons with HSK NDA project team to confirm the location of branching off their proposed reclaimed water main is underway.

4 ESTIMATED WATER DEMAND AND VOLUME OF PROPOSED SERVICE RESERVOIRS FOR THE DEVELOPMENT

4.1 Design Parameter

4.1.1 With reference to WSD's DI No. 1309 and EPD's Guidelines for Estimating Sewage Flows for Sewage Infrastructure Planning, WSD's consumer classifications, fresh water and flushing water unit demands as shown in ***Table 4.1*** were assumed for the estimation of water demands of the Development.

Table 4.1 – Unit Demands Assumed for the Development

Unit Demand	The Site (for PRH & SSF)	School	Non-domestic (3)		
WSD's Consumer Classification	R1	School(1)	Retail	Welfare Facilities	Ancillary Facilities and Others
Fresh Water Unit Demand (l/h/d)	230	25	-	200	40
Service Trade Unit Demand (2) (l/h/d)	40	-	-	-	-
Flushing Water Unit Demand (l/h/d)	70	30	70	70	70

Notes:
(1) A 30-classroom of primary school has been proposed
(2) In accordance with Table 2 of Departmental Instruction No. 1309 issued by WSD
(3) Calculated from data in Guidelines for Estimating Sewage Flows issued by EPD

4.2 Estimated Water Demand

4.2.1 According to the development parameters as advised in paragraph 2.4.1, the water demands and the required capacity of the proposed service reservoirs for the Development are summarized in ***Table 4.2*** and ***Table 4.3*** below respectively. Detailed calculation is annexed in ***Appendix C***.

Table 4.2 – Summary of Water Demands

Anticipated Population (h)	Fresh Water MDD (m^3/day)	Flushing Water MDD (m^3/day)	Peak Fresh Water MDD (m^3/day)	Peak Flushing Water MDD (m^3/day)
19,575	5,554	1,508	17,554	3,016

Table 4.3 - Summary of Water Service Reservoir

	Fresh water reservoir	Flushing water reservoir
Required Capacity (m^3)	7,970	969
Design Capacity (m^3)	8,100	1,000
TWL(mPD)	123	113.5
IL(mPD)	115	110

5 POTENTIAL IMPACT TO EXISTING AND PLANNED WATERWORKS

5.1 Impact on Existing Water Treatment Works and Existing Water Service Reservoirs

Fresh Water Supply

5.1.1 The Site is located near Tan Kwai Tsuen in Yuen Long which is within the fresh water supply zone of the existing ATWTW. As such, it is considered that there will be no adverse impact on the current zoning of the ATWTW due to development of the Site.

5.1.2 The existing TKTS FWSR is at +60mPD while the proposed public housing development will be formed at +42mPD to +82mPD. Direct supplying water from the existing TKTS FWSR is not feasible due to insufficient head.

5.1.3 Mitigation measures to resolve the residual head problem is necessary which will be discussed in Section 6.

Flushing Water Supply

5.1.4 The existing capacity of LOP SWPS does not cater for the flushing demand of the proposed public housing development at the Site.

5.1.5 In view of the above, mitigation measures are required and details are presented in Section 6.

5.2 Impact on Existing and Planned Water Mains

Within the Site

5.2.1 As mentioned in Section 3.3, there are some existing fresh water mains within or in vicinity of the Site. It is anticipated that only minor diversion/relocation/removal to these existing mains (e.g. the galvanised iron FW mains connecting the cottages at the western part of the Site) will be required, and hence there will be no major impact to the existing water mains.

Outside the Site

5.2.2 A WSD tunnel and the associated tunnel portals and no-blasting zone are identified to the north of the Site. An access road will be constructed to connect the Site to the Tin Shui Wai West Interchange. No blasting would be carried out within the 120m no-blasting zone for the construction of this access road to avoid affecting the WSD tunnel.

5.2.3 It is anticipated that diversions of existing water mains are required for the construction of access road from the Site to the Tin Shui Wai West Interchange and Shun Tat Street. The sections of existing fresh water mains with potential conflicts are shown in ***Drawing Nos. 199086/BIN/WIA/009 to 012***, while preliminary diversion plan is enclosed in ***Appendix D***. The sections of existing salt water mains with potential conflicts are shown in ***Drawing No. 199086/BIN/WIA/013***. Detailed design of the diversion will be proposed in the detailed design stage of the project.

5.2.4 In addition, the existing DN300 ductile iron washout pipe will be in conflict with the proposed pumping station and is proposed to be relocated. The detailed relocation

scheme will depend on findings of the utility survey and be proposed in the later stage of the project.

5.3 Water Gathering Ground

5.3.1 According to WSD's record drawings on water gathering ground enclosed in ***Appendix F***, the Site does not fall into WSD's Water Gathering Ground and hence both short-term and long-term impacts on the Water Gathering Ground are not anticipated.

6 PROPOSED WATER SUPPLIES SCHEMES AND MITIGATION PROPOSALS

6.1 Proposed Fresh Water Supply and Fresh Water Service Reservoir

6.1.1 Considering that the Site is located adjacent to the fresh water supply zone of TKTS FWSR, it is proposed to incorporate the Site into the above zone to avoid substantial rezoning arrangement.

6.1.2 The existing TKTS FWSR is at +60mPD while the proposed public housing development will be formed at +42mPD to +82mPD. Direct supplying water from the existing TKTS FWSR is not feasible due to insufficient head. As such, a high-level fresh water service reservoir is required. Fresh water will be sourced from the existing TKTS FWSR and pumped to the proposed high-level fresh water service reservoir via a booster pumping station.

6.1.3 A high-level fresh water service reservoir to be located at +115mPD near the Site will be provided to accommodate the fresh water demand of the Development. An access road will be provided to facilitate the operation and maintenance of the above waterworks facilities.

6.1.4 According to the Review of Planning Standards – Part I Storage Capacity for Fresh Water Service Reservoir published by WSD, the capacity of the proposed fresh water service reservoir shall be calculated in accordance with WSD's Review of the Prevailing Planning Standards for DI 1309, including scenarios of isolated supply zone and fire-fighting requirement. The calculation for the capacity of the proposed fresh water service reservoir is presented in ***Appendix C***.

6.1.5 As presented in ***Appendix C***, the proposed public housing development and its ancillary facilities will require mean daily demand of fresh water of about 5,554m^3/day to accommodate the anticipated fresh water consumption in domestic, non-domestic and service trade uses.

6.1.6 Based on the water demand forecast, the proposed fresh water service reservoir will have a design capacity of about 8,100m^3 and will be located at +115mPD with invert level also at +115mPD to meet the water demand of the Development and provide sufficient residual head.

6.1.7 The location and level of the proposed fresh water supply facilities are shown in ***Drawing Nos. 199086/BIN/WIA/014 to 017.***

6.1.8 As the Project had been included in Category C of the Public Works Programme subsequent to the approval of its Technical Feasibility Statement in August 2017, DEVB TC(W) No. 8/2017 with the effective date on 22 Dec 2017 should not be applicable. Nevertheless, reasons for not constructing the proposed service reservoirs in caverns under this Project are explained in the following paragraphs.

6.1.9 In order to meet the housing demand, the population intake of this Project was planned to be from 2030 by phases. In view that more than 10 years lead time is necessary for constructing reservoirs in cavern, the proposed fresh water and flushing water service reservoirs would be necessary to be constructed in open areas

instead of inside caverns to cater water demand arisen from the Development before the planned population intake.

6.2 Proposed Flushing Water Supply and Flushing Water Service Reservoir

Interim Scenario

6.2.1 With reference to the latest tentative implementation programme of YLS Development, the planned Tan Kwai Tsuen Reclaimed Water Service Reservoir (TKT RWSR) will be commissioned in 2033 while the proposed public housing development under this Assignment will have population intake from 2030 by phase. Programme mismatch exists between the commissioning of the reclaimed water supply facilities and the population intake of the Development.

6.2.2 The design capacity of LOP SWPS is 83MLD for delivering salt water to areas including Tin Shui Wai and Yuen Long Town. When the supply of reclaimed water to be available later, we understand that WSD will switch the FLW supply from salt water to reclaimed water for areas including Tin Shui Wai and Yuen Long Town so that the loading on LOP SWPS will be reduced significantly. In this connection, the existing pumps in LOP SWPS for the proposed development may only upgrade if the progress of reclaimed water supply for Tin Shui Wai and Yuen Long Town would be delayed.

6.2.3 With the expected availability of salt water supply from LOP SWPS, salt water supply from TKT SWSR is proposed as the interim flushing water supply before reclaimed water will be available.

6.2.4 As reclaimed water is the ultimate flushing source for the proposed public housing development, a high-level flushing water service reservoir is proposed at +110mPD with invert level also at +110mPD. The design capacity is 1,000m^3 to supply reclaimed water with sufficient residual head to the proposed housing sites. Before reclaimed water is available, salt water will be supplied by the existing TKT SWSR to the proposed high-level flushing water service reservoir via a booster pumping station.

6.2.5 Storage requirement of the proposed flushing water service reservoir is controlled by the ultimate scenario which adopt reclaimed water for flushing water supply as discussed in the following paragraphs.

6.2.6 The proposed interim flushing water supply arrangement is shown in ***Drawing Nos. 199086/BIN/WIA/018 to 020***.

Ultimate Scenario

6.2.7 With reference to the Holistic Review Study on the Use of Reclaimed Water for Flushing in Northwest New Territories, the flushing water for the Development is proposed to be supplied by reclaimed water from the planned YLS EPP via the planned TKT RWSR considering the cost-benefit.

6.2.8 Derivation of the required capacity needed for the proposed flushing water service reservoir is presented in ***Appendix C***. The total anticipated flushing water MDD required for domestic and non-domestic uses of the proposed public housing

development would be 1,508 m^3/day. The design capacity of the proposed high-level flushing water service reservoir would be 1,000 m^3 (i.e. 1,508 x 0.64) [1].

6.2.9 It is understood that further coordination with WSD and the project teams of YLS Development project, HSK NDA project and YLS EPP project are required to ascertain the detailed arrangement of reclaimed water supply.

6.2.10 Locations and levels of the proposed ultimate flushing water supply facilities are shown in ***Drawing Nos. 199086/BIN/WIA/021 to 023***.

6.3 Proposed Distribution Mains

Proposed Fresh Water Mains (FWM)

6.3.1 It is proposed to source the Development from the proposed fresh water service reservoir as detailed in Section 6.1. Fresh water mains of size DN450 to DN300 are proposed to be laid.

6.3.2 The proposed network of fresh water mains connecting the proposed fresh water service reservoir with the proposed pumping station and the Development will be discussed in Section 7.2.

6.3.3 To enhance the reliability of the proposed flushing water supply system, a 200mm diameter fresh water augmentation main will be laid branching off from the inlet main of the proposed high-level fresh water service reservoir to the proposed flushing water service reservoir as an alternative supply source for flushing supply to the proposed housing development in the event that the proposed flushing water pumping station has to be shut down due to operational reasons or as a result of other unforeseeable events. The invert level of the concerned fresh water main should be set at a level higher than the crown level of the overflow pipe to avoid accidental contamination of the fresh water supply system by flushing water.

Proposed Flushing Water Mains

Interim scenario

6.3.4 It is proposed to supply the Development by the existing TKT SWSR via the proposed booster pumping station as detailed in Section 6.2. Flushing water mains of size DN80 to DN200 are proposed to be laid. The proposed flushing water mains should meet the requirement of conveying reclaimed water such that it could be easily converted to reclaimed water in the future.

6.3.5 The proposed network of flushing water mains connecting the proposed flushing water service reservoir with the proposed pumping station and the Development will be discussed in Section 7.3.

Ultimate scenario

6.3.6 It is proposed to supply the Development by the proposed flushing water service reservoir to be fed by the proposed reclaimed water from YLS Development via the

[1] The storage requirement is similar to the requirement of proposed treated grey water service reservoir for flushing under Anderson Road Quarry development. The capacity of treated grey water service reservoir for flushing is 64% of the MDD, which consists of 25% for balancing, 33% for breakdown and allow 10% capacity as ineffective storage (i.e. [25+33]/0.9% of MDD).

proposed pumping station as detailed in Section 6.2. The proposed DN200 flushing water mains laid for the interim scenario would be used for supplying reclaimed water and thus no additional water mains would be laid.

6.3.7 In order to minimize the risk of cross-connections between the fresh water supply system and reclaimed water supply system, the flushing water pipes with reclaimed water should have distinctive features different to those pipes used for the fresh water supply system including but not limited to the use of purple pipe coating, labelling and different pipe sizes.

6.4 Proposed Firefighting Water Supply

6.4.1 The locations of fire hydrant and corresponding distribution mains are shown in the ***Drawing Nos. 199086/BIN/WIA/014 to 017***.

Along the proposed access road

6.4.2 Distribution mains of size DN 300 supplying fresh water is proposed to be laid with fire hydrants staggered every 300m along alternate sides of the proposed access road to be connected to Tin Shui Wai West Interchange (TSWWI) slip road and Shun Tat Road, as well as the access road between housing platforms.

6.4.3 The above distribution mains will be connected to the proposed DN450 fresh water main to be fed by the proposed fresh water service reservoir.

Within the proposed housing sites

6.4.4 Sufficient water capacity for firefighting has been reserved in the proposed fresh water service reservoir and the associated fresh water mains.

6.4.5 Firefighting water supply for the Development site will be provided by the fresh water mains along the proposed public access road between the housing platforms. Exact position of fire hydrants within the Development site should be determined together with the detailed layout design of the by the relevant departments.

6.5 Proposed Pumping Station

6.5.1 As aforementioned, two high-level reservoirs for supplying fresh water and flushing water would be required to support the Development. In view of the elevation difference between the existing TKT SWSR and the proposed flushing water service reservoir (for interim scenario of flushing water supply); the planned TKT RWSR and the proposed flushing water service reservoir (for ultimate scenario of flushing water supply); the existing TKTS FWSR and the proposed fresh water service reservoir, pumping facilities are required to provide sufficient pressure to feed the fresh water and flushing water to the proposed service reservoirs.

6.5.2 To minimize the footprint of the pumping station, the proposed fresh water and flushing water pumping stations are proposed to be combined and co-located at the level of about +52.5mPD.

6.5.3 A single-storey pumping station with headroom of about 4m to 7m is proposed to be located near the south side of the junction between Shui Fu Road and the proposed

access road, which is bounded by the existing drainage channel to the south and existing trunk water mains to the east.

6.5.4 The inlet for fresh water supply is proposed to be branched off from the existing DN1000 mild steel fresh water mains (FWM), located on the east of the proposed pumping station near Shui Fu Road. While as the outlet is proposed to be emanated from the north of the pumping station. Fresh water will be pumped along the existing WSD's access road and further along the proposed access road to reach the proposed fresh water service reservoir.

6.5.5 The inlet for flushing water supply is proposed to be branched off from the existing DN1000 salt water mains (SWM) at the junction between Shui Fu Road and the proposed access road. Both inlet and outlet are proposed at the north side of the pumping station in the interim stage to facilitate the future switching process from the use of salt water for interim stage to the use reclaimed water for the ultimate scenario. Similar to the fresh water supplies, flushing water would be pumped along the existing WSD's access road and further along the proposed access road to reach the proposed flushing water service reservoir.

6.5.6 Various auxiliary rooms including switch rooms, control room, E&M plant room are proposed in the pumping station. The location and preliminary layout of the pumping station is indicated in ***Drawing No. 199086/BIN/WIA/024***.

Pumps

6.5.7 Kinetics pump in the form of centrifugal pumps are proposed due to the small scale in nature. To cater for emergency situation and facilitating the maintenance, two pumps (one duty and one standby) sizing at peak flow are proposed for both flushing water and fresh water. The layout of the pumping station will be reviewed in detailed design stage to determine if space can be reserved for an additional pump for future upgrade.

6.5.8 Automatic pump operation system based on the water level in the service reservoir is recommended. Level sensing equipment will be provided for the purpose of pump control and emergency alarm. The standby pump will cut in when the duty pump fails to operate.

Electricity Power Supply

6.5.9 Dual feed power supply is proposed to enhance the stability of the power supply. CLP Power (CLPP) will be liaised for providing the dual feed system.

Ventilation and Air-conditioning

6.5.10 Apart from the control room, ventilation will be provided to all the remaining plant rooms in order to maintain and limit the temperature rise inside the pumping station such that the maximum ambient temperature in pump hall will not exceed 40°C.

6.5.11 The fresh air inlets and exhaust air outlets will be at the lowest and the highest possible levels respectively. Air inlets, outlets and ducts, if any, will be arranged to minimize stagnant air pockets inside the plant room and ensure no exhaust air is re-

circulated. Fixed louvres with removable wire mesh screens will be provided for the air inlets and outlets.

6.5.12 Independent compact air-conditioning units will be installed in the control room in accordance with WSD current practice.

6.5.13 The ventilation system will be designed to comply with ASHRAE and all equipment will comply with relevant British Standards.

Monitoring and Control

6.5.14 SCADA/PLC system will be provided for the electrical equipment and the pumping system with adequate input and output (I/O) points. Hot standby PLC shall be provided with redundant configuration for a safe, secure and trouble–free condition in the event of any malfunction in a PLC in the network.

6.6 Proposed District Metering Areas and Pressure Management Areas

6.6.1 District Metering Areas (DMA) and Pressure Management Areas (PMA) are proposed in accordance with the clauses 1.2.4 / 1.2.5 of the Manual of Mainlaying Practice (2012 Edition). The DMA and PMA for proposed fresh and flushing water service reservoir are indicated in ***Drawing No. 199086/BIN/WIA/025 and 026*** respectively.

6.7 Smart Water Initiatives

6.7.1 The adoption of Automatic Meter Reading and the aspect of smart initiatives will be taken into consideration in the design stage. Development (1) Division of WSD will be consulted on smart initiatives during design stage, including but not limited to:

- Intensive metering and real-time monitoring for Water Intelligent Network (WIN);
- Smart/Intelligent pressure management;
- Hydraulic modelling for leak pin-pointing and network operation;
- Water suspension notification system;
- On-line water quality monitoring at the distribution networks; and
- Leak pin-pointing with fibre optic technology.

7 PRELIMINARY HYDRAULIC DESIGN OF PROPOSED DISTRIBUTION MAINS

7.1 Hydraulic Analysis

7.1.1 It is proposed to feed the fresh water and flushing water to the proposed Development site by laying water mains to connect the proposed water service reservoirs and the existing water supply networks. ***Tables 7.1*** and ***7.2*** below summarize the diameters and capacities of the proposed water mains. It is revealed that all the proposed pipes will have sufficient capacities for the peak flows.

Table 7.1 – Summary of Proposed Fresh Water Mains Capacities

Size of Main (mm)	Available Peak Flow Velocity (m/s)	Required Peak Flow Velocity (m/s)	Available Peak Flow Capacity (m^3/day)	Required Peak Flow Capacity (m^3/day)
450	2	1.28	27483	17,534
300	1.5	0.99	9,161	6,020
250	1.5	1.42	6,362	6,020

Table 7.2 – Summary of Proposed Flushing Water Mains Capacities

Size of Main (mm)	Available Peak Flow Velocity (m/s)	Required Peak Flow Velocity (m/s)	Available Peak Flow Capacity (m^3/day)	Required Peak Flow Capacity (m^3/day)
200	1.5	1.11	4,072	3,016
100	1.5	1.49	1018	1,008
80	1.5	0.12	651	50

7.1.2 Preliminary hydraulic calculations have been carried out for the proposed water supply systems. It is noted that minimum residual heads of the proposed fresh water system and flushing water system fulfill the WSD's requirements. The calculations are annexed in ***Appendix C***.

7.2 Preliminary Design - Fresh Water

Inlet of the Proposed Pumping Station

7.2.1 DN300 FWM is proposed to be branched off from the existing DN1000 FWM before inlet to the existing Tan Kwai Tsuen Fresh Water Service Reservoir (SR216) and to be connected to the inlet of the proposed pumping station.

Outlet of the Proposed Pumping Station and Inlet of the Proposed FWSR

7.2.2 DN300 FWM is proposed as the outlet of the proposed pumping station and to be laid along the existing and proposed WSD's maintenance access road to feed fresh water to the proposed fresh water service reservoir.

Outlet of the Proposed FWSR

7.2.3 DN450 FWM is proposed as the outlet of the proposed FWSR and also the distribution main to the proposed Development. In order to save energy and minimize the pressure within the water supply network, it is proposed that the

distribution main will directly running down the proposed slopes behind the upper platform to provide fresh water supply to the Development at the upper platform. The distribution main will then pass through the upper platform and run along the proposed public access road to connect to the Development at the lower platform. Since a section of the FWM would need to be laid within the upper platform near the slope toe, a designated Waterworks Reserve (WWR) would be required to facilitate future maintenance of the water mains by WSD. HD has been consulted on the above arrangement of the distribution mains and has expressed no objection to such arrangement.

7.2.4 The preliminary layout of the proposed fresh water system is shown in ***Drawing Nos 199086/BIN/WIA/014 to 017***.

7.3 Preliminary Design – Flushing Water

Inlet of the Proposed Pumping Station

Interim scenario

7.3.1 DN200 SWM is proposed to be branched off from the existing DN1000 SWM output from the existing TKT SWSR and to be connected to the inlet of the proposed pumping station.

Ultimate scenario

7.3.2 DN200 flushing water main is proposed to be branched off from the planned reclaimed water main output from the planned TKT RWSR under YLS Development and HSK NDA and to be connected to the inlet of the proposed pumping station. The exact connection point is to be confirmed with the project teams of YLS Development/ HSK NDA.

Outlet of the Proposed Pumping Station and Inlet of the Proposed FLWSR

7.3.3 DN200 flushing water main/ DN200 SWM is proposed as the outlet of the proposed pumping station and to be laid along existing and proposed WSD's maintenance access to reach the proposed FLWSR.

Outlet of the Proposed FLWSR

7.3.4 DN200 flushing water main/ DN200 SWM is proposed as the outlet of the proposed flushing water service reservoir as well as the distribution main to the Development. In order to save energy and minimize the pressure within the water supply network, the DN200 flushing water main/ DN200 SWM is proposed to be directly running down the proposed slopes behind the upper platform to provide flushing water supply to the Development at the upper platform. The DN200 flushing water main/ DN200 SWM is then proposed to be passing through the upper platform and running along the proposed public access road to connect to the Development at the lower platform. Since a section of the SWM would need to be laid within the upper platform near the slope toe, a designated Waterworks Reserve (WWR) would be required to facilitate future maintenance of the water mains by WSD. The location of the WWR can be referred to ***Drawings Nos. 199086/BIN/WIA/016 and 022.***

7.3.5 The proposed interim flushing water supply system is shown in ***Drawing Nos. 199086/BIN/WIA/018 to 020***.

7.3.6 The preliminary layout of the proposed ultimate flushing water mains is shown in ***Drawing Nos. 199086/BIN/WIA/021 to 023***.

7.4 Cost Estimation and Programme of Works

7.4.1 Detailed cost estimation and programme of works are discussed in the "Implementation Programme, Cash Flow Schedule, Recurrent Consequence and Cost Estimate" respectively which were submitted under separate cover.

8 CONCLUSION AND RECOMMENDATION

8.1.1 An impact assessment on the existing and planned water supplies system due to the additional water demand arising from the Development was conducted.

8.1.2 Based on the latest development parameters, it is estimated that the fresh and flushing water demands due to the Development are 5,554 and 1,508 cubic meters per day in total respectively.

8.1.3 According to the as-built records, there would be insufficient residual head for both fresh water and flushing water supplies for the Development with high level building platforms by the existing water supply facilities. In addition, there would also be a shortfall in capacity of LOP SWPS for salt water supply for the Development.

8.1.4 The design capacity of LOP SWPS is 83MLD for delivering SW to areas including Tin Shui Wai and Yuen Long Town. When the supply of reclaimed water to be available later, we understand that WSD will switch the FLW supply from salt water to reclaimed water for areas including Tin Shui Wai and Yuen Long Town so that the loading on LOP SWPS will be reduced significantly. In this connection, upgrading of LOP SWPS for the proposed development may only be required if the progress of reclaimed water supply for Tin Shui Wai and Yuen Long Town would be delayed. Fresh water augmentation for flushing will be adopted as the last resort in emergency situation when the supply from salt water is not available.

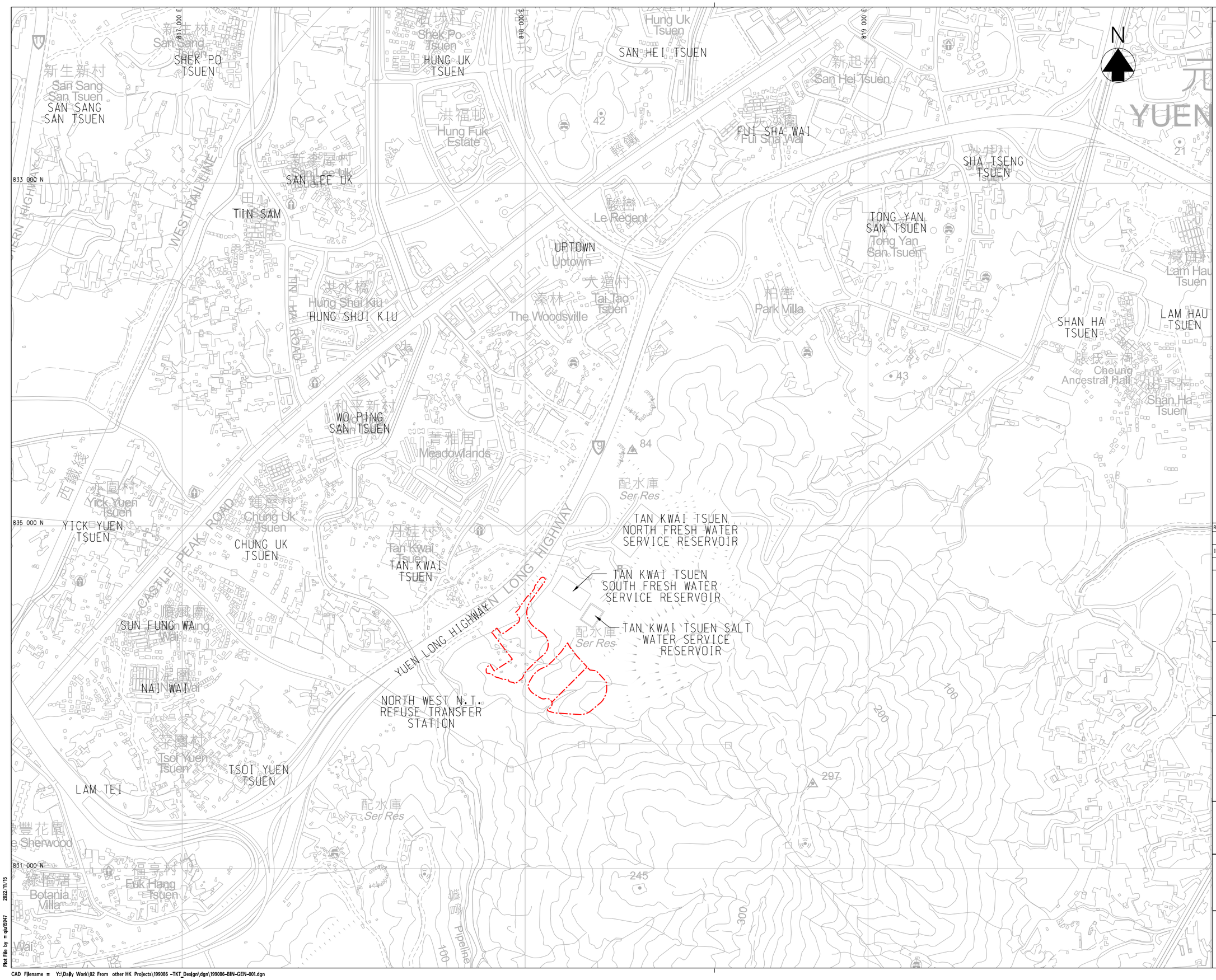
8.1.5 A high-level fresh water service reservoir with design capacity of approximately 8,100m^3, a high-level flushing water service reservoir with design capacity of approximately 1,000m^3 and an associated pumping station have been proposed to provide sufficient residual head and reliable water supplies for the proposed Development site. Access roads will be provided to facilitate the operation and maintenance of the new water supply facilities.

8.1.6 It is anticipated that diversion/relocation/removal of the existing mains due to the proposed site formation and infrastructure works under the project will be needed. Details of the diversion or relocation scheme will be proposed in the later stage of the project.

8.1.7 The proposed pumping station is branched off from the existing DN1000 FWM and connect to the proposed DN300 FWM. Fresh water will be pumped to the proposed fresh water service reservoir and connect to proposed DN450 FWM to provide fresh water supplies for the Development. Also, distribution mains of size DN300 supplying fresh water is proposed to be laid with fire hydrants staggered every 300m along alternate sides of the proposed access road to be connected to Tin Shui Wai West Interchange (TSWWI) slip road and Shun Tat Road, as well as the access road between housing platforms. Hydraulic analysis has been carried out and the proposal is found to be technically feasible.

8.1.8 The proposed pumping station is branched off from the existing DN1000 flushing water main and connect to the proposed DN200 flushing water main. Flushing water will be pumped to the proposed flushing water service reservoir and connect to proposed DN200 flushing water main to provide flushing water supplies for the

FIGURES



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Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

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Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROJECT LAYOUT PLAN

Drawing No.	Scale
199086/BIN/GEN/001	1 : 5000 (A1) 1 : 10000 (A3)

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CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
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PROPOSED IMPROVEMENT AT JUNCTION OF SHUN TAT STREET & CASTLE PEAK ROAD - HUNG SHUI KIU
NEW RIGHT TURN LANE TO YUEN LONG
EXISTING LEFT TURN LANE TO TUEN MUN

TO BE CONSTRUCTED BY OTHERS
TO BE CONSTRUCTED BY OTHERS

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING SHUI FU ROAD
PROPOSED CONNECTION TO EXISTING SHUI FU ROAD
BRIDGE
WWR
PROPOSED SITE FOR THE WATER PUMPING STATION
PROPOSED CONNECTION TO EXISTING SHUI FU ROAD
WWR
PROPOSED REGULATOR KIOSK AND STAFF REST ROOM
PROPOSED PUBLIC TRANSPORT INTERCHANGE
PROPOSED PASSENGER LIFT AND STAIRCASE
SUBWAY
PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD
PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD
UNDERPASS
BRIDGE
UNDERPASS
BURIAL GROUND
LOCATION OF PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD
LOCATION OF PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD
15m BUFFER ZONE WITH NATURAL STREAM PLUS 5m WORKING SPACE
PROPOSED PLATFORM F.L. +82.0mPD

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOPMENT AND ASSOCIATED G/IC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- +66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
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Drawing Title
SITE FORMATION LAYOUT PLAN

Drawing No.	Scale
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CEDD Civil Engineering and Development Department

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199086/BIN/WIA/005, 008, 012, 015, 019, 023

199086/BIN/WIA/004, 007, 011, 014, 018, 022

YUEN LONG HIGHWAY

TO BE CONSTRUCTED BY OTHERS

TO BE CONSTRUCTED BY OTHERS

120m NO BLASTING LIMIT FOR WSD TUNNEL

EXISTING WSD TUNNEL

BRIDGE

WWR

PROPOSED PUMPING STATION

WWR

PROPOSED PUBLIC TRANSPORT INTERCHANGE

PROPOSED PASSENGER LIFT AND STAIRCASE

SUBWAY

PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD

BRIDGE

BURIAL GROUND

PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD

PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD

15m BUFFER ZONE WITH NATURAL STREAM PLUS 5m WORKING SPACE

PROPOSED IMPROVEMENT AT JUNCTION OF SHUN TAT STREET & CASTLE PEAK ROAD - HUNG SHUI KIU

NEW RIGHT TURN LANE TO YUEN LONG

EXISTING LEFT TURN LANE TO TUEN MUN

JUNCTION(J5)

LEGEND:

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- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING FLUSHING WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR
- PROPOSED PUMPING STATION
- INDICATIVE LOCATION OF THE PLANNED TAN KWAI TSUEN RECLAIMED WATER SERVICE RESERVOIR UNDER HSK NDA DEVELOPMENT

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	Designed	Checked	Drawn	Checked
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SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
WATERWORKS INSTALLATION (KEY PLAN)

Drawing No.
199086/BIN/WIA/001

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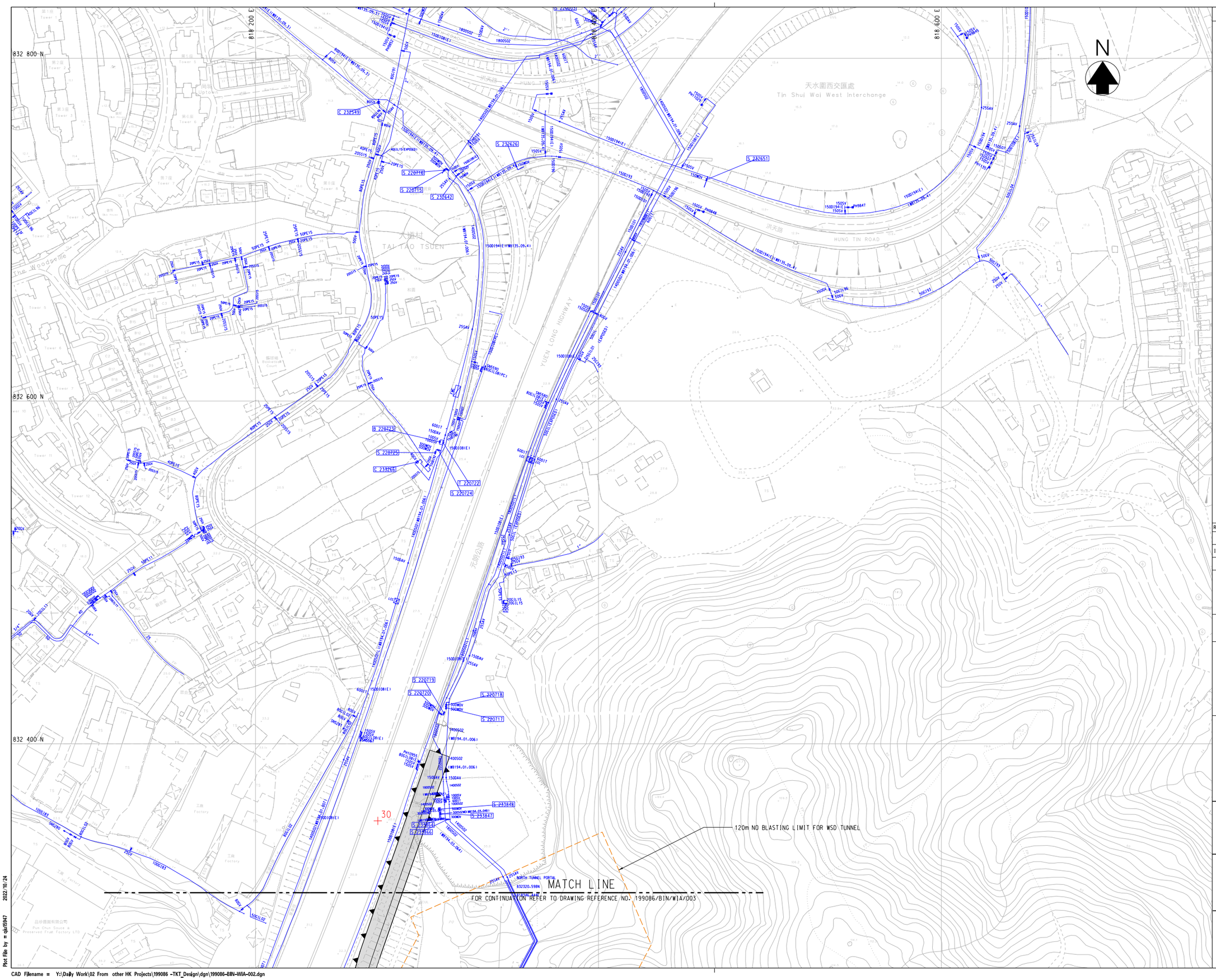

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER MAINS

Revision	Date	Description		Initial
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Drawing Title
EXISTING FRESH WATER MAINS RECORD PLAN

(SHEET 1 OF 4)

Drawing No.
199086/BIN/WIA/002

Scale
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BINNIES HONG KONG LIMITED
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818 400 E
832 200 N
832 000 N
831 800 N

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120m NO BLASTING LIMIT FOR WSD TUNNEL
EXISTING WSD TUNNEL
PROPOSED PUMPING STATION
WWR
YUEN LONG HIGHWAY
TAN KWAI TSUEN LANE
元朗公路
NORTH TUNNEL PORTAL
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818346.446E
SOUTH TUNNEL PORTAL
832162.627N
818264.370E
Tan Kwai Tsuen North Fresh Water Service Reservoir
新志村北食水配水庫

LEGEND:

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- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- EXISTING FRESH WATER MAINS
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- PROPOSED PUMPING STATION

Revision	Date	Description			Initial
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Initial	TCL	WLC	SZ	LCH	
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SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING FRESH WATER MAINS RECORD PLAN

(SHEET 2 OF 4)

Drawing No.
199086/BIN/WIA/003

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PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD

PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD

15m BUFFER ZONE WITH NATURAL STREAM PLUS 5m WORKING SPACE

818 000 E
818 200 E
818 400 E
818 600 E
831 800 N
831 600 N
831 400 N

LEGEND:

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- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING FLUSHING WATER SERVICE RESERVOIR
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR

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SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING FRESH WATER MAINS RECORD PLAN

(SHEET 3 OF 4)

Drawing No.
199086/BIN/WIA/004

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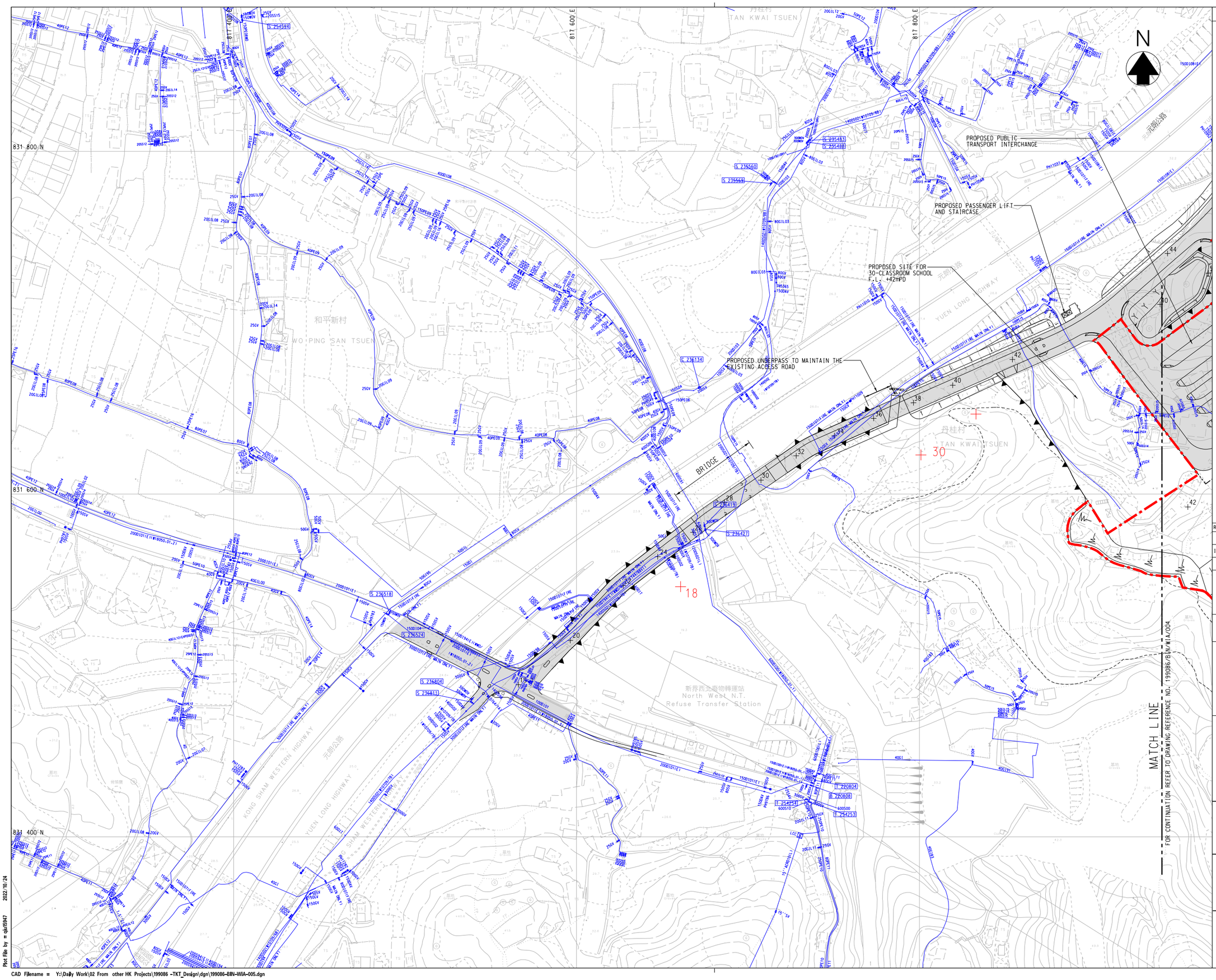

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER MAINS

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING FRESH WATER MAINS RECORD PLAN

(SHEET 4 OF 4)

Drawing No.	Scale
199086/BIN/WIA/005	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjb15947 2022/10/24

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-005.dgn

818 000 E
818 200 E
818 400 E
832 200 N
832 000 N
831 800 N

N

120m NO BLASTING LIMIT FOR WSD TUNNEL
EXISTING WSD TUNNEL
PROPOSED PUMPING STATION
BRIDGE
WWR
MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/007

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- EXISTING SALT WATER MAINS
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- PROPOSED PUMPING STATION

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING SALT WATER MAINS RECORD PLAN

(SHEET 1 OF 3)

Drawing No.	Scale
199086/BIN/WIA/006	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjb15947 2022/10/24
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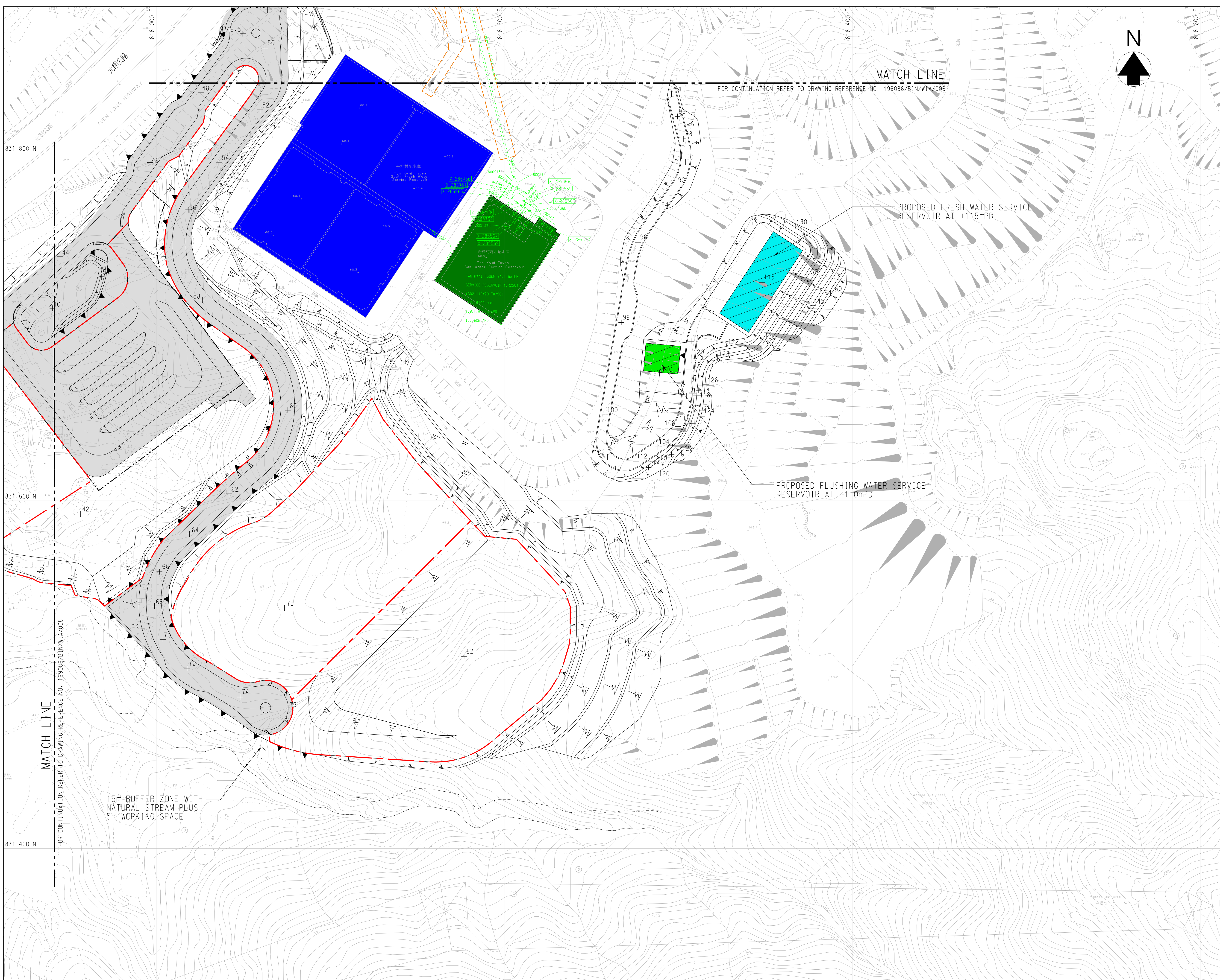


LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING SALT WATER MAINS
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING FLUSHING WATER SERVICE RESERVOIR
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.

CE 92/2017 (CE)

Title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title

EXISTING SALT WATER MAINS RECORD PLAN

(SHEET 2 OF 3)

Drawing No.

199086/BIN/WIA/007

Scale

1 : 1000 (A1)
1 : 2000 (A3)

土 木 工 程 拓 展 署
CEDD Civil Engineering and Development Department

binnies
BINNIES HONG KONG LIMITED
賓 尼 斯 工 程 顧 問 有 限 公 司

Plot File by = cjlu15947 2022/11/15

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-007.dgn

817 400 E
817 600 E
817 800 E
831 800 N
831 600 N
831 400 N

TAN KWAI TSUEN
和平新村
WO PING SAN TSUEN
丹桂村
TAN KWAI TSUEN
新界西北廢物轉運站
North West N.T.
Refuse Transfer Station

PROPOSED PUBLIC TRANSPORT INTERCHANGE

PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD

UNDERPASS No.1

BRIDGE

YUEN LONG HIGHWAY
KONG SHAM WESTERN HIGHWAY
SHUN TAT STREET

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO.: 199086/BIN/WIA/007

N

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- EXISTING SALT WATER MAINS

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING SALT WATER MAINS RECORD PLAN

(SHEET 3 OF 3)

Drawing No.
199086/BIN/WIA/008

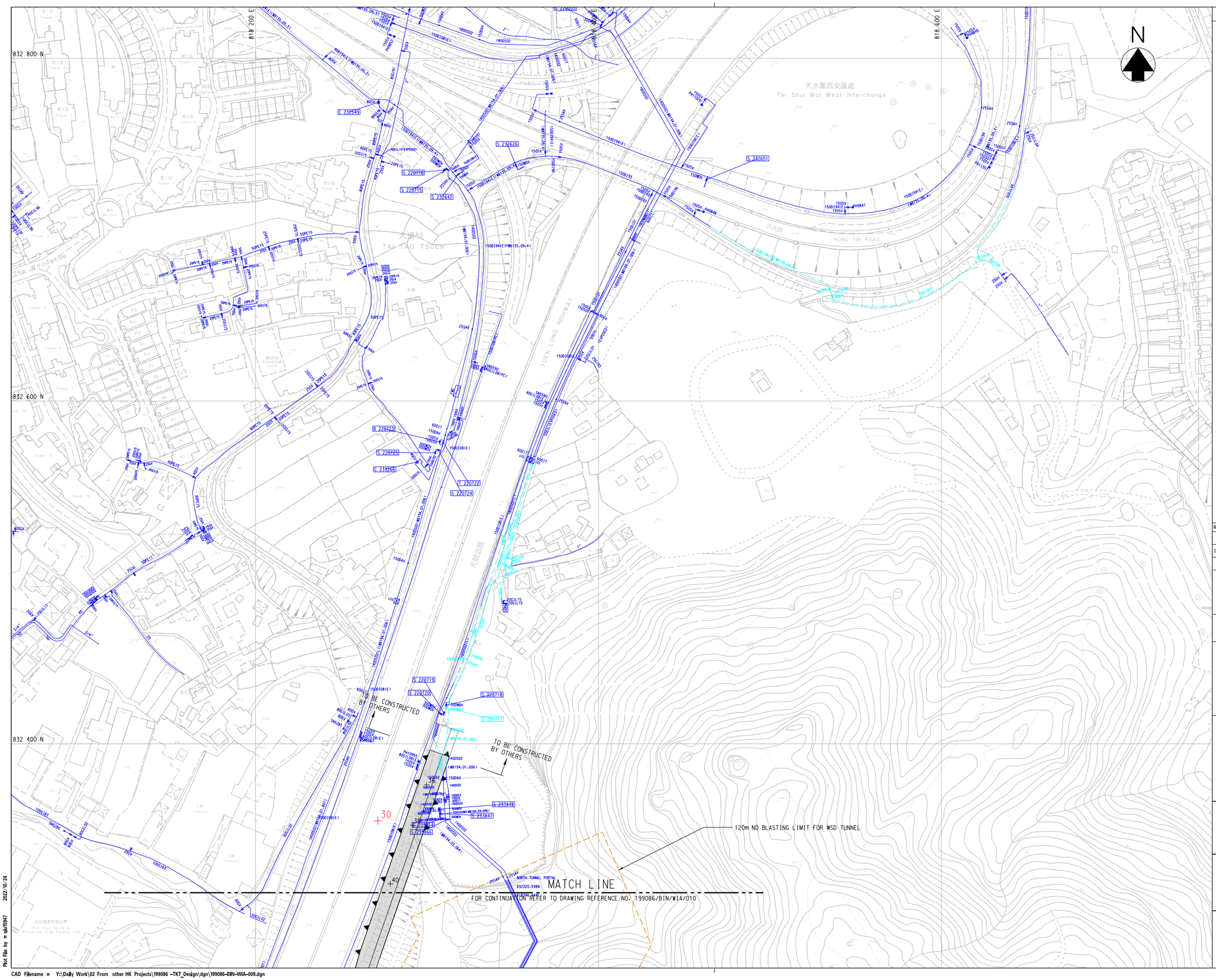
Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2022/10/24

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-008.dgn



LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- +66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- EXISTING FRESH WATER MAINS TO BE DIVERTED

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
POTENTIAL IMPACT TO THE EXISTING FRESH WATER MAINS

(SHEET 1 OF 4)

Drawing No.
199086/BIN/WIA/009

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjh15947 2022/10/24

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-009.dgn

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/009

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/011

120m NO BLASTING LIMIT FOR WSD TUNNEL

EXISTING WSD TUNNEL

PROPOSED PUMPING STATION

WWR

BRIDGE

YUEN LONG HIGHWAY

Tan Kwai Tsuen North
Fresh Water Service Reservoir

818 000 E
818 200 E
818 400 E
832 200 N
832 000 N
831 800 N

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- EXISTING LEVEL
- PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- EXISTING FRESH WATER MAINS TO BE DIVERTED

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
POTENTIAL IMPACT TO THE EXISTING FRESH WATER MAINS

(SHEET 2 OF 4)

Drawing No.	Scale
199086/BIN/WIA/010	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gki5947 2022/10/24

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-010.dgn

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/010

N

818 000 E

818 200 E

818 400 E

818 600 E

831 800 N

831 600 N

831 400 N

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/012

丹桂村配水庫
Tan Kwai Tsuen
South Fresh Water
Service Reservoir

丹桂村海水配水庫
T.K.T.
Tan Kwai Tsuen
Salt Water Service Reservoir

PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD

PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD

15m BUFFER ZONE WITH NATURAL STREAM PLUS 5m WORKING SPACE

BUFFER ZONE FROM NATURAL STREAM

元朗公路
YUEN LONG HIGHWAY

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- EXISTING FRESH WATER MAINS TO BE DIVERTED

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.

CE 92/2017 (CE)

Title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title

POTENTIAL IMPACT TO THE EXISTING FRESH WATER MAINS

(SHEET 3 OF 4)

Drawing No.	Scale
199086/BIN/WIA/011	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjb5947 2022/11/15

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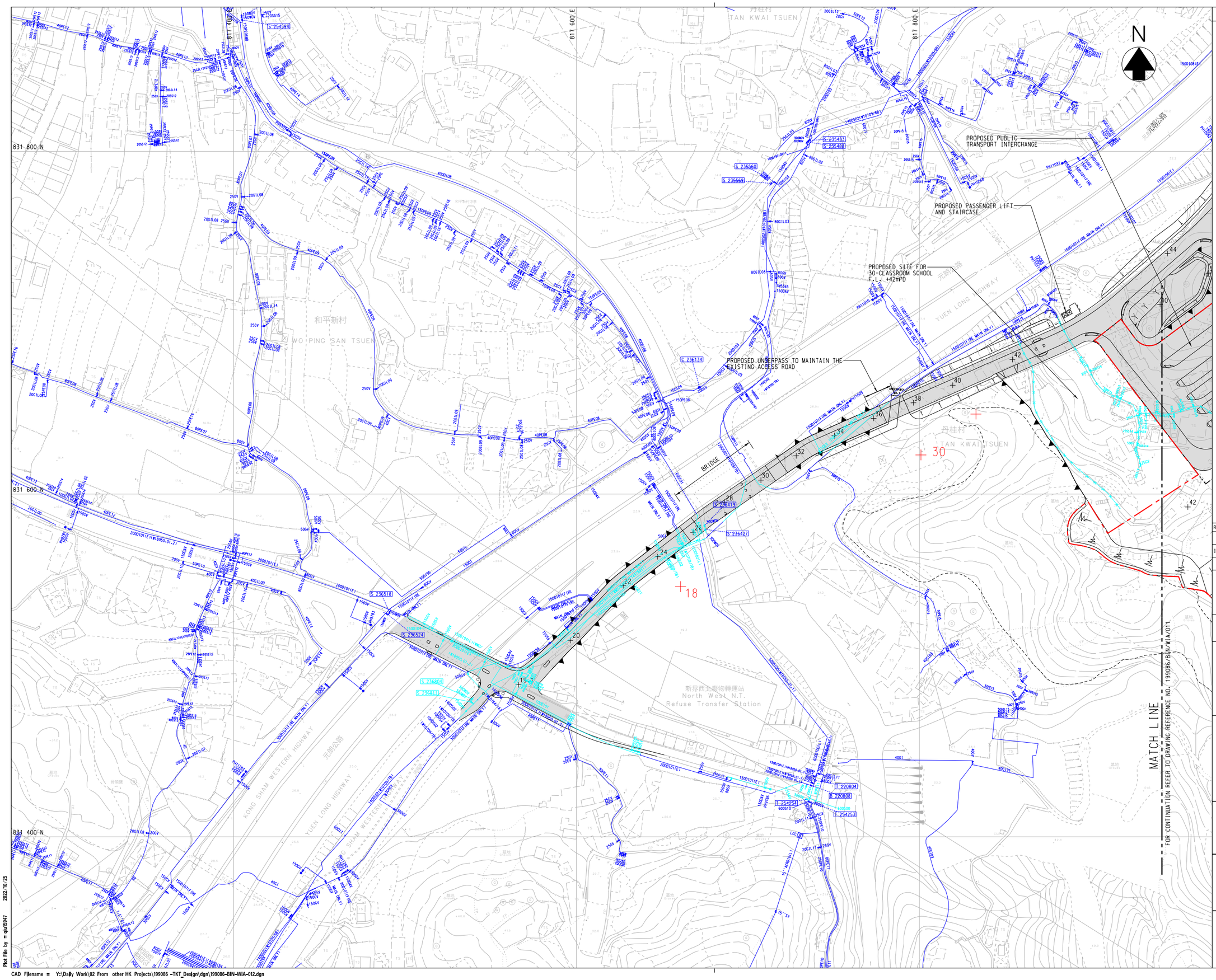

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- EXISTING FRESH WATER MAINS TO BE DIVERTED

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
POTENTIAL IMPACT TO THE EXISTING FRESH WATER MAINS

(SHEET 4 OF 4)

Drawing No.	Scale
199086/BIN/WIA/012	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjb15947 2022/10/25

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-012.dgn

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/014

818 000 E
818 200 E
818 400 E
832 200 N
832 000 N
831 800 N

N

120m NO BLASTING LIMIT FOR WSD TUNNEL
EXISTING WSD TUNNEL
PROPOSED PUMPING STATION
BRIDGE
WWR
YUEN LONG HIGHWAY
TAN KWAI TSUEN MAIN ROAD
TAN KWAI TSUEN LANE
SHUI PIN ROAD
元朗公路
Po Kok Branch School
Great Garden
Manor Parc
DOMUS
CASA REGALIA
丹桂村北食水配水庫
Tan Kwai Tsuen North
Fresh Water Service Reservoir

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/011

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING SALT WATER MAINS
- EXISTING SALT WATER MAINS TO BE RETAINED

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
POTENTIAL IMPACT TO THE EXISTING SALT WATER MAINS

Drawing No.	Scale
199086/BIN/WIA/013	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = gjb15947 2022/10/25
CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-013.dgn

818 200 E
818 400 E
818 600 E
832 800 N
832 600 N
832 400 N

N

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER MAINS
- PROPOSED FIRE HYDRANT
- 300 DIAMETER (mm) PROPOSED FIRE WATER MAINS

120m NO BLASTING LIMIT FOR WSD TUNNEL

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/015

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED FRESH WATER SYSTEM

(SHEET 1 OF 4)

Drawing No.
199086/BIN/WIA/014

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

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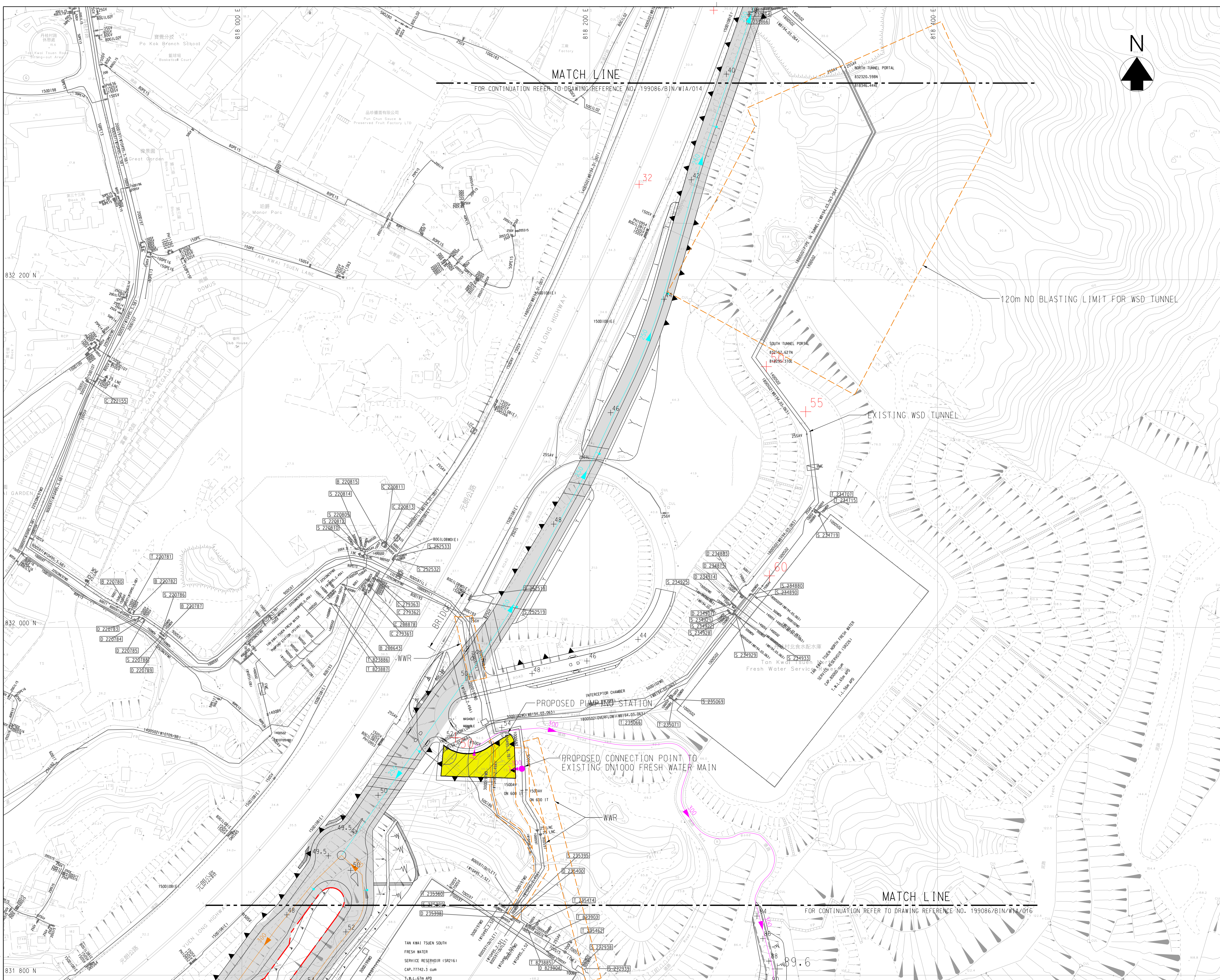

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELEMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- PROPOSED PUMPING STATION
- EXISTING FRESH WATER MAINS
- 450 DIAMETER (mm) PROPOSED FRESH WATER MAINS - INLET
- 450 DIAMETER (mm) PROPOSED FRESH WATER MAINS - OUTLET
- PROPOSED FIRE HYDRANT
- 300 DIAMETER (mm) PROPOSED FIRE WATER MAINS

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.

CE 92/2017 (CE)

Title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title

PROPOSED FRESH WATER SYSTEM

(SHEET 2 OF 4)

Drawing No.

199086/BIN/WIA/015

Scale

1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

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賓尼斯工程顧問有限公司

Plot File by = gis15947 2023/7/6

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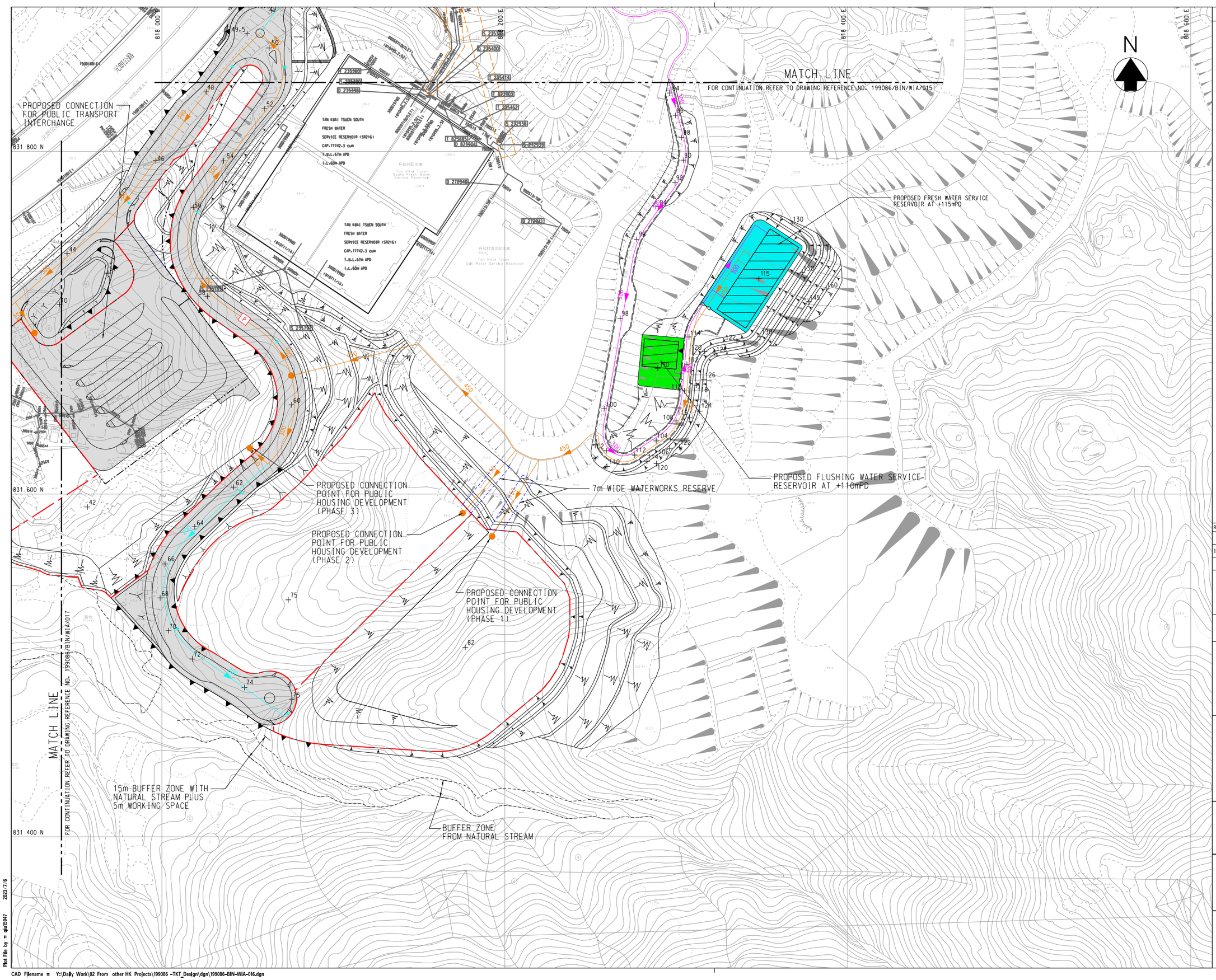

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR
- EXISTING FRESH WATER MAINS
- 600 DIAMETER (mm) PROPOSED FRESH WATER MAINS - INLET
- 450 DIAMETER (mm) PROPOSED FRESH WATER MAINS - OUTLET
- 200 DIAMETER (mm) PROPOSED FRESH WATER AUGMENTATION MAIN
- PROPOSED FIRE HYDRANT
- 250 DIAMETER (mm) PROPOSED FIRE WATER MAINS
- PROPOSED WATERWORKS RESERVE
- P PRESSURE REDUCING VALVE

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED FRESH WATER SYSTEM

(SHEET 3 OF 4)

Drawing No.
199086/BIN/WIA/016

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu65947 2023/7/6

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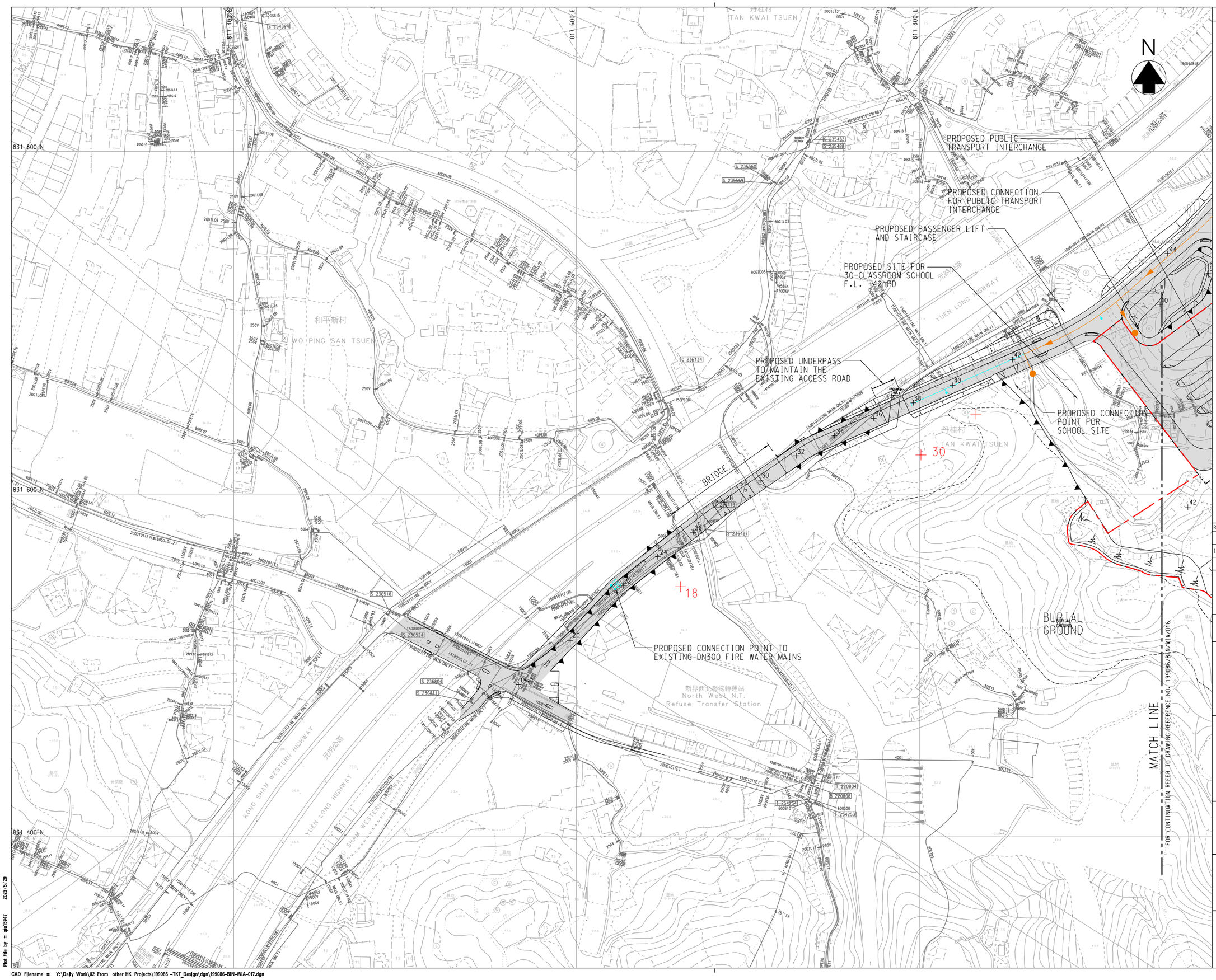

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- EXISTING FRESH WATER MAINS
- 450 DIAMETER (mm) PROPOSED FRESH WATER MAINS - OUTLET
- PROPOSED FIRE HYDRANT
- 300 DIAMETER (mm) PROPOSED FIRE WATER MAINS

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED FRESH WATER SYSTEM

(SHEET 4 OF 4)

Drawing No.
199086/BIN/WIA/017

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qin15947 2023/5/29

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-017.dgn

818 000 E
818 200 E
818 400 E
832 200 N
832 000 N
831 800 N

N

120m NO BLASTING LIMIT FOR WSD TUNNEL

EXISTING WSD TUNNEL

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING SHUI FU ROAD

BRIDGE

WWR

PROPOSED PUMPING STATION

MATCH LINE

FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/019

YUEN LONG HIGHWAY

TAI TO TSUEN ROAD

TAN KWAI TSUEN ROAD

TAN KWAI TSUEN LANE

SHUI FU ROAD

Po Kok Branch School

Great Garden

Manor Parc

DOMUS

CASA REGALIA

Tan Kwai Tsuen Fresh Water Pumping Station

Tan Kwai Tsuen North Fresh Water Service Reservoir

Pun Chun Sauce & Preserved Fruit Factory LTD

元朗公路

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- PROPOSED PUMPING STATION
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED SALT WATER MAINS - INLET
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED INTERIM FLUSHING WATER SYSTEM

(SHEET 1 OF 3)

Drawing No.
199086/BIN/WIA/018

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu05947 2023/5/29

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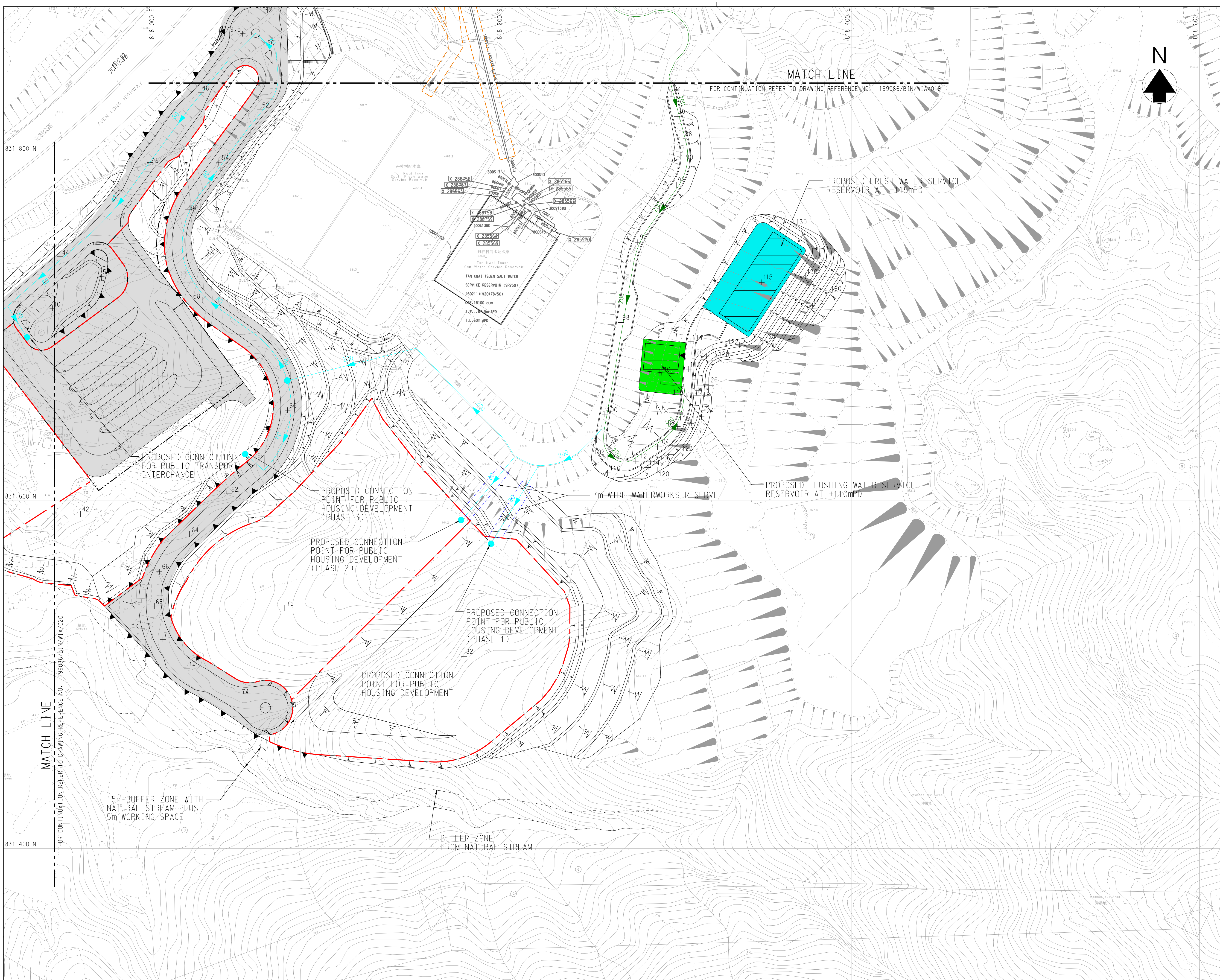

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LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELEMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED SALT WATER MAINS - INLET
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET
- PROPOSED WATERWORKS RESERVE

Revision	Date	Description	Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED INTERIM FLUSHING WATER SYSTEM

(SHEET 2 OF 3)

Drawing No.
199086/BIN/WIA/019

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

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BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = ghl5947 2023/7/3

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LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET

PROPOSED PUBLIC TRANSPORT INTERCHANGE

PROPOSED CONNECTION FOR PUBLIC TRANSPORT INTERCHANGE

PROPOSED PASSENGER LIFT AND STAIRCASE

PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD

PROPOSED CONNECTION POINT FOR SCHOOL SITE

BRIDGE

MATCH LINE FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/019

817 400 E
817 600 E
817 800 E
831 800 N
831 600 N
831 400 N

和平新村
WO PING SAN TSUEN
丹桂村
TAN KWAI TSUEN
SHUN TAT STREET
KONG SHAM WESTERN HIGHWAY
YUEN LONG HIGHWAY
元朗公路
新界西北廢物轉運站
North West N.T. Refuse Transfer Station
BURIAL GROUND

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED INTERIM FLUSHING WATER SYSTEM

(SHEET 3 OF 3)

Drawing No.
199086/BIN/WIA/020

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qin15947 2023/5/29

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-020.dgn

818 000 E
818 200 E
818 400 E
832 200 N
832 000 N
831 800 N

N

TREATED SEWAGE EFFLUENT TO BE SUPPLIED BY YLS DEVELOPMENT (CONNECTION POINT TO BE CONFIRMED WITH YLS DEVELOPMENT / HSK NDA)

120m NO BLASTING LIMIT FOR WSD TUNNEL

EXISTING WSD TUNNEL

PROPOSED UNDERPASS TO MAINTAIN THE EXISTING SHUI FU ROAD

BRIDGE

WWR

PROPOSED PUMPING STATION

TREATED SEWAGE EFFLUENT TO BE SUPPLIED BY YLS DEVELOPMENT (CONNECTION POINT TO BE CONFIRMED WITH YLS DEVELOPMENT /HSK NDA)

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/022

89.6

Tan Kwai Tsuen North Fresh Water Service Reservoir

YUEN LONG HIGHWAY
TAN KWAI TSUEN ROAD
TAN KWAI TSUEN LANE
SHUI FU ROAD

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- 65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- PROPOSED PUMPING STATION
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - INLET
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED ULTIMATE FLUSHING WATER SYSTEM

(SHEET 1 OF 3)

Drawing No.
199086/BIN/WIA/021

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

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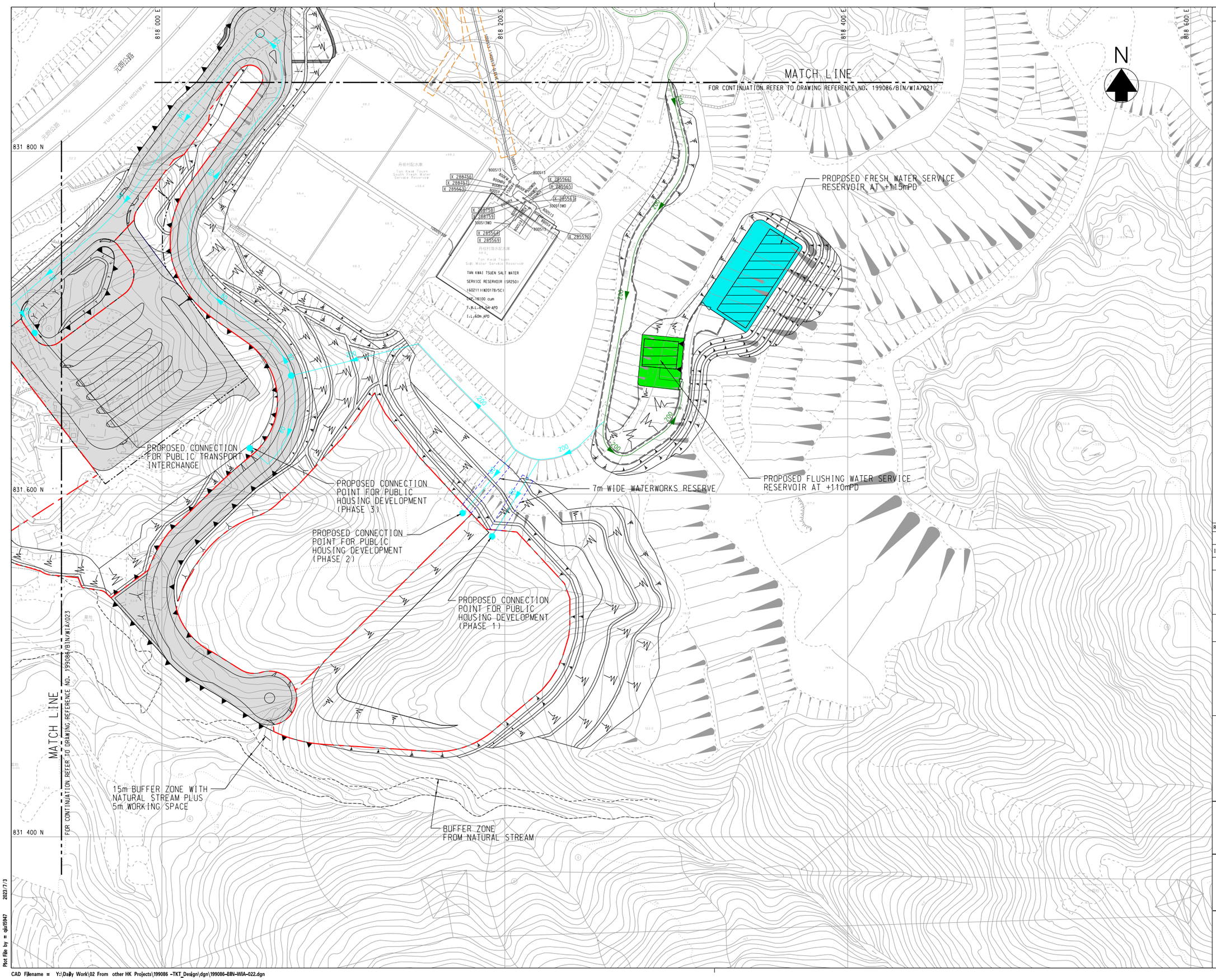

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- PROPOSED FRESH WATER SERVICE RESERVOIR
- PROPOSED FLUSHING WATER SERVICE RESERVOIR
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - INLET
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET
- PROPOSED WATERWORKS RESERVE

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED ULTIMATE FLUSHING WATER SYSTEM

(SHEET 2 OF 3)

Drawing No.	Scale
199086/BIN/WIA/022	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

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817 400 E
817 600 E
817 800 E
831 800 N
831 600 N
831 400 N

丹桂村
TAN KWAI TSUEN
和平新村
WO PING SAN TSUEN
SHUN TAT STREET
KONG SHAM WESTERN HIGHWAY
元朗公路
YUEN LONG HIGHWAY
新界西北廢物轉運站
North West N.T.
Refuse Transfer Station
BURIAL GROUND

PROPOSED PUBLIC TRANSPORT INTERCHANGE
PROPOSED CONNECTION FOR PUBLIC TRANSPORT INTERCHANGE
PROPOSED PASSENGER LIFT AND STAIRCASE
PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD
PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD
BRIDGE
PROPOSED CONNECTION POINT FOR SCHOOL SITE

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/022

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED GIC FACILITIES
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING SALT WATER MAINS
- 200 DIAMETER (mm) PROPOSED FLUSHING WATER MAINS - OUTLET

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PROPOSED ULTIMATE FLUSHING WATER SYSTEM

(SHEET 3 OF 3)

Drawing No.
199086/BIN/WIA/023

Scale
1 : 1000 (A1)
1 : 2000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

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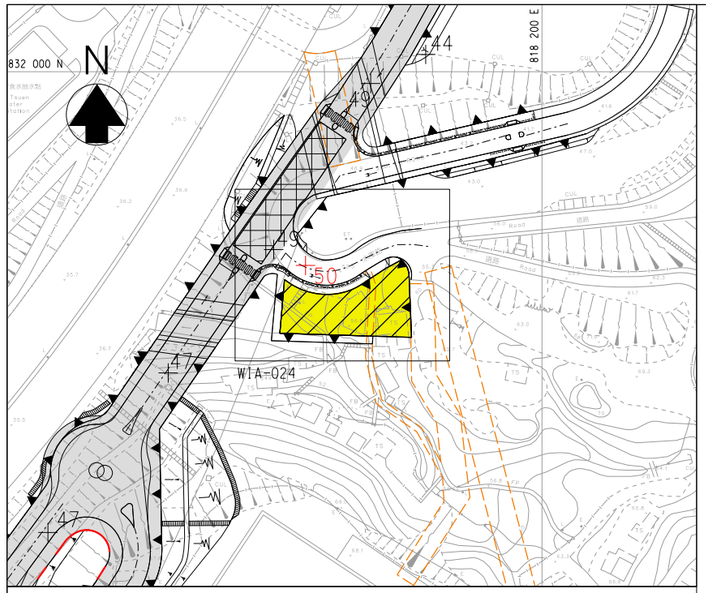
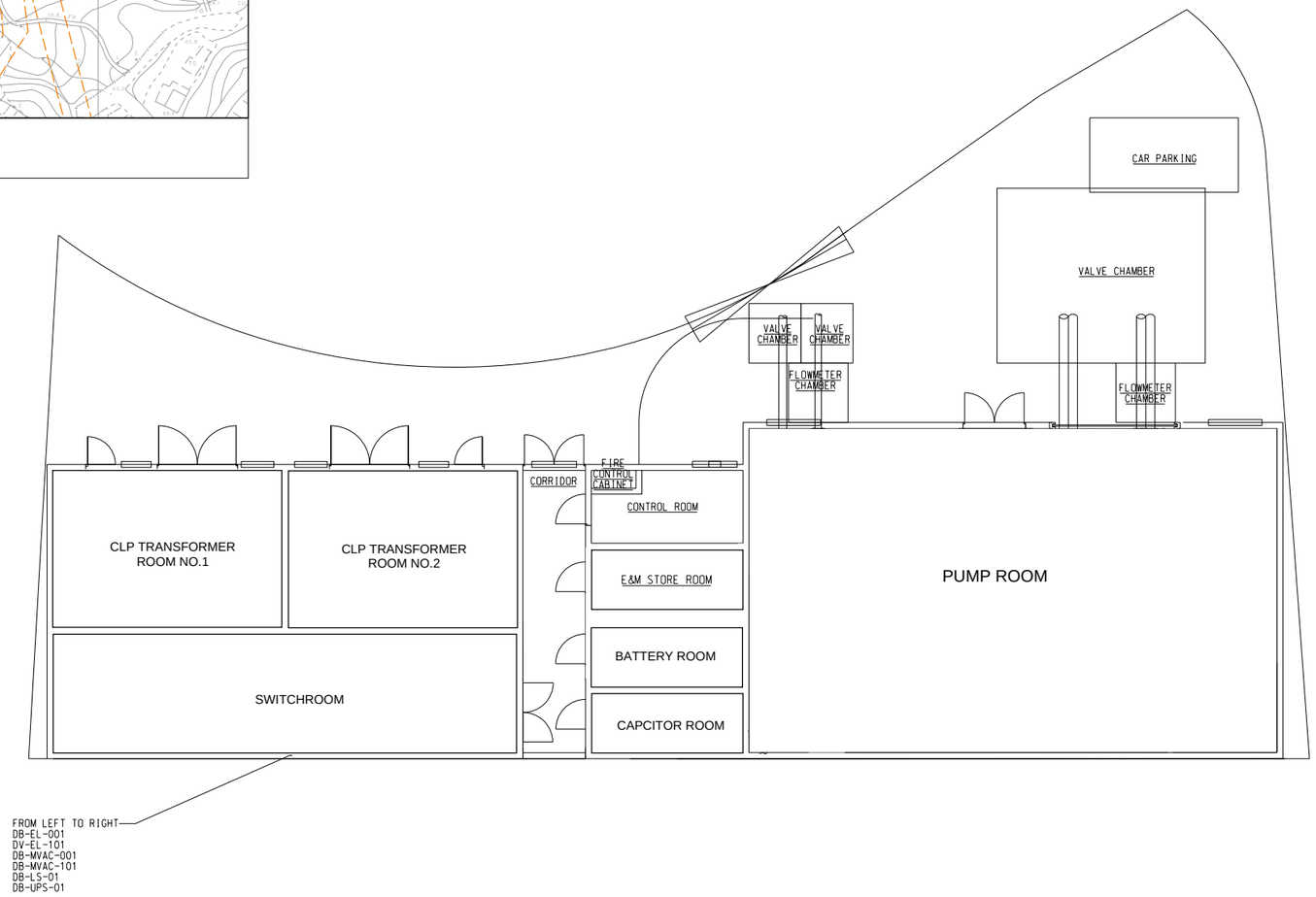


KEY PLAN
N.T.S.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.

LEGEND:

DOUBLE-LEAF DOOR

CABLE / PIPE TRENCH WITH CHEQUER PLATE OR GOATING COVER

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
GENERAL ARRANGEMENT OF THE PROPOSED PUMPING STATION

Drawing No.
199086/BIN/WIA/024

Scale
1 : 100 (A1)
1 : 200 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = glu15947 2023/7/11

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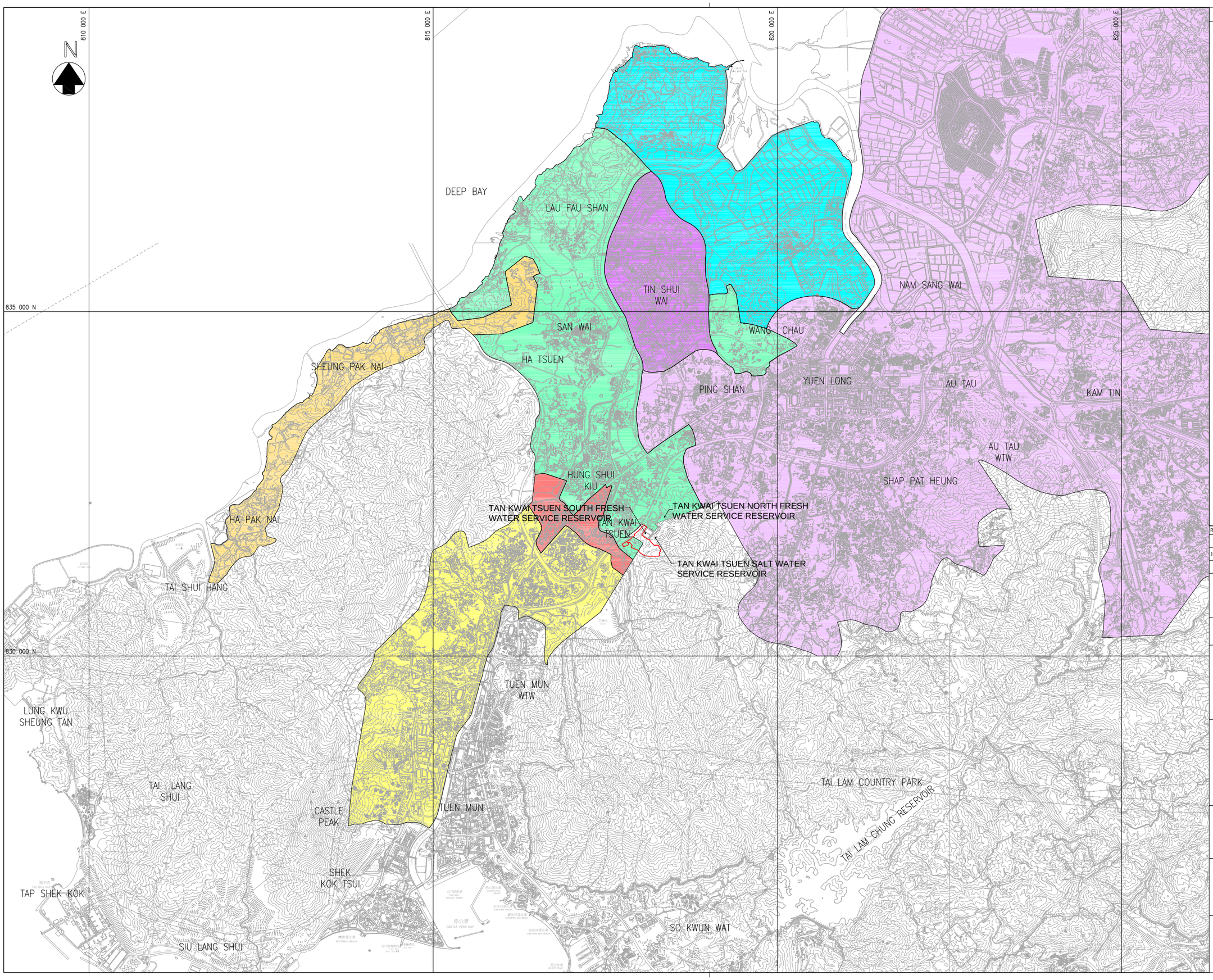
Appendix A

FRESH WATER SUPPLY ZONE

Appendix B

SALT WATER SUPPLY ZONE



NOTES:

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1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. THE BASE PLAN IS EXTRACTED FROM SURVEY SHEET NOS. T2, T5, T6.

LEGEND:

- AU TAU & NGAU TAM MEI F.W. PRIMARY S/R COMMON SUPPLY ZONE
- WANG CHAU F.W. S/R SUPPLY ZONE
- TAN KWAI TSUEN SOUTH AND TAN KWAI TSUEN NORTH F.W. S/R COMMON SUPPLY ZONE
- TAN KWAI TSUEN NORTH F.W. S/R SUPPLY ZONE (TMF SUPPLIED BY WANG CHAU F.W. S/R)
- YUEN LONG F.W. S/R SUPPLY ZONE
- TUEN MUN NORTH F.W. S/R SUPPLY ZONE
- FUNG KONG TSUEN AND FUNG KONG TSUEN NO.2 F.W. TANKS SUPPLY ZONE
- PROPOSED SITE FOR PUBLIC HOUSING DEVELOMENT AND ASSOCIATED G/IC FACILITIES

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	EM	LCH	SZ	LCH
Date	02/19	02/19	02/19	02/19

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
EXISTING FRESH WATER SUPPLY ZONES

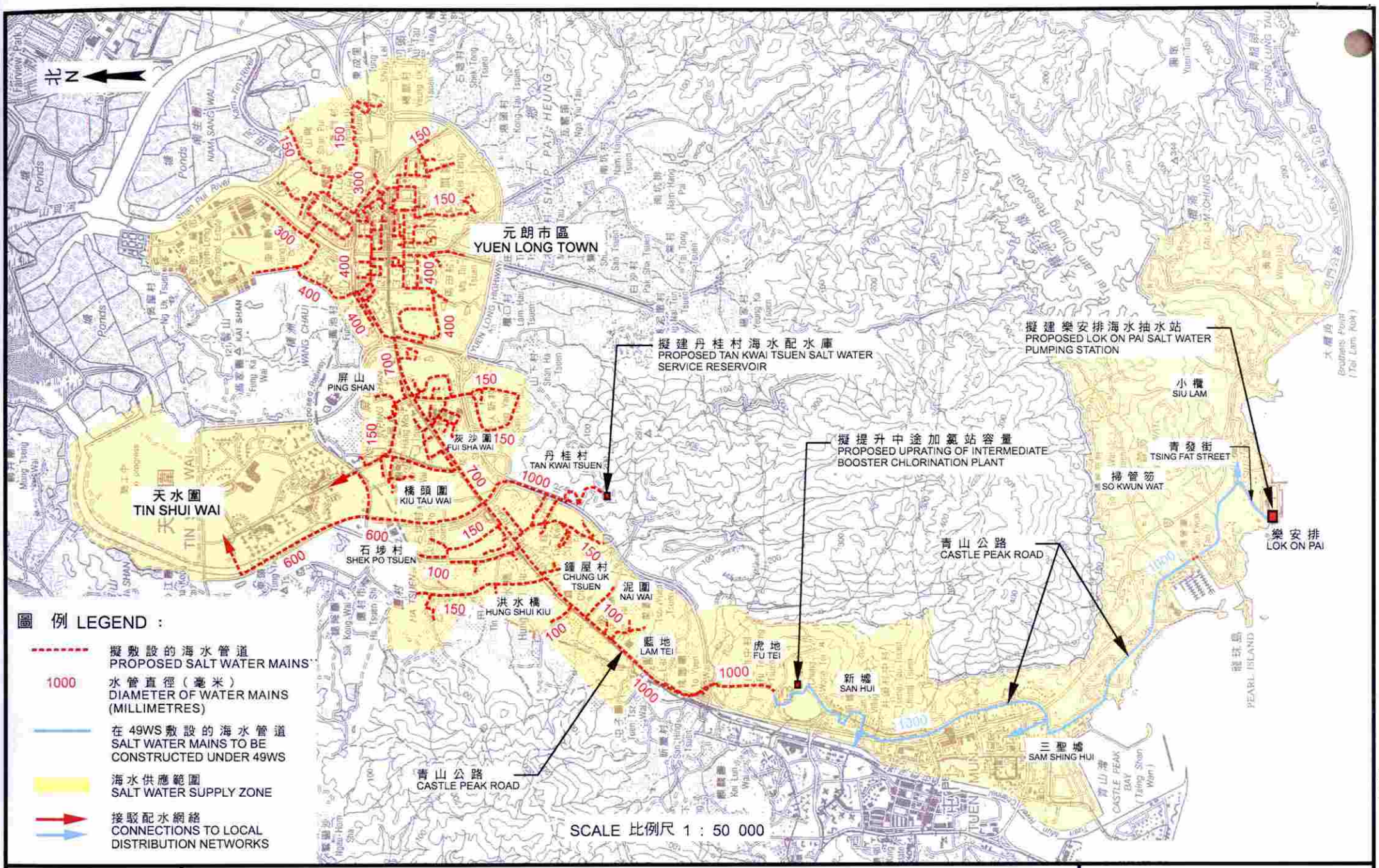
Drawing No.
APPENDIX A

Scale
A1 1 : 25000
A3 1 : 50000

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

APPENDICES



核准 APPROVED

總工程師/設計 CE / DES

13 / 11 / 2008

（甲級工程）
（CAT 'A' Submission）

工務計劃項目 45WS 號 - 新界西北區海水供水計劃 - 餘下工程
P.W.P. Item No. 45WS - Salt water supply for Northwest New Territories - remaining works

水務署
WATER SUPPLIES DEPT.

草圖編號 SKETCH NO. SK 62008 / 086 / 001

REF. 62008-086.CDR

附件— ENCLOSURE 1

Appendix C

WATER DEMANDS, SERVICE RESERVOIR VOLUME AND RESIDUAL HEADS CHECK

CE 92/2017 (CE) Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction
Appendix C - Water Demands, Service Reservoir Volume and Residual Heads Check

(1) Development Breakdown- Estimate of Water Demand

Phase 1 (SSF)

Land Use	Domestic Population [1]	Non-domestic population [2] [3]	No. of teaching staffs and students [4] [5] [6]	Fresh Water Unit Demand (m^3/h/d) [6]			Fresh Water Mean Daily Demand (MDD) (m^3/d)	Flushing Water Unit Demand (m^3/h/d) [6]			Flushing Water Mean Daily Demand (MDD) (m^3/d)
				Residential	Service Trade	School		Residential	Service Trade	School	
Domestic	**5,319**	-	-	0.23	0.04	-	1436.1	0.07	-	-	372.3
Non-Domestic	-	**168**	-	-	-	-	-	-	-	-	-
Retail [7]	-	0	-	-	-	-	-	-	0.07	-	0.0
Welfare Facilities [8]	-	152	-	-	0.2	-	30.4	-	0.07	-	10.6
Ancillary Facilities [9]	-	11	-	-	0.04	-	0.4	-	0.07	-	0.8
Others [9]	-	5	-	-	0.04	-	0.2	-	0.07	-	0.4
Kindergarten	-	-	**201**	-	-	0.025	5.0	-	-	0.03	6.0
Total FWMDD (m^3/day)							**1,472**				**390**

Phase 2 (PRH)

Land Use	Domestic Population [1]	Non-domestic population [2] [3]	No. of teaching staffs and students [4] [5] [6]	Fresh Water Unit Demand (m^3/h/d) [6]			Fresh Water Mean Daily Demand (MDD) (m^3/d)	Flushing Water Unit Demand (m^3/h/d) [6]			Flushing Water Mean Daily Demand (MDD) (m^3/d)
				Residential	Service Trade	School		Residential	Service Trade	School	
Domestic	**6,480**	-	-	0.23	0.04	-	1749.6	0.07	-	-	453.6
Non-Domestic	-	**286**	-	-	-	-	-	-	-	-	-
Retail [7]	-	110	-	-	-	-	-	-	0.07	-	7.7
Welfare Facilities [8]	-	152	-	-	0.2	-	30.4	-	0.07	-	10.6
Ancillary Facilities [9]	-	24	-	-	0.04	-	1.0	-	0.07	-	1.7
Others [9]	-	0	-	-	0.04	-	0.0	-	0.07	-	0.0
Kindergarten	-	-	**201**	-	-	0.025	5.0	-	-	0.03	6.0
Total FWMDD (m^3/day)							**1,786**				**479**

Phase 3 (PRH)

Land Use	Domestic Population [1]	Non-domestic population [2] [3]	No. of teaching staffs and students [4] [5] [6]	Fresh Water Unit Demand (m^3/h/d) [6]			Fresh Water Mean Daily Demand (MDD) (m^3/d)	Flushing Water Unit Demand (m^3/h/d) [6]			Flushing Water Mean Daily Demand (MDD) (m^3/d)
				Residential	Service Trade	School		Residential	Service Trade	School	
Domestic	**8,235**	-	-	0.23	0.04	-	2223.5	0.07	-	-	576.5
Non-Domestic	-	**543**	-	-	-	-	-	-	-	-	-
Retail [7]	-	98	-	-	-	-	-	-	0.07	-	6.9
Welfare Facilities [8]	-	220	-	-	0.2	-	44.0	-	0.07	-	15.4
Ancillary Facilities [9]	-	3	-	-	0.04	-	0.1	-	0.07	-	0.2
Others [9]	-	222	-	-	0.04	-	8.9	-	0.07	-	15.5
Kindergarten	-	-	**0**	-	-	0.025	0.0	-	-	0.03	0.0
Total FWMDD (m^3/day)							**2,276**				**614**

Primary School

Land Use	Domestic Population [1]	Non-domestic population [2] [3]	No. of teaching staffs and students [4] [5] [6]	Fresh Water Unit Demand (m^3/h/d) [6]			Fresh Water Mean Daily Demand (MDD) (m^3/d)	Flushing Water Unit Demand (m^3/h/d) [6]			Flushing Water Mean Daily Demand (MDD) (m^3/d)
				Residential	Service Trade	School		Residential	Service Trade	School	
Primary School	-	-	**821**	-	-	0.025	**20**	-	-	0.03	**25**

Remarks: (1) Assumed 2.7 persons per flat;
(2) No water demand is assumed for car parking area;
(3) Worker densities of 3.5 employees (Retail Trade) and 3.3 employees (Community, Social & Personal Services) per 100 m^2 GFA is adopted in accordance with "Commercial and Industrial Floor Space Utilization Survey" issued by the PlanD in 2004/2005;
(4) Asusming 180 students per kindergarden (with 2 kindergartens planned) and 25.5 students per class for the planned primary school (30-classrooom) with reference to Chapter 3 of the HKPSG;
(5) Pupil-teacher ratios of 8.6:1 (kindergarden) and 13.8:1 (primary school) are assumed based on Education Bureau's 2017/18 Figures and Statistics;
(6) Refereces have been taken from the mean unit daily demands recommeneded in Table 1 and 2 in the WSD DI 1309 and derived from GESF published by EPD;
(7) The fresh water unit demand of retail is included in domestic service trade;
(8) The fresh water unit demand of welfare facilities is adopted in accordance with Section 4.4(d) of GESF published by EPD;
(9) Ancillary facilities and others include office, workshop, PTI and covered walkway etc.

817 000 E
817 500 E
818 000 E
818 500 E
832 500 N
832 000 N
831 500 N

Proposed Fire Hydrant (Roundabout near TSWWI)
Residual Head: 44.79m

Proposed Connection Point to Housing Site (PTI)
Residual Head: 37.96m

Proposed Location of Pressure Reducing Valve (PRV)
Residual Head (in): 56.28m
Residual Head (out): 31.28m

Proposed Connection Point to School Site
Residual Head: 37.37m

Proposed Fresh Water Service Reservoir
Invert Level: +115 mPD

Proposed Fire Hydrant (Proposed Access Road)
Residual Head: 45.13m

Proposed Connection Point to Housing Site (Lower Platform - Phase 3)
Residual Head: 50.22m

Proposed Connection Point to Housing Site (Upper Platform - Phase 1)
Residual Head: 31.30m

Proposed Fire Hydrant (Upper Platform)
Residual Head: 54.44m

Proposed Connection Point to Housing Site (Upper Platform - Phase 2)
Residual Head: 39.47m

FH1
FH2
FH3
PRV
A
B1
B2
B3
B4
C1
C2
C3
D
E
F

PROPOSED IMPROVEMENT AT JUNCTION OF SHUN TAT STREET & CASTLE PEAK ROAD - HUNG SHUI KIU
NEW RIGHT TURN LANE TO YUEN LONG
EXISTING LEFT TURN LANE TO TUEN MUN
PROPOSED UNDERPASS TO MAINTAIN THE EXISTING SHUI FU ROAD
PROPOSED CONNECTION TO EXISTING SHUI FU ROAD
PROPOSED SITE FOR THE WATER PUMPING STATION
PROPOSED REGULATOR KIOSK AND STAFF REST ROOM
PROPOSED PUBLIC TRANSPORT INTERCHANGE
PROPOSED PASSENGER LIFT AND STAIRCASE
SUBWAY
PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD
LOCATION OF PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD
LOCATION OF PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD
TO BE CONSTRUCTED BY OTHERS
BRIDGE
WWR
BURIAL GROUND

N

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOPMENT AND ASSOCIATED G/IC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- +66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD

Revision	Date	Description			Initial
		Designed	Checked	Drawn	Checked
Initial		TCL	WLC	SZ	LCH
Date		04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
FRESH WATER SUPPLY PLAN

Drawing No.
199086/BIN/SFAI/001

Scale
1 : 3000 (A1)
1 : 6000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
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Plot File by = ajk5947 2022/11/15

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Agreement No. CE 92/2017 (CE)
CE 92/2017 (CE) Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction
Water Supply Impact Assessment
(4) Residual Head Adequacy - Fresh Water Supply

Summary of Fresh Water Demand

			Daily Operation		Fire Fighting Scenario	
Supply Zone	**Type**	**MDD (m^3/day)**	**Demand Multiplier**	**Peak Demand (m^3/day)**	**Demand Multiplier**	**Peak Demand (m^3/day)**
Proposed Housing Development (Phase 1)	FW	1,472	3	4,416	1	7,472
Proposed Housing Development (Phase 2)	FW	1,786	3	5,358	1	1,786
Proposed Housing Development (Phase 3)	FW	2,276	3	6,828	1	2,276
Primary School	FW	20	3	60	1	20
Fire Fighting Flow	FW	6,000	-	-	1	6,000

Hydraulic Assessment of Fresh Water Mains (Daily Operation)

Invert level of the proposed FWSR **115** mPD
Head Reduction of PRV **25** m

Start	End	Nominal Pipe Diameter (mm)	Internal Pipe Diameter (mm)	Available Peak Flow Capacity (m^3/day)	Pipe Length (m)	Say Pipe Length (m)	Hazen-Williams Coefficient	Peak Demand (m^3/day)	Peak Velocity (m/s)	Friction Loss(1)	Minor Loss(2)	Total Head Loss	Culmulative Head Loss	Elevation (m)	Residual Head (m)	Residual Head Check (>20m)	Remarks
E	F	250	250	6362	92	120	110	60	0.01	0.00	0.00	0.00	1.49	42.00	46.51	OK	
D	E	250	250	6362	235	290	110	60	0.01	0.00	0.00	0.00	1.49	43.00	45.51	OK	
PRV	D	300	300	9161	220	270	110	60	0.01	0.00	0.00	0.00	1.49	49.50	39.01	OK	
C1	PRV	300	300	9161	100	120	110	60	0.01	0.00	0.00	0.00	1.49	55.00	33.51	OK	After PRV
															58.51	OK	
C2	C3	150	150	2290	14	20	110	6828	4.47	3.36	0.67	4.03	5.41	57.50	52.09	OK	
C1	C2	300	300	9161	56	70	110	6828	1.12	0.40	0.08	0.48	8.07	58.50	48.43	OK	
B2	C1	450	450	20612	161	200	110	6888	0.50	0.16	0.03	0.19	1.49	59.50	54.01	OK	
B2	B4	150	150	2290	48	60	110	5358	3.51	6.43	1.29	7.72	7.72	75.00	32.28	OK	
B1	B2	450	450	27483	22	30	110	12246	0.89	0.07	0.01	0.08	1.38	88.00	25.62	OK	
B1	B3	150	150	3054	55	70	110	4416	2.89	5.25	1.05	6.30	7.59	82.00	25.41	OK	
A	B1	450	450	27483	215	260	110	16662	1.21	1.08	0.22	1.29	1.29	90.00	23.71	OK	Before PRV

Hydraulic Assessment of Fresh Water Mains (Fire Fighting)

Invert level of the proposed FWSR **115** mPD
Head Reduction of PRV **25** m

Start	End	Nominal Pipe Diameter (mm)	Internal Pipe Diameter (mm)	Available Peak Flow Capacity (m^3/day)	Pipe Length (m)	Say Pipe Length (m)	Hazen-Williams Coefficient	Peak Demand (m3/day)(3)	Peak Velocity (m/s)	Friction Loss(1)	Minor Loss(2)	Total Head Loss	Culmulative Head Loss	Elevation (m)	Residual Head (m)	Residual Head Check (>17m for draw off note and >20m for others)	Remarks
D	FH3	250	250	6362	942	1140	110	6000	1.41	12.52	2.50	15.02	20.21	25.00	44.79	OK	
F	FH2	250	250	6362	136	170	110	6000	1.41	1.87	0.37	2.24	12.87	32.00	45.13	OK	
E	F	250	250	6362	92	120	110	6020	1.42	1.33	0.27	1.59	10.63	42.00	37.37	OK	
D	E	250	250	6362	235	290	110	6020	1.42	3.20	0.64	3.85	9.04	43.00	37.96	OK	After PRV
PRV	D	300	300	9161	220	270	110	6020	0.99	1.23	0.25	1.47	5.19	49.50	35.31	OK	
C1	PRV	300	300	9161	100	120	110	6020	0.99	0.55	0.11	0.65	3.72	55.00	31.28	OK	
															56.28	OK	
C2	FH1	300	300	9161	205	250	110	6020	0.99	1.14	0.23	1.36	3.06	57.50	54.44	OK	
C2	C3	150	150	2290	14	20	110	8276	5.42	4.79	0.96	5.75	6.28	58.50	50.22	OK	
C1	C2	300	300	9161	56	70	110	8276	1.36	0.57	0.11	0.69	2.17	59.50	53.33	OK	
B2	C1	450	450	20612	161	200	110	8296	0.60	0.23	0.05	0.27	1.70	61.00	52.30	OK	
B2	B4	300	300	9161	48	60	110	7786	1.27	0.44	0.09	0.53	0.53	75.00	39.47	OK	Before PRV
B1	B2	450	450	20612	22	30	110	10082	0.73	0.05	0.01	0.06	1.49	88.00	25.51	OK	
B1	B3	300	300	9161	55	70	110	13472	2.21	1.41	0.28	1.70	1.70	82.00	31.30	OK	
A	B1	450	450	27483	215	260	110	17554	1.28	1.19	0.24	1.43	1.43	90.00	23.57	OK	

Note:

(1) By Hazen Williams Equation, Friction Loss = $\frac{10.67L(Q^{1.85})}{C^{1.852}d^{4.82}}$ where L is length of pipeline (m), C is Hazen-Williams Coefficient, d is internal diameter of pipe (m) and Q is design flow of pipe (m^3/s)

(2) Assume minor loss (i.e. due to bends and tees) is 20% of the friction loss.

(3) Assume Pressure Reducing Valve (PRV) has lowered the Residual Head by 30m.

Agreement No. CE 92/2017 (CE)
CE 92/2017 (CE) Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction
Water Supply Impact Assessment
(5) Residual Head Adequacy - Flushing Water Supply

Summary of Flushing Water Demand

			Daily Operation	
Supply Zone	**Type**	**MDD (m^3/day)**	**Demand Multiplier**	**Peak Demand (m^3/day)**
Proposed Housing Development (Phase 1)	FLW	390	2	780
Proposed Housing Development (Phase 2)	FLW	479	2	958
Proposed Housing Development (Phase 3)	FLW	614	2	1,228
Primary School	FLW	25	2	50

Hydraulic Assessment of Flushing Water Mains

Invert level of the proposed FLWSR **110** mPD

Start	End	Nominal Pipe Diameter (mm)	Internal Pipe Diameter (mm)	Available Peak Flow Capacity (m^3/day)	Pipe Length (m)	Say Pipe Length (m)	Hazen-Williams Coefficient	Peak Demand (m^3/day)	Peak Velocity (m/s)	Friction Loss(1)	Minor Loss(2)	Total Head Loss	Culmulative Head Loss	Elevation (m)	Residual Head (m)	Residual Head Check (>15m)
E	F	80	80	651	92	120	90	50	0.12	0.07	0.01	0.08	5.45	42.00	62.55	OK
D	E	80	80	651	235	290	90	50	0.12	0.17	0.03	0.20	5.37	43.00	61.63	OK
C1	D	80	80	651	246	300	90	50	0.12	0.17	0.03	0.21	5.16	49.50	55.34	OK
C2	C3	80	80	651	14	20	90	1228	2.83	4.35	0.87	5.22	23.97	57.50	28.53	OK
C1	C2	80	80	651	56	70	90	1228	2.83	15.22	3.04	18.26	22.57	58.50	28.93	OK
B2	C1	200	200	4072	161	200	90	1278	0.47	0.54	0.11	0.65	4.95	59.50	45.55	OK
B2	B4	80	80	651	48	60	90	1008	2.32	9.05	1.81	10.86	18.75	75.00	16.25	OK
B1	B2	200	200	4072	22	30	90	1788	0.66	0.15	0.03	0.18	4.31	88.00	17.69	OK
B1	B3	80	80	651	55	70	90	780	1.80	6.57	1.31	7.89	7.89	82.00	20.11	OK
A	B1	200	200	4072	215	260	90	3016	1.11	3.44	0.69	4.12	4.12	90.00	15.88	OK

Note:

(1) By Hazen Williams Equation, Friction Loss = $\frac{10.67L(Q^{1.85})}{C^{1.852}d^{4.82}}$ where L is length of pipeline (m), C is Hazen-Williams Coefficient, d is internal diameter of pipe (m) and Q is design flow of pipe (m^3/s)

(2) Assume minor loss (i.e. due to bends and tees) is 20% of the friction loss.

817 000 E
817 500 E
818 000 E
818 500 E
832 500 N
832 000 N
831 500 N

N

Proposed Connection Point to Housing Site (PTI)
Residual Head: 61.63m

Proposed Connection Point to School Site
Residual Head: 62.55m

Proposed Flushing Water Service Reservoir
Invert Level: +110 mPD

Proposed Connection Point to Housing Site (Lower Platform - Phase 3)
Residual Head: 28.93m

Proposed Connection Point to Housing Site (Upper Platform - Phase 1)
Residual Head: 20.11m

Proposed Connection Point to Housing Site (Upper Platform - Phase 2)
Residual Head: 16.25m

PROPOSED IMPROVEMENT AT JUNCTION OF SHUN TAT STREET & CASTLE PEAK ROAD - HUNG SHUI KIU
NEW RIGHT TURN LANE TO YUEN LONG
EXISTING LEFT TURN LANE TO TUEN MUN
PROPOSED UNDERPASS TO MAINTAIN THE EXISTING SHUI FU ROAD
PROPOSED CONNECTION TO EXISTING SHUI FU ROAD
PROPOSED SITE FOR THE WATER PUMPING STATION
PROPOSED REGULATOR KIOSK AND STAFF REST ROOM
PROPOSED PUBLIC TRANSPORT INTERCHANGE
PROPOSED PASSENGER LIFT AND STAIRCASE
SUBWAY
PROPOSED SITE FOR 30-CLASSROOM SCHOOL F.L. +42mPD
PROPOSED UNDERPASS TO MAINTAIN THE EXISTING ACCESS ROAD
UNDERPASS
BRIDGE
WWR
TO BE CONSTRUCTED BY OTHERS
LOCATION OF PROPOSED FRESH WATER SERVICE RESERVOIR AT +115mPD
LOCATION OF PROPOSED FLUSHING WATER SERVICE RESERVOIR AT +110mPD
BURIAL GROUND
15m BUFFER ZONE WITH NATURAL STREAM PLUS 5m WORKING SPACE
PROPOSED PLATFORM F.L. +82.0mPD

A B1 B2 B3 B4 C1 C2 C3 D E F

LEGEND:

- PROPOSED SITE FOR PUBLIC HOUSING DEVELOPMENT AND ASSOCIATED G/IC FACILITIES
- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- +66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
FLUSHING WATER SUPPLY PLAN

Drawing No.
199086/BIN/SFAI/001

Scale
1 : 3000 (A1)
1 : 6000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
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Agreement No. CE 92/2017 (CE)
CE 92/2017 (CE) Public Housing Development near Tan Kwai Tsuen, Yuen Long – Investigation, Design and Construction
Water Supply Impact Assessment
(5) Residual Head Adequacy - Flushing Water Supply

Summary of Flushing Water Demand

			Daily Operation	
Supply Zone	**Type**	**MDD (m^3/day)**	**Demand Multiplier**	**Peak Demand (m^3/day)**
Proposed Housing Development (Phase 1)	FLW	390	2	780
Proposed Housing Development (Phase 2)	FLW	479	2	958
Proposed Housing Development (Phase 3)	FLW	614	2	1,228
Primary School	FLW	25	2	50

Hydraulic Assessment of Flushing Water Mains

Invert level of the proposed FLWSR **110** mPD

Start	End	Nominal Pipe Diameter (mm)	Internal Pipe Diameter (mm)	Available Peak Flow Capacity (m^3/day)	Pipe Length (m)	Say Pipe Length (m)	Hazen-Williams Coefficient	Peak Demand (m^3/day)	Peak Velocity (m/s)	Friction Loss[(1)]	Minor Loss[(2)]	Total Head Loss	Culmulative Head Loss	Elevation (m)	Residual Head (m)	Residual Head Check (>15m)
E	F	80	80	651	92	120	90	50	0.12	0.07	0.01	0.08	5.45	42.00	62.55	OK
D	E	80	80	651	235	290	90	50	0.12	0.17	0.03	0.20	5.37	43.00	61.63	OK
C3	D	80	80	651	246	300	90	50	0.12	0.17	0.03	0.21	5.16	49.50	55.34	OK
C2	C3	80	80	651	14	20	90	1228	2.83	4.35	0.87	5.22	23.97	57.50	28.53	OK
C1	C2	80	80	651	56	70	90	1228	2.83	15.22	3.04	18.26	22.57	58.50	28.93	OK
B2	C1	200	200	4072	161	200	90	1278	0.47	0.54	0.11	0.65	4.95	59.50	45.55	OK
B2	B4	80	80	651	48	60	90	1008	2.32	9.05	1.81	10.86	18.75	75.00	16.25	OK
B1	B2	200	200	4072	22	30	90	1788	0.66	0.15	0.03	0.18	4.31	88.00	17.69	OK
B1	B3	80	80	651	55	70	90	780	1.80	6.57	1.31	7.89	7.89	82.00	20.11	OK
A	B1	200	200	4072	215	260	90	3016	1.11	3.44	0.69	4.12	4.12	90.00	15.88	OK

Note:

(1) By Hazen Williams Equation, Friction Loss = $\frac{10.67L(Q^{1.85})}{C^{1.852}d^{4.82}}$ where L is length of pipeline (m), C is Hazen-Williams Coefficient, d is internal diameter of pipe (m) and Q is design flow of pipe (m^3/s)

(2) Assume minor loss (i.e. due to bends and tees) is 20% of the friction loss.

Appendix D

PROPOSED DIVERSION PLAN FOR EXISTING WATER MAINS

818 200 E
818 400 E
818 600 E
832 800 N
832 600 N
832 400 N

N

MATCH LINE
FOR CONTINUATION REFER TO DRAWING REFERENCE NO. 199086/BIN/WIA/302

MC01 = CH 1200.000
MC01 = CH 1250.000
MC01 = CH 1300.000

NORTH TUNNEL PORTAL
832320.598N
818346.444E

HUNG TIN ROAD
洪天路
YUEN LONG HIGHWAY
元朗公路
TAI TAO TSUEN
大桃園
天水圍西交匯處
Tin Shui Wai West Interchange
Uptown

NOTES:

1. ALL CORRDINATES REFER TO HONG KONG GEODETIC DATUM (1980) AND ARE IN METRES.
2. ALL DIMENSIONS AND CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.
3. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.

LEGEND:

- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- +66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- +22.0 ROAD LEVEL (mPD)
- REFERENCE LINE MC01

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

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Agreement no.
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Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PRELIMINARY DIVERSION PLAN FOR FRESH WATER MAIN

(SHEET 1 OF 2)

Drawing No.
199086/BIN/WIA/301

Scale
1 : 1000 (A1)
1 : 2000 (A3)

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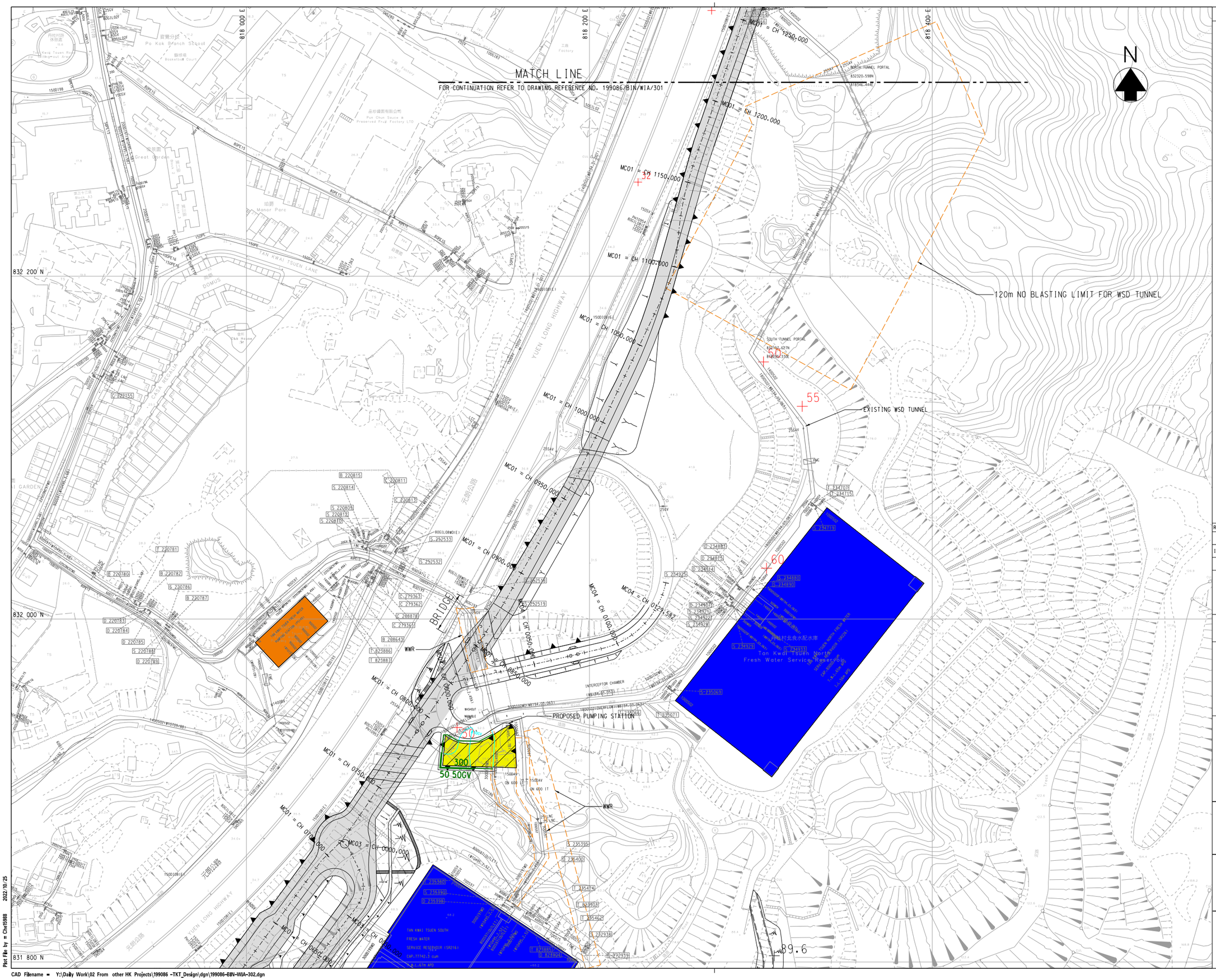

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NOTES:

1. ALL CORRDINATES REFER TO HONG KONG GEODETIC DATUM (1980) AND ARE IN METRES.
2. ALL DIMENSIONS AND CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.
3. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.

LEGEND:

- PROPOSED NATURAL TERRAIN HAZARD MITIGATION WORKS
- PROPOSED SLOPE
- 66.12 EXISTING LEVEL
- +65 PROPOSED LEVEL
- PROPOSED RETAINING WALL
- EXISTING WSD NO BLASTING LIMIT / WWR
- PROPOSED PUBLIC ROAD
- POTENTIAL INTERNAL ROAD
- EXISTING FRESH WATER SERVICE RESERVOIR
- EXISTING PUMPING STATION
- EXISTING FRESH WATER MAINS
- EXISTING FRESH WATER MAINS TO BE RETAINED
- EXISTING FRESH WATER MAINS TO BE ABANDONED
- +22.0 ROAD LEVEL (mPD)
- REFERENCE LINE MC01
- 1400 DIAMETER (mm) PROPOSED FRESH WATER MAIN DIVERSION

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	TCL	WLC	SZ	LCH	
Date	04/22	04/22	04/22	04/22	

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Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PRELIMINARY DIVERSION PLAN FOR FRESH WATER MAIN

(SHEET 2 OF 2)

Drawing No.	Scale
199086/BIN/WIA/302	1 : 1000 (A1) 1 : 2000 (A3)

土木工程拓展署
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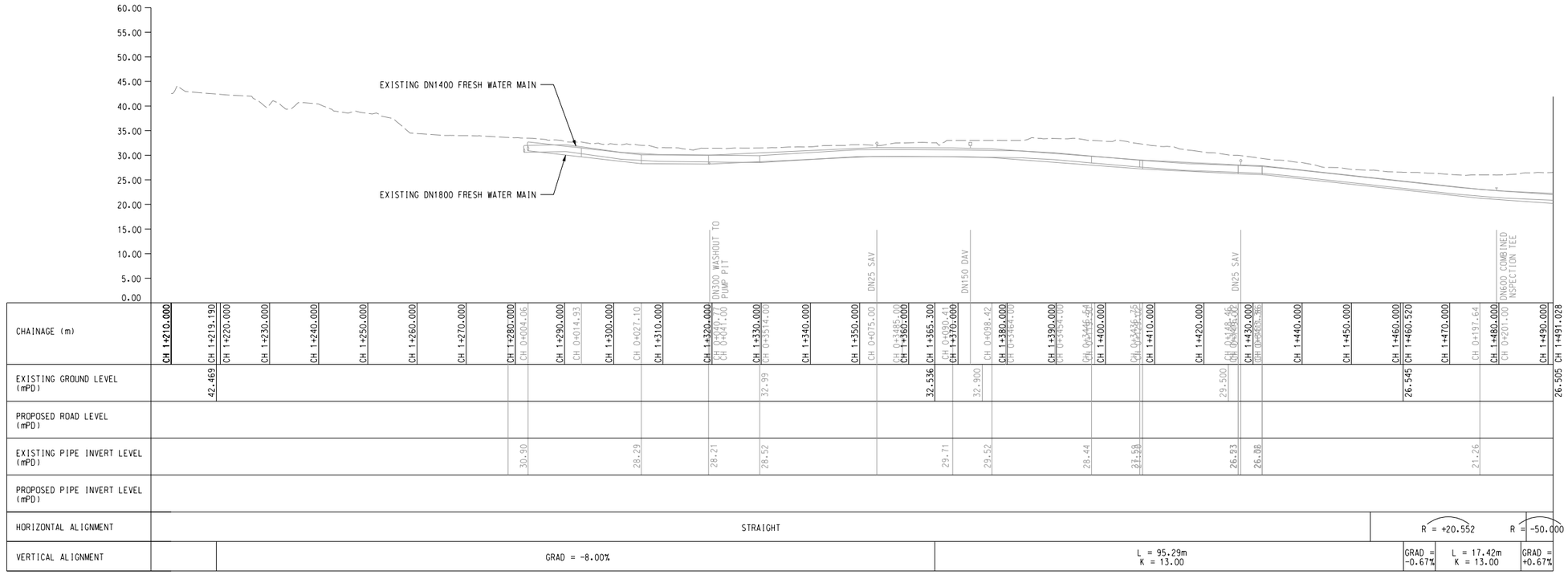

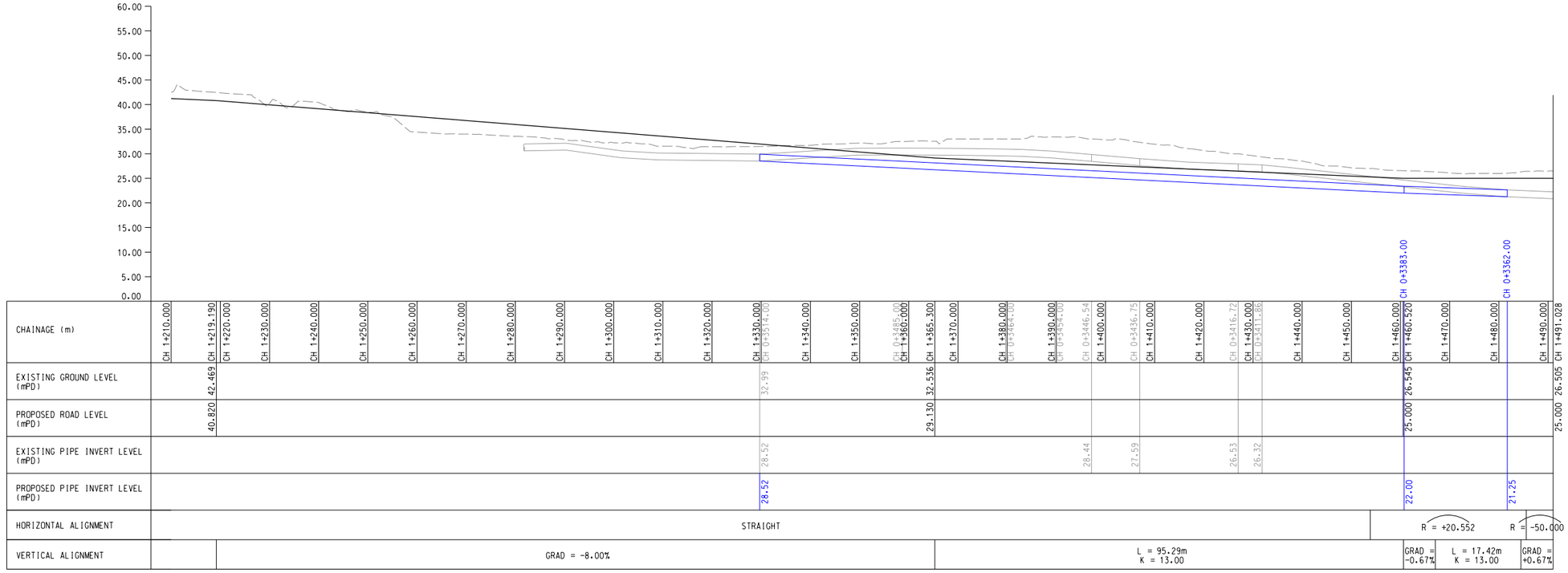

PROPOSED ROAD LONGITUDINAL PROFILE (MC01)

SCALE A1 1 : 500
A3 1 : 1000

NOTES:

1. ALL DIMENSIONS AND CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.
3. ALL VERTICAL CURVES ARE PARABOLIC. ALL HORIZONTAL TRANSITIONS ARE CLOTHOIDAL.
4. CHAINAGES AND LEVELS SHOWN ARE ALONG THE SETTING OUT LINES.
5. EXISTING GROUND LEVELS SHOWN ARE APPROXMATE ONLY.

LEGEND:

- EXISTING PROFILE
- PROPOSED PROFILE
- EXISTING FRESH WATER MAIN
- PROPOSED FRESH WATER MAIN DIVERSION

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	KWM	LCH	SZ	LCH
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Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PRELIMINARY DIVERSION PLAN FOR FRESH WATER MAIN - LONGITUDINAL SECTION

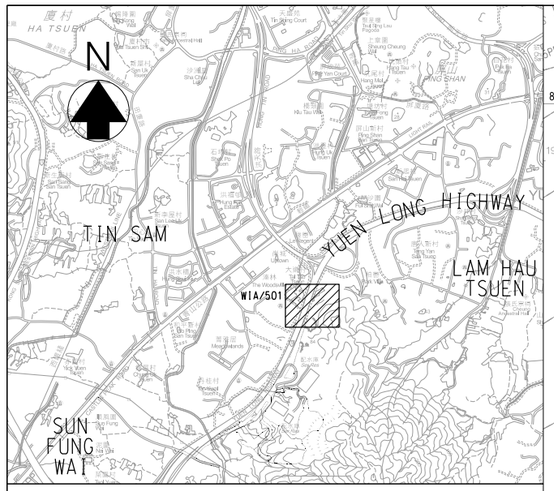
Drawing No.	Scale
199086/BIN/WIA/304	AS SHOWN

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = Chs15988 2022/10/25

CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-304.dgn



LOCATION PLAN
SCALE 1:20000

NOTES:

1. ALL CORRDINATES REFER TO HONG KONG GEODETIC DATUM (1980) AND ARE IN METRES.
2. ALL DIMENSIONS AND CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.
3. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED PUBLIC TRANSPORT INTERCHANGE TO BE CONSTRUCTED BY HD
- +22.0 ROAD LEVEL (mPD)
- REFERENCE LINE MC01

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
PRELIMINARY DIVERSION PLAN FOR FRESH WATER MAIN (INTERFACE A)

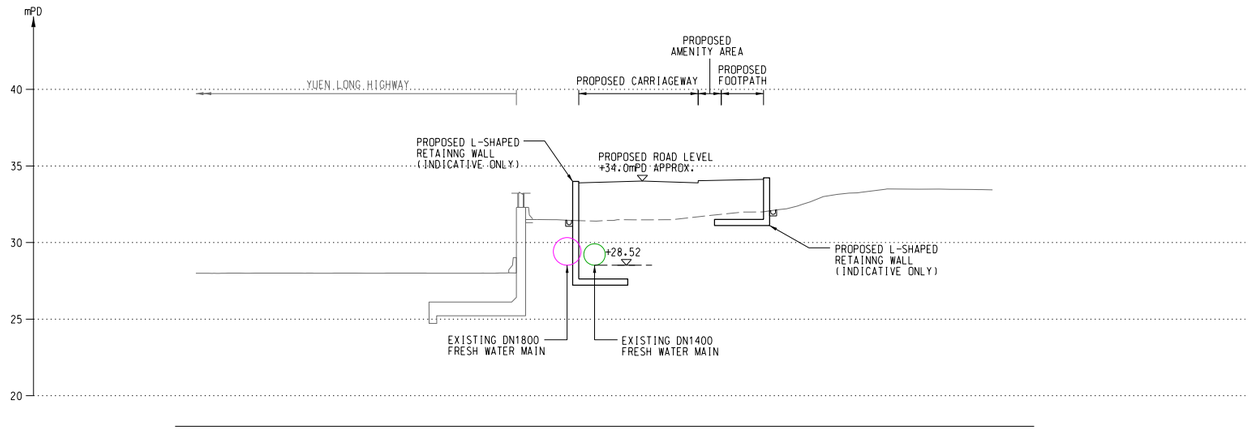
Drawing No.	Scale
199086/BIN/WIA/501	1 : 500 (A1) 1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

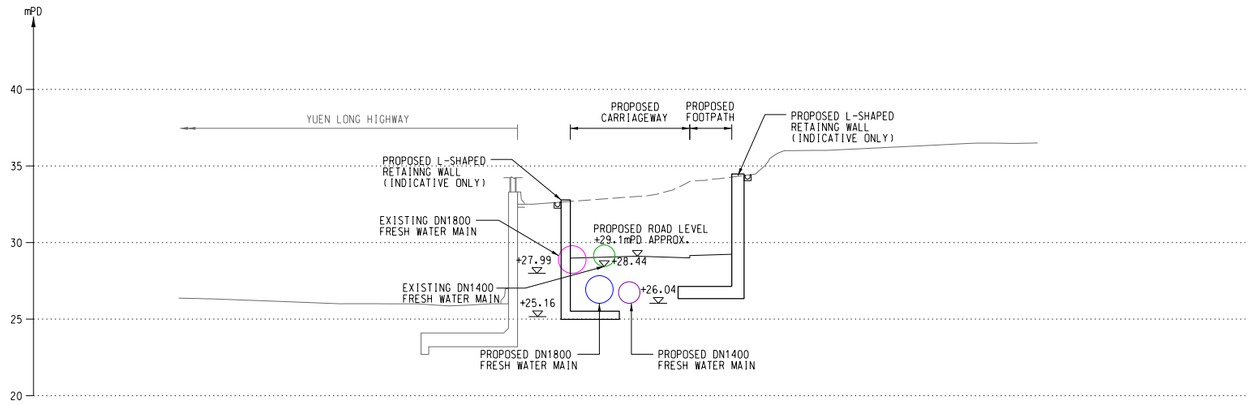
BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = Chn15988 2022/10/25

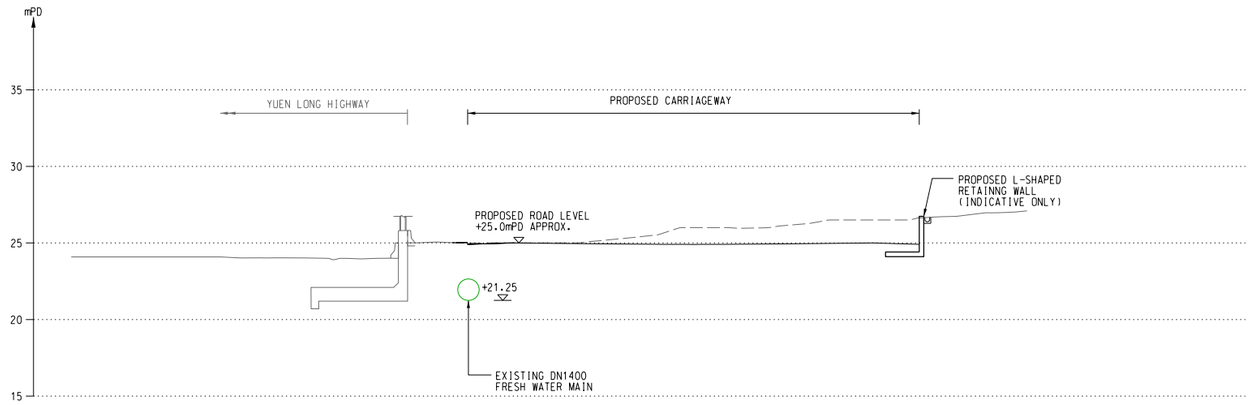
CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-501.dgn



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHER WISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (P.D.).
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS, SPECIFICATIONS AND INSTRUCTIONS ISSUED BY THE ENGINEER.

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	KWM	LCH	SZ	LCH
Date	11/21	11/21	11/21	11/21

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
SITE FORMATION PLAN (SECTION A, B & C)

Drawing No.	Scale
199086/BIN/WIA/502	1 : 200 (A1) 1 : 400 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = Chet5988 2022/10/25

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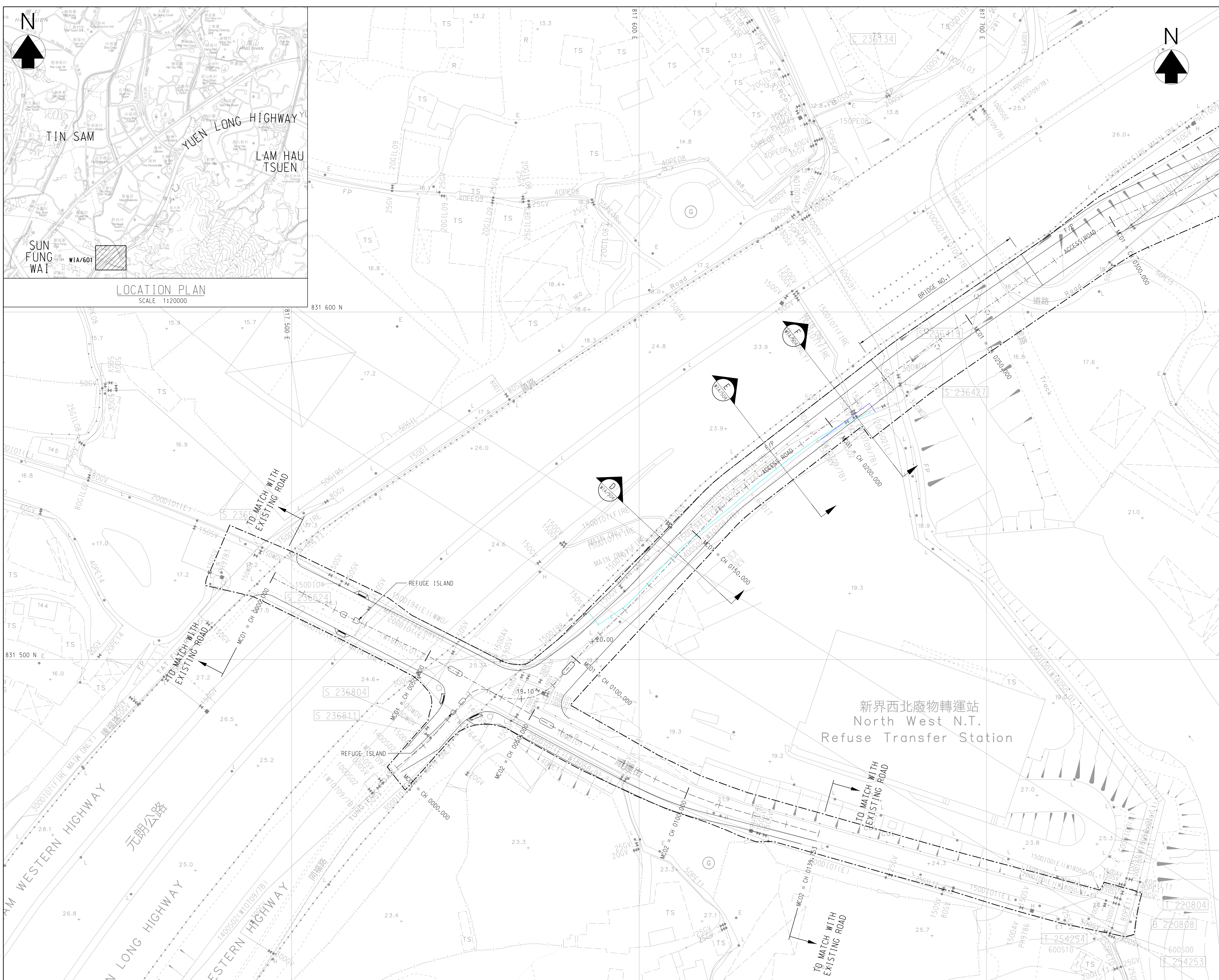


NOTES:

1. ALL CORRDINATES REFER TO HONG KONG GEODETIC DATUM (1980) AND ARE IN METRES.
2. ALL DIMENSIONS AND CHAINAGES ARE IN METRES UNLESS OTHERWISE STATED.
3. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.

LEGEND:

- LIMIT OF WORKS AREA
- PROPOSED PUBLIC TRANSPORT INTERCHANGE TO BE CONSTRUCTED BY HD
- +22.0 ROAD LEVEL (mPD)
- REFERENCE LINE MC01
- EXISTING DN1400 FRESH WATER MAIN
- PROPOSED DIVERTED DN1400 FRESH WATER MAIN

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	KWM	LCH	SZ	LCH
Date	02/21	02/21	02/21	02/21

Approved

Agreement no.

CE 92/2017 (CE)

Title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title

PRELIMINARY DIVERSION PLAN FOR FRESH WATER MAIN

Drawing No.

199086/BIN/WIA/601

Scale

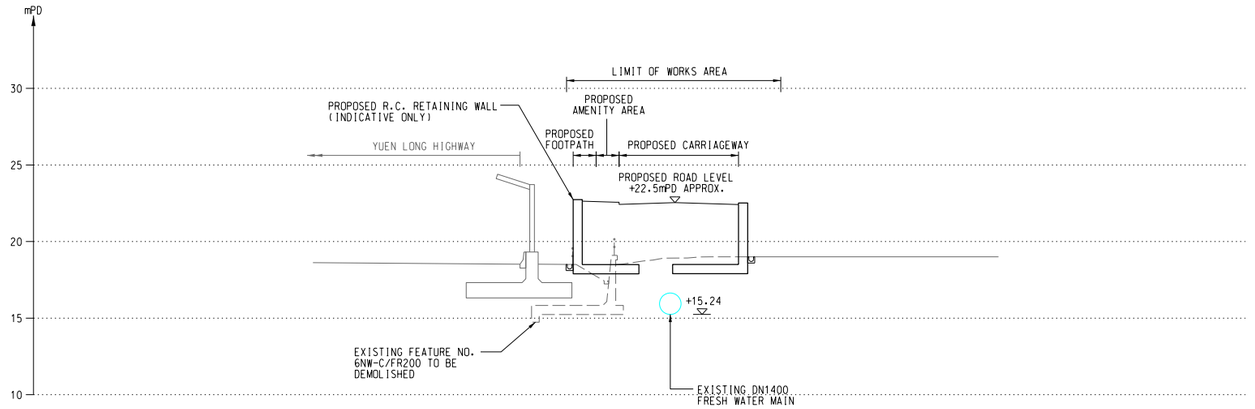
1 : 500 (A1)
1 : 1000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

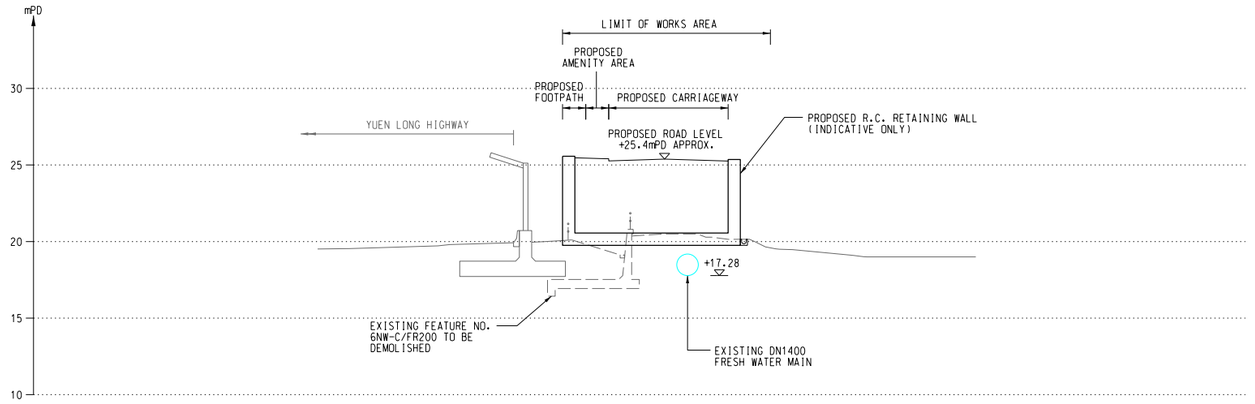
BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = Che15988 2022/10/25

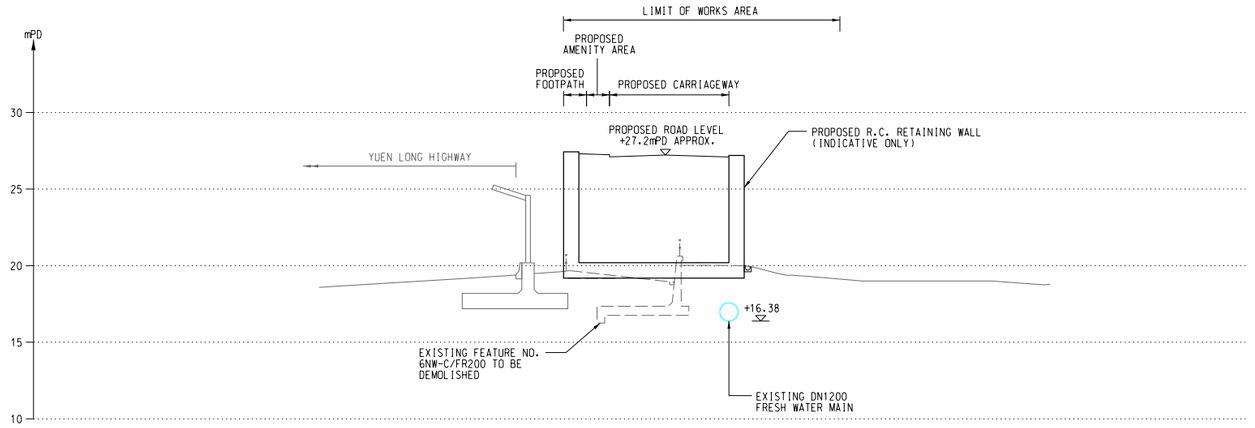
CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-601.dgn



SECTION D-D



SECTION E-E



SECTION F-F

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHER WISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (P.D.).
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS, SPECIFICATIONS AND INSTRUCTIONS ISSUED BY THE ENGINEER.

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	KWM	LCH	SZ	LCH
Date	11/21	11/21	11/21	11/21

Approved

Agreement no.
CE 92/2017 (CE)

Title
SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title
SITE FORMATION PLAN (SECTION D, E & F)

Drawing No.	Scale
199086/BIN/WIA/602	1 : 200 (A1) 1 : 400 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = Chet5988 2022/10/25

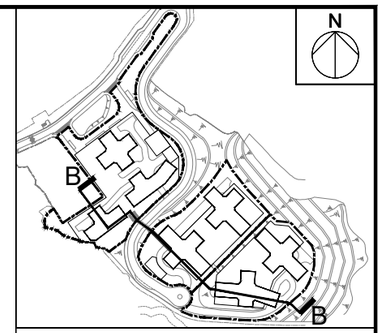
CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\199086-BIN-WIA-602.dgn

Appendix E

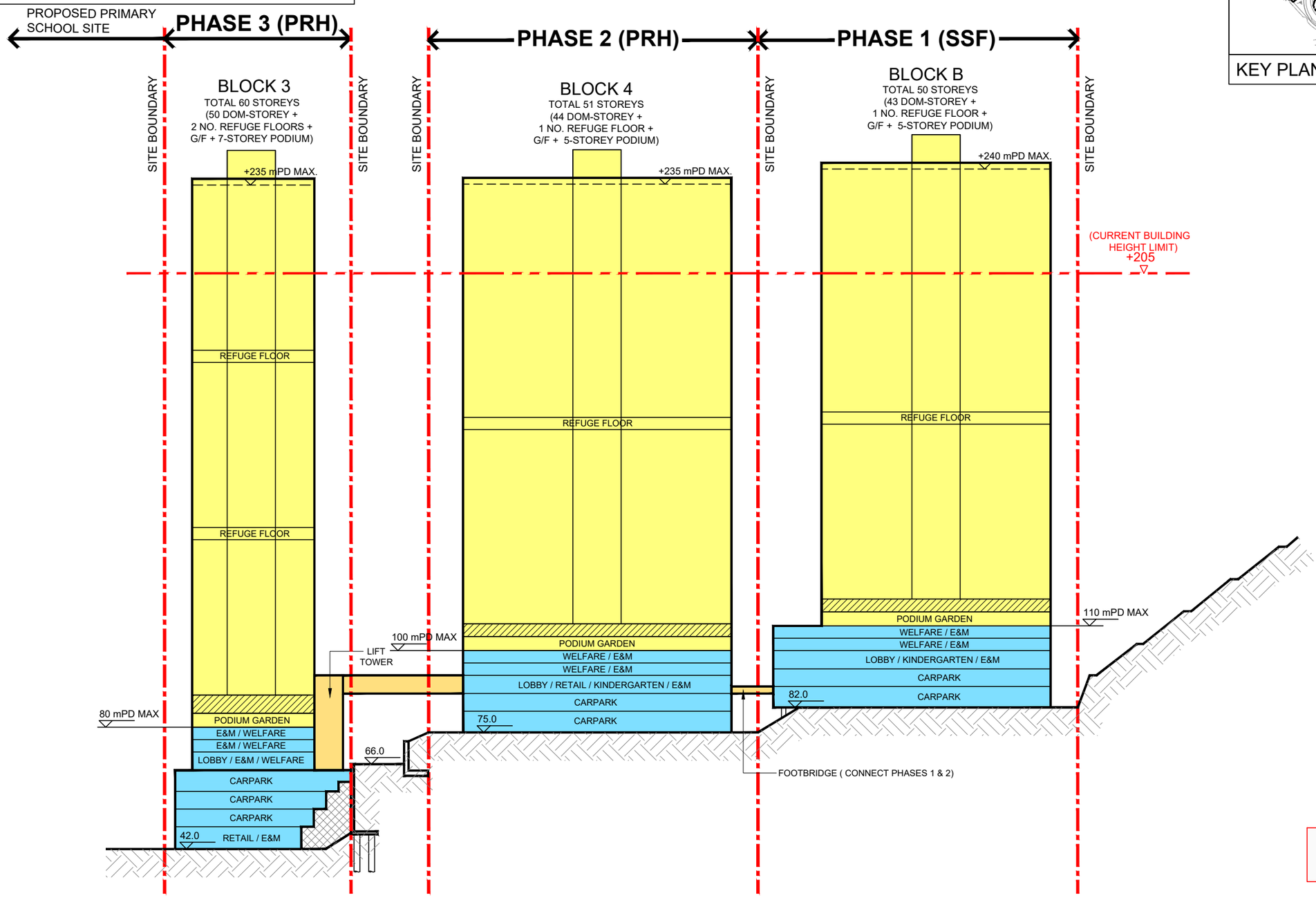
PRELIMINARY HOUSING SITE LAYOUT PLAN

LEGEND

- SITE BOUNDARY
- DOMESTIC BLOCK
- COMMERCIAL / RETAIL / CARPARK / SOCIAL WELFARE FACILITIES
- FOOTBRIDGE



KEY PLAN SCALE 1 : 8000



DRAFT

PROJECT TITLE

PUBLIC HOUSING DEVELOPMENT AT NEAR TAN KWAI TSUEN PHASES 1, 2 & 3

DRAWING TITLE

SITE SECTION B - B

SCALE 1:600 (A1) , 1:1200 (A3)

房 屋 署
HOUSING DEPARTMENT

DRAWING NO. YL52/S16/A/LO-03

DATE: 13/6/2022

N

丹桂村
TAN KWAI TSUEN

元朗公路
YUEN LONG HIGHWAY

丹桂村配水庫
TAN KWAI TSUEN
FRESH WATER SERVICE
RESERVOIR

PROPOSED BUS LAYBY

INGRESS OF PTI AND EVA FOR PODIUM

EGRESS OF PTI AND EVA FOR PODIUM

PROPOSED PRIMARY SCHOOL SITE

BLOCK 1
TOTAL 60 STOREYS
(50 DOM-STOREY +
2 NO. REFUGE FLOORS +
G/F + 7-STOREY PODIUM)

BLOCK 2
TOTAL 60 STOREYS
(50 DOM-STOREY +
2 NO. REFUGE FLOORS +
G/F + 7-STOREY PODIUM)

BLOCK 5
TOTAL 51 STOREYS
(44 DOM-STOREY +
1 NO. REFUGE FLOOR +
G/F + 5-STOREY PODIUM)

BLOCK A
TOTAL 50 STOREYS
(43 DOM-STOREY +
1 NO. REFUGE FLOOR +
G/F + 5-STOREY PODIUM)

BLOCK 3
TOTAL 60 STOREYS
(50 DOM-STOREY +
2 NO. REFUGE FLOORS +
G/F + 7-STOREY PODIUM)

BLOCK 4
TOTAL 51 STOREYS
(44 DOM-STOREY +
1 NO. REFUGE FLOOR +
G/F + 5-STOREY PODIUM)

BLOCK B
TOTAL 50 STOREYS
(43 DOM-STOREY +
1 NO. REFUGE FLOOR +
G/F + 5-STOREY PODIUM)

PROPOSED TAXI LAYBY

FOOTBRIDGE
(CONNECT PHASES 1 &2)

PHASE 3
BLOCK 1
BLOCK 2
BLOCK 3

PHASE 2
BLOCK 4
BLOCK 5

PHASE 1
BLOCK A
BLOCK B

LEGEND

- SITE BOUNDARY
- EVA / DRIVEWAY
- DOMESTIC BLOCK
- PODIUM (COMMERCIAL / RETAIL / CARPARK / MARKET / SOCIAL WELFARE FACILITIES / PTI UNDERNEATH)
- FOOTBRIDGE
- REFUSE COLLECTION POINT

DRAFT

PROJECT TITLE

PUBLIC HOUSING DEVELOPMENT AT NEAR TAN KWAI TSUEN PHASES 1, 2 & 3

DRAWING TITLE

PROPOSED SITE LAYOUT PLAN

SCALE 1:1000 (A1) , 1:2000 (A3)

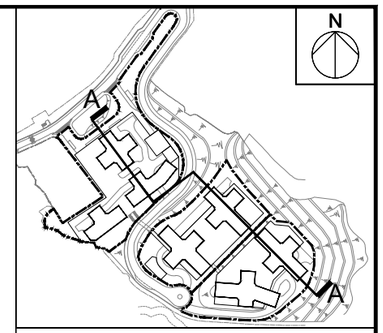
房 屋 署
HOUSING DEPARTMENT

DRAWING NO.
YL52/S16/A/LO-01

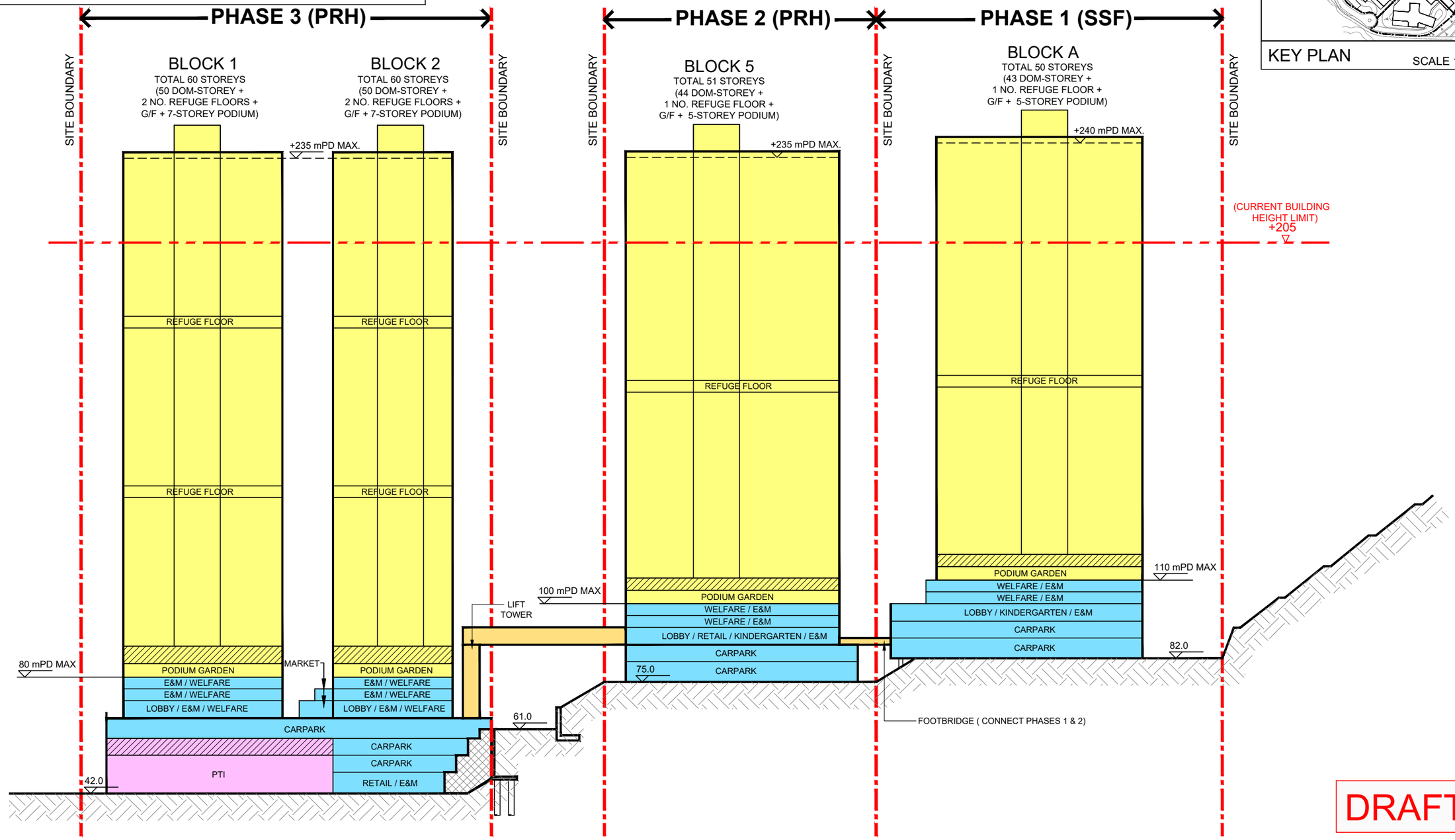
DATE:
13/6/2022

LEGEND

- SITE BOUNDARY
- DOMESTIC BLOCK
- COMMERCIAL / RETAIL / CARPARK / SOCIAL WELFARE FACILITIES
- PUBLIC TRANSPORT INTERCHANGE
- FOOTBRIDGE



KEY PLAN SCALE 1 : 8000



DRAFT

PROJECT TITLE

PUBLIC HOUSING DEVELOPMENT AT NEAR TAN KWAI TSUEN PHASES 1, 2 & 3

DRAWING TITLE

SITE SECTION A - A

SCALE 1:600 (A1) , 1:1200 (A3)

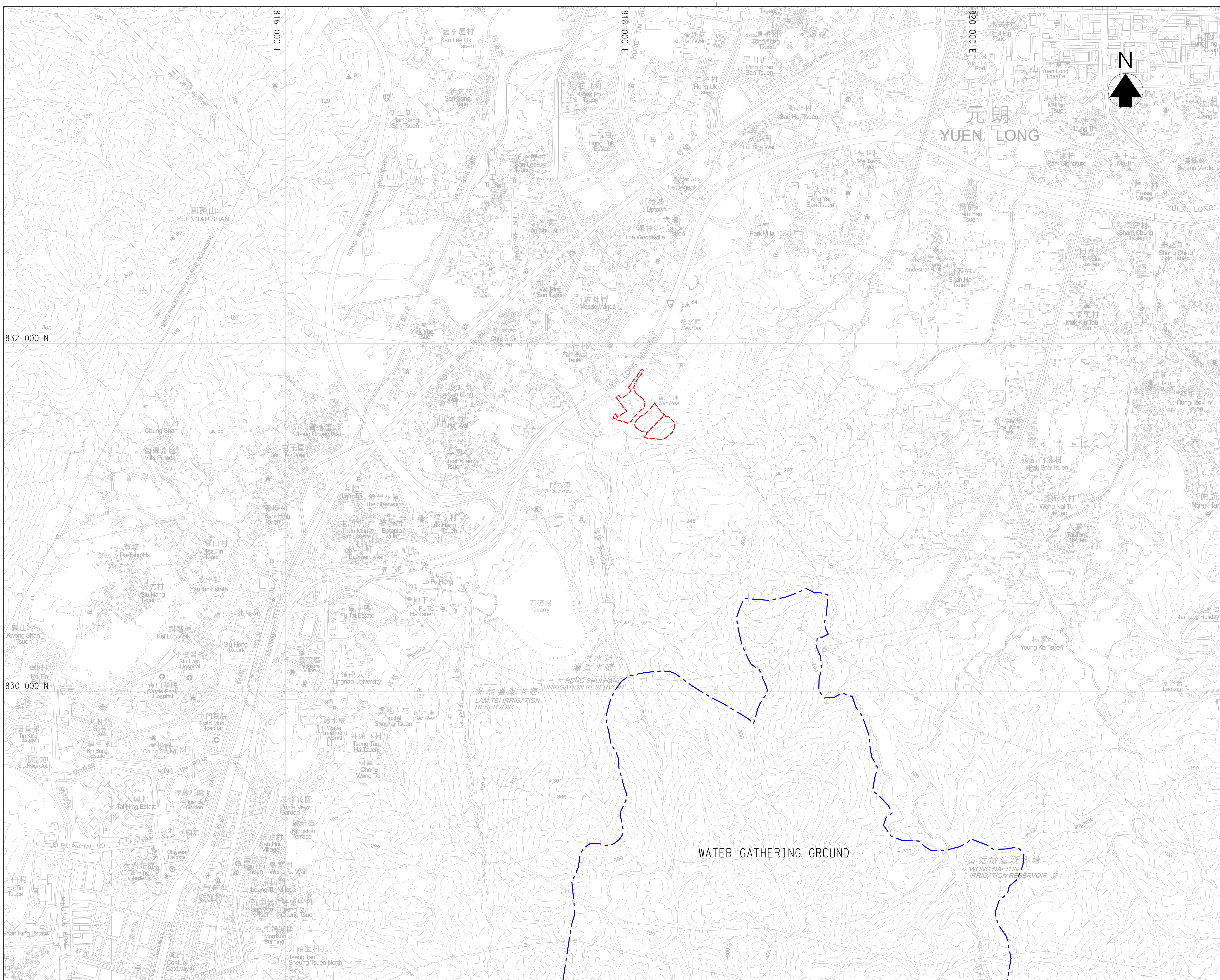
房 屋 署
HOUSING DEPARTMENT

DRAWING NO. YL52/S16/A/LO-02

DATE: 13/6/2022

Appendix F

WATER GATHERING GROUND



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LEGEND:

- POTENTIAL PUBLIC HOUSING SITE
- WATER GATHERING GROUND BOUNDARY

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	TCL	WLC	SZ	LCH
Date	04/22	04/22	04/22	04/22

Approved

Agreement no.

CE 92/2017 (CE)

Title

SITE FORMATION AND INFRASTRUCTURE WORKS FOR PUBLIC HOUSING DEVELOPMENT NEAR TAN KWAI TSUEN, YUEN LONG - INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing Title

WATER GATHERING GROUND BOUNDARY

Drawing No.

APPENDIX D

Scale

1 : 10000 (A1)
1 : 20000 (A3)

土木工程拓展署
CEDD Civil Engineering and Development Department

BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot File by = qiu15947 2022/11/15
CAD Filename = Y:\Daily Work\02 From other HK Projects\199086 -TKT_Design\dgn\APPENDIX D.dgn

Appendix G

Surge Analysis Report for Water Supply Systems

Calculation for System Curve of Fresh Water

Design Assumption

1 Used Code

1 Manual of Mainlaying Practice (2012 Edition)
2 Stomwater Drainage Manual (2018 Edition)

2 Design Assumption

FLUID PROPERTIES

	salinity	pressure (gauge)	density	kin visc	vapour pre	R	C	To	μo	To	Temp	μ, dyn visc
	(g/l)	(Pa)	(kg/m³)	(m2/s)	(m)	J/(kg.K)	(K)	(K)	(cP)	(oR)	(Kelvin)	(cP)
Water	0	n/a	997.05	0.00	0.33							
Air	n/a	101300	1.18	0.00	0.00	286.90	120.00	291.15	0.02	524.07	298.15	0.02

3 Used Equation

1 Flow Rate = Cross-section Area x Average Speed

2 $\text{Velocity} = \frac{Flow\ Rate}{Flow\ Area}$;

3 $\text{Velocity Head} = \frac{Velocity^2}{2\ x\ Gravity}$;

4 $\text{Reynolds Number} = \frac{Velocity\ x\ Gravity}{Kinem\ Viscosity}$;

5 $\text{Head } Loss = \frac{Head\ Loss\ Coefficient\ x\ Cross\text{-}sectional\ mean\ velocity^2}{2\ x\ Kinem\ Viscosity}$;

Project Component Set

Calculation no. **199086 - Tan Kwai Tsuen**

Rev. no. **A**

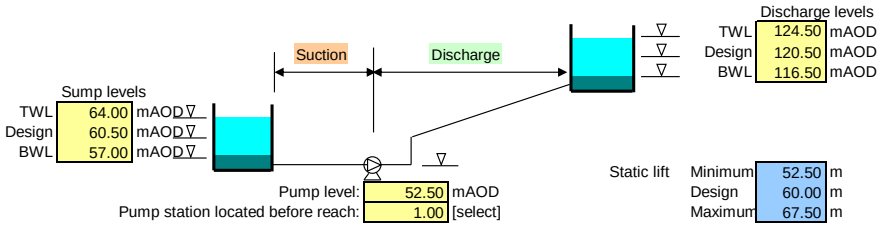
CALCULATION TITLE

0 GENERAL

Input data in	yellow boxes
Output results in	blue boxes

1 INPUT DATA

Gravity, g	9.81	m/s2
Atmos pressure	101.3	kPa
Fluid	Water	[select]
Temperature	25	°c
Kinem. viscosity	8.95E-07	m2/s
Density	997.0	kg/m³
Vap pressure	0.33	m



Reach:		1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
Description		FR1											
Length (m)		657.40											
Diameter (m)		0.60											
Flow area (m²)		0.28					0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roughness (mm)	Low	0.06											
	Design	0.30											
	High	1.50											
Proportion of station flow		1.00											

Global head loss factor: 5.00 % (added to friction and fittings losses throughout)

Fittings Losses:	k-value	Number of fittings:											
Inlet (sharp edged)	0.5												
Elbow 90° bend	1	2.00											
Elbow 45° bend	0.4	10.00											
Elbow 22.5° bend	0.2	15.00											
Elbow 11.25° bend	0.15	9.00											
Outlet	1	1.00											
None	0												
None	0												
Additional K (other devices)		1.00											
Total K		12.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

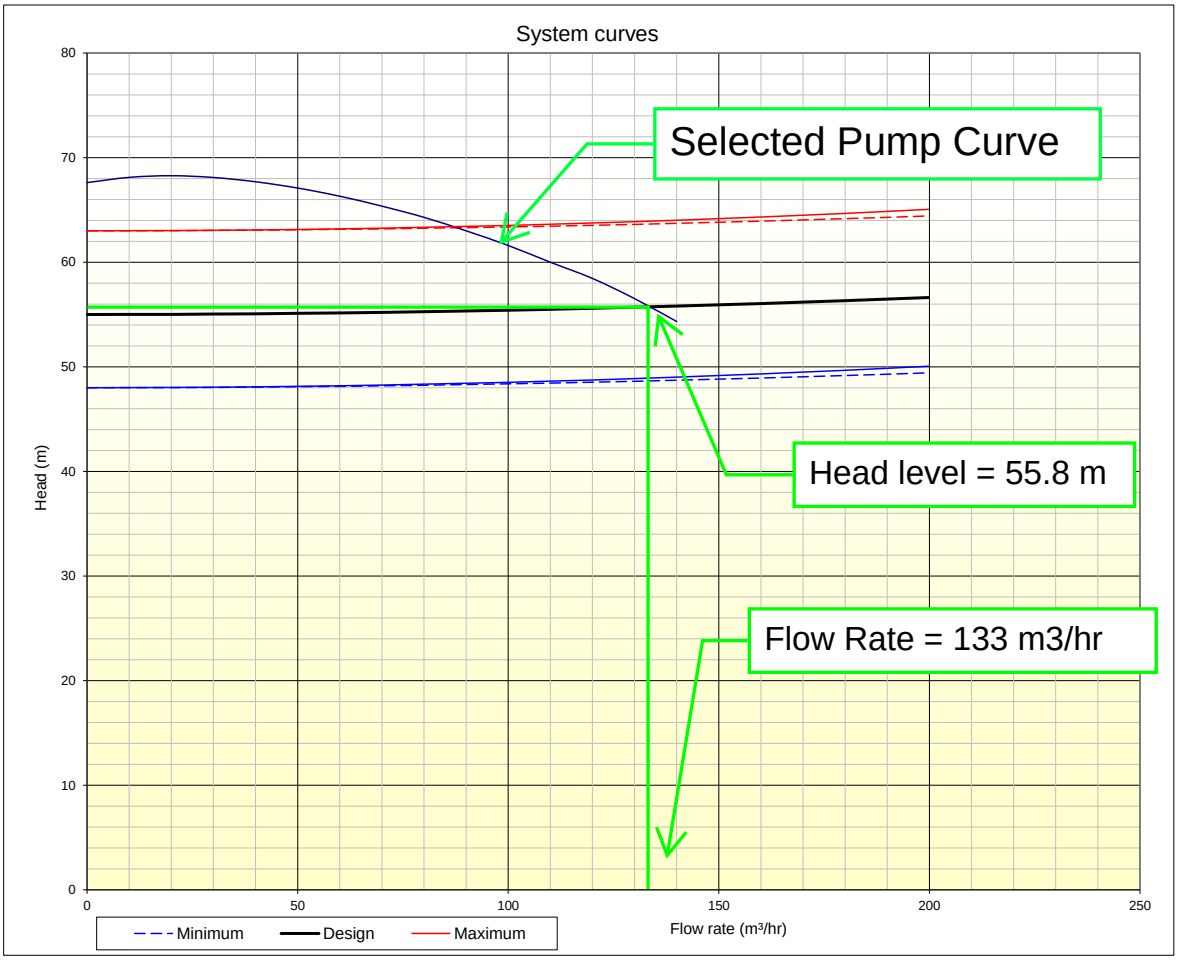
3 SYSTEM CURVES

Plot definition

Maximum flow rate: 200.00 m³/hr [select]

Pump curves

Curve No.	No. duty	RPM or %
1.00	1.00	100.00



BASE PUMP CURVE

RPM or % 100.00

	Q m³/hr	H m
1	0	67.61
2	10	68.11
3	20	68.27
4	30	68.10
5	40	67.69
6	50	67.09
7	60	66.31
8	70	65.36
9	80	64.29
10	90	63.00
11	100	61.60
12	110	60.00
13	120	58.45
14	130	56.52
15	140	54.33
16		
17		
18		
19		
20		

4 DATA LIBRARY

Fittings K Values

	Item	K
	None	0.00
Inlet / outlet	Inlet (sharp edged)	0.50
	Outlet	1.00
	Inlet (re-entrant)	0.80
	Inlet (slightly rounded)	0.25
	Inlet (bellmouth)	0.05
Bends	Elbow 90° bend	1.00
	Elbow 45° bend	0.40
	Elbow 22.5° bend	0.20
	Elbow 11.25° bend	0.15
	Short R 90° bend	0.75
	Short R 45° bend	0.30
	Short R 22.5° bend	0.15
	Short R 11.25° bend	0.10
	Long R 90° bend	0.40
	Long R 45° bend	0.20
	Long R 22.5° bend	0.10
	Long R 11.25° bend	0.05
	Sweep 90°	0.20
	Sweep 45°	0.10
	Sweep 22.5°	0.05
	Mitre bend 90°	1.20
	Mitre bend 45°	0.40
	Mitre bend 22.5°	0.20
	Mitre bend 11.25°	0.15
Transitions	Taper up (4:5)	0.03
	Taper up (3:4)	0.04
	Taper up (1:2)	0.12
	Expansion 4:5	0.15
	Expansion 3:4	0.20
	Expansion 2:3	0.35
	Expansion 1:2	0.60
	Expansion 1:3	0.80
	Expansion 1:5	1.00
	Contraction 5:4	0.15
	Contraction 4:3	0.20
	Contraction 3:2	0.30
	Contraction 2:1	0.35
	Contraction 3:1	0.45
	Contraction ≥5:1	0.50
T-junctions	T line to branch 90°	1.20
	T line to branch 45°	0.60
	T line to branch 30°	0.40
	T straight through	0.35
	T line to branch 90° Radiused	0.80
Valves	Gate valve	0.12
	Butterfly valve	0.30
	Globe valve	5.00
	Plug valve	0.25
	Swing check valve	1.00
	Flap valve	1.50
	Foot valve & strainer	2.50
User defined	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00
	Other	0.00

System Curve Calculation				
Gravity	9.81	m/s2		
Water visc	0.00			
Density	997.05	kg/m3		
U/s head	64.00	60.50	57.00	m
D/s head	116.50	120.50	124.50	m
Static lift	52.50	60.00	67.50	m

Section		1.00
Length	m	657.40
Diameter	m	0.45
Area	m2	0.16
k		12.35
Flow factor		1.00

MIN Ks		0.06			Total	Min	Max
Flow (m³/s)		Losses (m)			losses	head	head
		friction	fittings		(m)	(m)	(m)
0	0	0.00	0.00		0.000	48.000	63.000
0.003	10	0.00	0.00		0.005	48.005	63.005
0.006	20	0.00	0.00		0.018	48.018	63.018
0.008	30	0.00	0.00		0.038	48.038	63.038
0.011	40	0.01	0.00		0.065	48.065	63.065
0.014	50	0.01	0.00		0.099	48.099	63.099
0.017	60	0.02	0.01		0.141	48.141	63.141
0.019	70	0.02	0.01		0.189	48.189	63.189
0.022	80	0.03	0.01		0.244	48.244	63.244
0.025	90	0.04	0.02		0.306	48.306	63.306
0.028	100	0.04	0.02		0.374	48.374	63.374
0.031	110	0.05	0.02		0.449	48.449	63.449
0.033	120	0.06	0.03		0.531	48.531	63.531
0.036	130	0.07	0.03		0.620	48.620	63.620
0.039	140	0.08	0.04		0.715	48.715	63.715
0.042	150	0.09	0.04		0.818	48.818	63.818
0.044	160	0.10	0.05		0.926	48.926	63.926
0.047	170	0.11	0.06		1.042	49.042	64.042
0.050	180	0.13	0.06		1.164	49.164	64.164
0.053	190	0.14	0.07		1.293	49.293	64.293
0.056	199.8	0.15	0.08		1.425	49.425	64.425
MAX Ks		1.50			Total	Min	Max
Flow (m³/s)		Losses (m)			losses	head	head
		friction	fittings		(m)	(m)	(m)
0	0	0.00	0.00		0.000	48.000	63.000
0.003	10	0.00	0.00		0.006	48.006	63.006
0.006	20	0.00	0.00		0.022	48.022	63.022
0.008	30	0.01	0.00		0.048	48.048	63.048
0.011	40	0.01	0.00		0.084	48.084	63.084
0.014	50	0.02	0.00		0.131	48.131	63.131
0.017	60	0.02	0.01		0.188	48.188	63.188
0.019	70	0.03	0.01		0.255	48.255	63.255
0.022	80	0.04	0.01		0.333	48.333	63.333
0.025	90	0.05	0.02		0.420	48.420	63.420
0.028	100	0.06	0.02		0.518	48.518	63.518
0.031	110	0.08	0.02		0.626	48.626	63.626
0.033	120	0.09	0.03		0.745	48.745	63.745
0.036	130	0.11	0.03		0.873	48.873	63.873
0.039	140	0.12	0.04		1.012	49.012	64.012
0.042	150	0.14	0.04		1.161	49.161	64.161
0.044	160	0.16	0.05		1.320	49.320	64.320
0.047	170	0.18	0.06		1.490	49.490	64.490
0.050	180	0.20	0.06		1.669	49.669	64.669
0.053	190	0.23	0.07		1.859	49.859	64.859
0.056	199.8	0.25	0.08		2.055	50.055	65.055
DESIGN Ks		0.30			Total	Design	
Flow (m³/s)		Losses (m)			losses	head	
		friction	fittings		(m)	(m)	
0.000	0	0.00	0.00		0.000	55.000	
0.003	10	0.00	0.00		0.005	55.005	
0.006	20	0.00	0.00		0.019	55.019	
0.008	30	0.01	0.00		0.040	55.040	
0.011	40	0.01	0.00		0.070	55.070	
0.014	50	0.01	0.00		0.108	55.108	
0.017	60	0.02	0.01		0.153	55.153	
0.019	70	0.02	0.01		0.207	55.207	
0.022	80	0.03	0.01		0.268	55.268	
0.025	90	0.04	0.02		0.338	55.338	
0.028	100	0.05	0.02		0.415	55.415	
0.031	110	0.06	0.02		0.501	55.501	
0.033	120	0.07	0.03		0.594	55.594	
0.036	130	0.08	0.03		0.695	55.695	
0.039	140	0.09	0.04		0.804	55.804	
0.042	150	0.10	0.04		0.921	55.921	
0.044	160	0.12	0.05		1.046	56.046	
0.047	170	0.13	0.06		1.179	56.179	
0.050	180	0.15	0.06		1.320	56.320	
0.053	190	0.16	0.07		1.469	56.469	
0.056	199.8	0.18	0.08		1.622	56.622	

Calculation for System Curve of Flushing Water

Design Assumption

1 Used Code

1 Manual of Mainlaying Practice (2012 Edition)
2 Stomwater Drainage Manual (2018 Edition)

2 Design Assumption

FLUID PROPERTIES

	salinity	pressure (gauge)	density	kin visc	vapour pre	R	C	To	μo	To	Temp	μ, dyn visc
	(g/l)	(Pa)	(kg/m³)	(m2/s)	(m)	J/(kg.K)	(K)	(K)	(cP)	(oR)	(Kelvin)	(cP)
Water	0	n/a	997.05	0.00	0.33							
Air	n/a	101300	1.18	0.00	0.00	286.90	120.00	291.15	0.02	524.07	298.15	0.02

3 Used Equation

1 Flow Rate = Cross-section Area x Average Speed

2 $\text{Velocity} = \frac{Flow\ Rate}{Flow\ Area}$;

3 $\text{Velocity Head} = \frac{Velocity^2}{2\ x\ Gravity}$;

4 $\text{Reynolds Number} = \frac{Velocity\ x\ Gravity}{Kinem\ Viscosity}$;

5 $\text{Head } Loss = \frac{Head\ Loss\ Coefficient\ x\ Cross\text{-}sectional\ mean\ velocity^2}{2\ x\ Kinem\ Viscosity}$;

Project	Component	Set	Rev. no.
199086 - Tan Kwai Tsuen			A

Calculation no. *(Sheet no. given in header)*

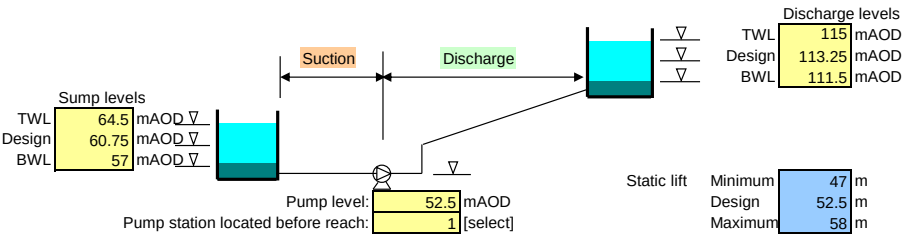
CALCULATION TITLE

0 GENERAL

Input data in	yellow boxes
Output results in	blue boxes

1 INPUT DATA

Gravity, g	9.81	m/s2
Atmos pressure	101.3	kPa
Fluid	Seawater	[select]
Temperature	25	°C
Kinem. viscosity	9.21E-07	m2/s
Density	1023.3	kg/m³
Vap pressure	0.33	m



Reach:		1	2	3	4	5	6	7	8	9	10	11	12
Description		FL1											
Length (m)		559.2											
Diameter (m)		0.2											
Flow area (m²)		0.03142					0	0	0	0	0	0	0
Roughness (mm)	Low	0.06											
	Design	0.3											
	High	1.5											
Proportion of station flow		1											

Global head loss factor: 5 % (added to friction and fittings losses throughout)

Fittings Losses:	k-value	Number of fittings:											
Inlet (sharp edged)	0.5												
Elbow 90° bend	1	2											
Elbow 45° bend	0.4	10											
Elbow 22.5° bend	0.2	12											
Elbow 11.25° bend	0.15	7											
Outlet	1	1											
None	0												
None	0												
Additional K (other devices)		1											
Total K		11.45	0	0	0	0	0	0	0	0	0	0	0

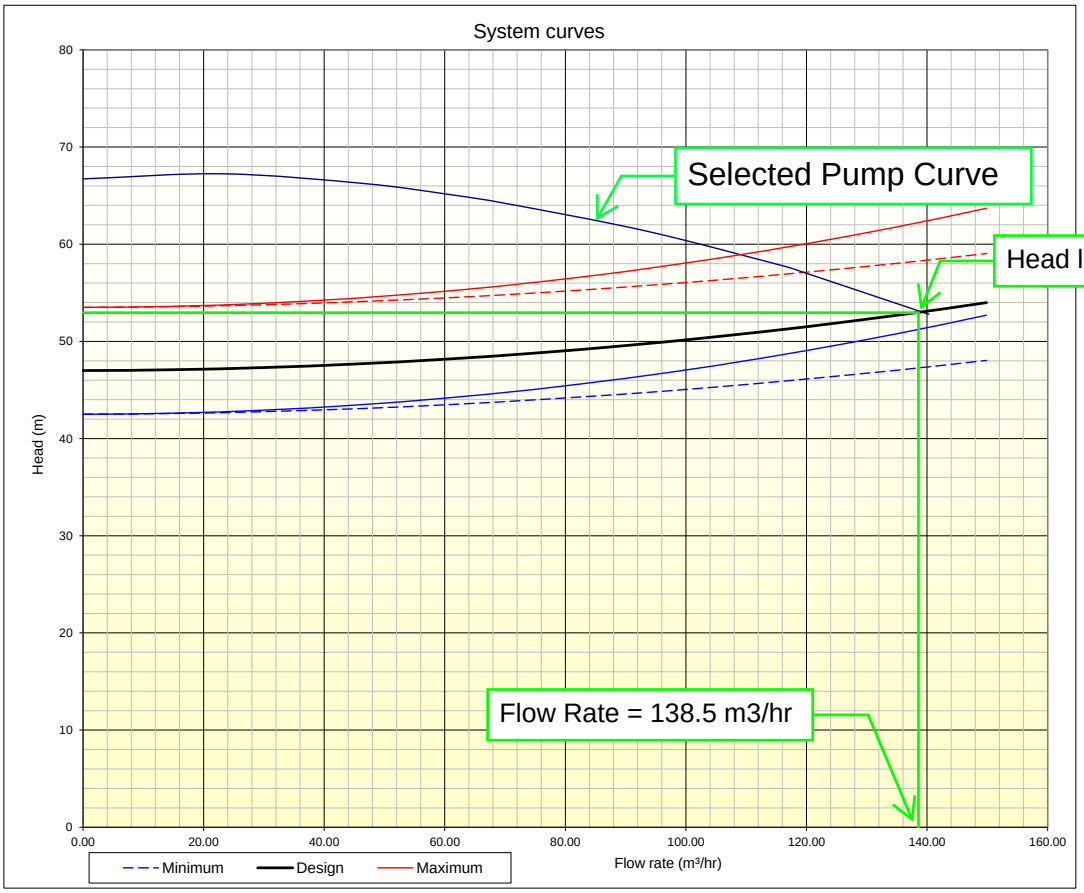
3 SYSTEM CURVES

Plot definition

Maximum flow rate: 150 m³/hr [select]

Pump curves

Curve No.	No. duty	RPM or %
1	1	100



BASE PUMP CURVE (Data from proposed pump's cal

RPM or % 100

	Q m³/hr	H m
1	0	66.719
2	23.382502	67.2428
3	46.765005	66.2339
4	61.022837	65.0896
5	70.147507	64.189
6	93.530009	61.3385
7	116.91251	57.6422
8	117.0556	57.6165
9	140.29501	52.786
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

4 DATA LIBRARY

Fittings K Values

	Item	K
	None	0
Inlet / outlet	Inlet (sharp edged)	0.5
	Outlet	1
	Inlet (re-entrant)	0.8
	Inlet (slightly rounded)	0.25
	Inlet (bellmouth)	0.05
Bends	Elbow 90° bend	1
	Elbow 45° bend	0.4
	Elbow 22.5° bend	0.2
	Elbow 11.25° bend	0.15
	Short R 90° bend	0.75
	Short R 45° bend	0.3
	Short R 22.5° bend	0.15
	Short R 11.25° bend	0.1
	Long R 90° bend	0.4
	Long R 45° bend	0.2
	Long R 22.5° bend	0.1
	Long R 11.25° bend	0.05
	Sweep 90°	0.2
	Sweep 45°	0.1
	Sweep 22.5°	0.05
	Mitre bend 90°	1.2
	Mitre bend 45°	0.4
	Mitre bend 22.5°	0.2
	Mitre bend 11.25°	0.15
Transitions	Taper up (4:5)	0.03
	Taper up (3:4)	0.04
	Taper up (1:2)	0.12
	Expansion 4:5	0.15
	Expansion 3:4	0.2
	Expansion 2:3	0.35
	Expansion 1:2	0.6
	Expansion 1:3	0.8
	Expansion 1:5	1
	Contraction 5:4	0.15
	Contraction 4:3	0.2
	Contraction 3:2	0.3
	Contraction 2:1	0.35
	Contraction 3:1	0.45
	Contraction ≥5:1	0.5
T-junctions	T line to branch 90°	1.2
	T line to branch 45°	0.6
	T line to branch 30°	0.4
	T straight through	0.35
	T line to branch 90° Radiused	0.8
Valves	Gate valve	0.12
	Butterfly valve	0.3
	Globe valve	5
	Plug valve	0.245
	Swing check valve	1
	Flap valve	1.5
	Foot valve & strainer	2.5
User defined	Other	0
	Other	0
	Other	0
	Other	0
	Other	0
	Other	0
	Other	0
	Other	0
	Other	0

System Curve Calculation				
Gravity		9.81	m/s2	
Water visc		9.21E-07		
Density		1023.34	kg/m3	
U/s head		64.5	60.75	57 m
D/s head		111.5	113.25	115 m
Static lift		47	52.5	58 m

Max flow		0.04167	m3/s
Section		1	
Length	m	559.2	
Diameter	m	0.2	
Area	m2	0.03142	
k		11.45	
Flow factor		1	

MIN Ks			0.06		Total	Min	Max
Flow (m³/s)			Losses (m)		losses	head	head
			friction	fittings	(m)	(m)	(m)
	0.00	0.00	0.00	0.00	0.00	42.50	53.50
	0.00	7.50	0.02	0.00	0.02	42.52	53.52
	0.00	15.00	0.06	0.01	0.07	42.57	53.57
	0.01	22.50	0.13	0.02	0.16	42.66	53.66
	0.01	30.00	0.21	0.04	0.27	42.77	53.77
	0.01	37.50	0.32	0.06	0.40	42.90	53.90
	0.01	45.00	0.45	0.09	0.57	43.07	54.07
	0.01	52.50	0.59	0.13	0.76	43.26	54.26
	0.02	60.00	0.76	0.16	0.97	43.47	54.47
	0.02	67.50	0.95	0.21	1.21	43.71	54.71
	0.02	75.00	1.15	0.26	1.48	43.98	54.98
	0.02	82.50	1.38	0.31	1.77	44.27	55.27
	0.03	90.00	1.62	0.37	2.09	44.59	55.59
	0.03	97.50	1.88	0.43	2.43	44.93	55.93
	0.03	105.00	2.17	0.50	2.80	45.30	56.30
	0.03	112.50	2.47	0.58	3.20	45.70	56.70
	0.03	120.00	2.79	0.66	3.62	46.12	57.12
	0.04	127.50	3.13	0.74	4.06	46.56	57.56
	0.04	135.00	3.49	0.83	4.53	47.03	58.03
	0.04	142.50	3.87	0.93	5.03	47.53	58.53
	0.04	149.85	4.25	1.02	5.54	48.04	59.04
MAX Ks			1.50		Total	Min	Max
Flow (m³/s)			Losses (m)		losses	head	head
			friction	fittings	(m)	(m)	(m)
	0.00	0.00	0.00	0.00	0.00	42.50	53.50
	0.00	7.50	0.02	0.00	0.03	42.53	53.53
	0.00	15.00	0.09	0.01	0.11	42.61	53.61
	0.01	22.50	0.20	0.02	0.24	42.74	53.74
	0.01	30.00	0.36	0.04	0.42	42.92	53.92
	0.01	37.50	0.56	0.06	0.65	43.15	54.15
	0.01	45.00	0.80	0.09	0.93	43.43	54.43
	0.01	52.50	1.08	0.13	1.27	43.77	54.77
	0.02	60.00	1.41	0.16	1.65	44.15	55.15
	0.02	67.50	1.78	0.21	2.09	44.59	55.59
	0.02	75.00	2.19	0.26	2.57	45.07	56.07
	0.02	82.50	2.65	0.31	3.11	45.61	56.61
	0.03	90.00	3.15	0.37	3.70	46.20	57.20
	0.03	97.50	3.69	0.43	4.33	46.83	57.83
	0.03	105.00	4.28	0.50	5.02	47.52	58.52
	0.03	112.50	4.91	0.58	5.76	48.26	59.26
	0.03	120.00	5.58	0.66	6.55	49.05	60.05
	0.04	127.50	6.30	0.74	7.39	49.89	60.89
	0.04	135.00	7.06	0.83	8.28	50.78	61.78
	0.04	142.50	7.86	0.93	9.22	51.72	62.72
	0.04	149.85	8.69	1.02	10.20	52.70	63.70
DESIGN Ks			0.30		Total	Design	
Flow (m³/s)			Losses (m)		losses	head	
			friction	fittings	(m)	(m)	
	0.00	0.00	0.00	0.00	0.00	47.00	
	0.00	7.50	0.02	0.00	0.02	47.02	
	0.00	15.00	0.07	0.01	0.08	47.08	
	0.01	22.50	0.14	0.02	0.18	47.18	
	0.01	30.00	0.25	0.04	0.31	47.31	
	0.01	37.50	0.38	0.06	0.47	47.47	
	0.01	45.00	0.54	0.09	0.67	47.67	
	0.01	52.50	0.73	0.13	0.90	47.90	
	0.02	60.00	0.94	0.16	1.16	48.16	
	0.02	67.50	1.18	0.21	1.46	48.46	
	0.02	75.00	1.45	0.26	1.79	48.79	
	0.02	82.50	1.75	0.31	2.16	49.16	
	0.03	90.00	2.07	0.37	2.56	49.56	
	0.03	97.50	2.42	0.43	3.00	50.00	
	0.03	105.00	2.80	0.50	3.47	50.47	
	0.03	112.50	3.21	0.58	3.97	50.97	
	0.03	120.00	3.64	0.66	4.51	51.51	
	0.04	127.50	4.10	0.74	5.08	52.08	
	0.04	135.00	4.59	0.83	5.69	52.69	
	0.04	142.50	5.10	0.93	6.33	53.33	
	0.04	149.85	5.63	1.02	6.99	53.99	